3.16 **Visual**

3.16.1 Affected Environment

This section identifies existing scenic resources within the project area. It takes into account existing views of the Sterling Highway as well as views from the highway toward the surrounding environment. This section is based on and summarizes the *Visual Analysis* (HDR and USKH 2012) completed for the project.

The glacially carved Kenai River valley frames the visual environment of the project area. Steep mountains and the unique turquoise color of Kenai Lake and the Kenai River are the predominant features seen from the project area. Canyons formed by Juneau Creek and Cooper Creek, tributaries of the Kenai River, notch the north and south sides of the main valley. The Sterling Highway is recognized as a State Scenic Byway from MP 37 to 75 because of its scenery, history, and recreational opportunities. Designated Wilderness within KNWR on both sides of the Kenai River in the western end of the project area also heightens expectations for natural views. See Section 3.2.1.1 for a description of Wilderness management intent to preserve areas where the "imprint of man's work is substantially unnoticeable" (Wilderness Act).

The existing Sterling Highway runs through boreal and riparian forest, interspersed with longer views in areas where the trees have been cleared or where the road follows the banks of the Kenai River. Bridge crossings of the Kenai River afford views of both the river and the surrounding valley. Foreground views from the Kenai Lake outlet and the Kenai River are of riparian forest and human development; mountain uplands and peaks can be seen in the background. The view of Cooper Landing, as seen from the Sterling Highway, Kenai Lake, and the Kenai River, is mainly of single-story small framed and sometimes log commercial buildings and other wood-frame facilities, such as docks and boardwalks.

Figure 3.16-1 and Figure 3.16-2 provide examples of existing views in the project area.

Figure 3.16-1. View from Quartz Creek Road/Sterling Highway intersection at Kenai Lake, looking west (Key View 1), an example of views in lower elevations of the project area.

Figure 3.16-2. View from Juneau Creek Falls informal overlook (near Resurrection Pass Trail) looking down Juneau Creek (Key View 12a), an example of views in higher elevations in the project area.

3.16.1.1 Visual Assessment Methodology

The visual analysis was conducted using the Visual Resource Analysis method developed by the Federal Highway Administration (FHWA) in conjunction with the American Society of Landscape Architects (FHWA 1981, HI-88-054). The analysis considers the qualities of the existing visual resources, anticipated changes to those qualities, and the number and sensitivities of viewer groups exposed to changes. The main viewer groups identified include area residents, recreationalists, and motorists.

Existing visual resources were evaluated using a multistep approach. First, the project area was divided into distinct "Landscape Units," defined as areas that have distinct and cohesive visual qualities based on considerations of landform, water, vegetation, and the built environment. Eight distinct Landscape Units were identified in the project area. These are depicted on Map 3.16-1.

Following identification, landscape architects assessed the existing visual characteristics of each distinct Landscape Unit. The assessment was based on the following standardized criteria:

- **Visual Quality**: a qualitative appraisal of the relative value of visual resources based on vividness, intactness, and unity. Quality addresses concepts such as a "sense of enclosure" or openness, changing views, complexity or uniformity of the view, and commonness of the view in the region.
- **Visual Concern**: a measure of how an area is used and the visual sensitivity of the user.
- **Visual Exposure**: a categorization based on viewing distance (e.g., foreground, middleground, or background) and time (e.g., long-duration views, such as from a home, or short-duration views, such as seen from a passing vehicle).
- **Visual Sensitivity**: a summation of the quality, concern, and exposure evaluated for each viewer group.

Table 3.16-1 summarizes the existing visual characteristics of the eight identified Landscape Units.

Following identification of Landscape Units, landscape architects identified "Key Views" representative of each Landscape Unit. Key Views were selected to provide representative "scenes" within each Landscape Unit and views that help specifically pinpoint and analyze potential impacts within a geographically large area. These include important view areas for specific viewer groups (e.g., views seen by rafters on the Kenai River). Key Views include Cooper Landing settlement and community activity areas, recreational use areas, and scenic locations where views are available (e.g., Juneau Falls, Kenai Lake, Kenai River, and the Kenai Princess Lodge deck). In total, 16 Key Views were identified. Map 3.16-1 depicts the location and direction of each Key View.

Table 3.16-1. Visual assessment of Landscape Units

Landscape Unit	General Visual Characteristics				Representative Key Views Visual Quality Evaluation Rating
	Visual Quality	Visual Concern	Visual Exposure	Visual Sensitivity	
(1) Kenai Lake	Moderate to High	High	All distances Period varies	Motorists - Low to Moderate Kenai Lake viewers - high	**1** - High **2** - High
(2) Kenai Lake/River Junction	Moderate	Low to Moderate	Foreground Period varies	Moderate	**3** - Moderate/High
(3) Juneau Mountain	High	High	Middleground Intermittent	High	**4** - Moderate **7A** - Moderate **8** - Moderate
(4) Kenai River East	High	High	Foreground Continuous	High	**6** - High
(5) Cooper Creek	Moderate to High	High	Foreground to Middleground Period varies	High	**5** - Moderate **7B** - High **9** - Moderate/high
(6) Juneau Creek Valley	High	High	All distances Periods vary Largely unseen	High	**10** - High **12A, 12B** - High **13 -** Moderate/High
(7) Kenai River West	Moderate to high	High	Foreground Period varies	High	**11 -** Moderate/High **16** - Moderate
(8) West Kenai River Uplands	Moderate to High	Low to Moderate	Foreground Largely unseen	Moderate to High	**14** - Moderate **15** - Moderate

Ratings range: low, moderate/low, moderate, moderate/high, high.

Landscape architects similarly examined the Key Views and assessed existing visual quality based on standardized FHWA criteria (FHWA 1981). These include:

- **Vividness**: "The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive pattern."
- **Intactness:** "The integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment."
- **Unity:** "The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern; …refers to the compositional harmony or inter-compatibility between landscape elements."

Aspects of each criterion were scored on a scale of 1 (very low) to 7 (very high). The scores for all three criteria were then averaged to give a numeric score (range of 1–7) which translates to an overall existing Visual Quality Evaluation (VQE) rating (e.g., 1–2 = Low; 3–4 = Moderate; 5 = Moderate/High; 6–7 = High). Details about the assessment methodology and application of the

methodology to this project can be found in the FHWA *Visual Impact Assessment for Highway Projects* guide (1981, HI-88-054) and the *Visual Analysis* (HDR and USKH 2012), respectively. Table 3.16-2 summarizes the existing VQE ratings of the Key Views.

Table 3.16-2. Key Views – Visual Quality Evaluation (VQE) ratings

Key View	Key View Location	Criteria			VQE Rating
		Vividness	Intactness	Unity	
1	Kenai Lake	High	Moderate	High	High
2	Snug Harbor Road	High	High	High	High
3	Kenai River/Lake Junction	High	Moderate	Moderate	Moderate/High
4	Cooper Landing	Moderate	Low	Moderate	Moderate
5	Cooper Landing Community Center	Moderate	Low	Moderate	Moderate
6	Kenai River East	Moderate	High	High	High
7A	Juneau Mountain	Moderate	Low	Moderate	Moderate
7B	Kenai Princess South	High	Moderate	High	High
8	Bean Creek Road	Moderate	Low	Moderate	Moderate
9	Cooper Lake Dam Road	Moderate	High	High	Moderate/High
10	Juneau Creek Valley	High	High	High	High
11	Round Mountain	High	Moderate	High	Moderate/High
12A	Juneau Creek Falls Lookout	High	High	High	High
12B	Resurrection Trail Bridge Crossing	High	High	High	High
13	Resurrection Trail	Moderate	High	High	Moderate/High
14	Russian River Ferry	Moderate	Moderate	Moderate	Moderate
15	River View	High	Moderate	Moderate	Moderate
16	Russian River Ferry/ Kenai River Sanctuary	Moderate/High	Moderate	Moderate	Moderate

Note: VQE = Visual Quality Evaluation

In general, the visual resources in the project area have moderate to high ratings throughout. For more information on the existing visual resource assessment methodology, see the *Visual Analysis* (HDR and USKH 2012).

3.16.2 Environmental Consequences

This section describes the impacts of the alternatives on the visual environment. A visual impact is measured as the degree of change in visual resources and viewer responses to those changes. Visual impact analysis was conducted using complementary methodologies, selected because of their accepted use in measuring the visual impact of highway development and operations.

Primary impact analysis was based on the Visual Resource Analysis method, an evaluation of how each alternative would change the existing characteristics and qualities of the Landscape Units and Key Views described above (see Section 3.16.1). The analysis also considered viewer groups, their sensitivity toward various levels of change in the visual environment, and the effects each alternative would have on the viewer response at the Key Views. Table 3.16-3 summarizes the changes to the existing VQE at each Key View under each alternative. The overall impact of each alternative is expressed as the total change in the VQE rating of all Key Views with a larger score indicative of a larger impact to visual resources. Landscape Unit and Key View locations are shown on Map 3.16-1.

Potential impacts were also assessed using a Visual Prioritization Process (VPP) developed by FHWA and the U.S. Forest Service (Mason 1993, FHWA 1994). The VPP was used to quantitatively score the magnitude and potential visibility of each alternative based on visual impacts associated with roadway construction elements in the landscape. Roadway elements evaluated include cuts, fills, and bridges, including consideration for light and glare effects. Scores for individual roadway elements were based on nine criteria, including the distance at which the element can be seen, the magnitude or size of the element; the aspect, horizontal, and vertical angles of view; the duration of visibility at different distances; and silhouette effects. Scores for all individual roadway elements in each alternative were totaled to give an overall VPP score for that alternative (see Table 3.16-4). A higher VPP score indicates a larger visual resource impact.

Additional detail on the methodologies used to evaluate visual impacts can be found in the *Visual Analysis* (HDR and USKH 2012).

3.16.2.1 No Build Alternative

Direct and Indirect Impacts

The No Build Alternative would result in continued use of the existing highway at its current alignment, and includes future highway maintenance actions, such as ongoing highway surface maintenance and preservation treatments and the replacement of the Cooper Landing, Schooner Bend, and Cooper Creek bridges in accordance with the Alaska Department of Transportation and Public Facilities' highway maintenance schedules. These impacts are addressed in Section 3.27, Cumulative Impacts. For all viewer groups, the ability to enjoy and view scenery along the existing roadway would be compromised on an increasing basis by growth in traffic volume. However, the overall landscape would be maintained in existing conditions. As a result, no change to the visual environment is expected under the No Build Alternative.

3.16.2.2 Issues Applicable to the Build Alternatives

Under all build alternatives, impacts to visual resources would occur as a result of changes to the Sterling Highway alignment and the construction of new roadway elements such as cuts, fills, and bridges. The degree to which each build alternative would impact visual qualities at Key Views and Landscape Units varies based on the location of each alternative's new alignment and the visibility of the alignment for different viewer groups. The amount of permanent vegetation loss associated with each alternative would affect the visibility of the alignment for the viewer groups at the Key Views. The VQE rating was assessed for each Key View for each alternative and is summarized in Table 3.16-3. A numeric value was used to assess the general magnitude of each change in VQE rating, and is shown as an overall total at the end of the table.

Table 3.16-3. Key View VQE rating by build alternative

Key View	Key View Location	Existing VQE Rating	VQE Rating by Alternative			
			Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
1	Kenai Lake	H	H	H	H	H
2	Snug Harbor Road	H	-	H/M [.5]	H/M [.5]	H/M [.5]
3	Kenai River/Lake Junction	H/M	H/M	H/M	H/M	H/M
4	Cooper Landing	M	-	M	M	M
5	Cooper Landing Community Center	M	M	-	-	-
6	Kenai River East	H	-	-	-	-
7A	Juneau Mountain	M	-	M/L [.5]	M/L [.5]	M/L [.5]
7B	Kenai Princess South	H	M [1]	-	-	-
8	Bean Creek Road	M	-	M	M	M
9	Cooper Lake Dam Road	H/M	L [1.5]	-	-	-
10	Juneau Creek Valley	H	-	H	-	-
11	Round Mountain	H/M	-	M [.5]	-	-
12A	Juneau Creek Falls Lookout	H	-	-	M/L [1.5]	M/L [1.5]
12B	Resurrection Trail Bridge Crossing	H	-	-	M/L [1.5]	M/L [1.5]
13	Resurrection Trail	H/M	-	-	M/L [1]	M/L [1]
14	Russian River Ferry	M	-	-	-	L [1]
15	River View	M	-	-	M	-
16	Russian River Ferry/ Kenai River Sanctuary	M	-	-	-	L [1]
	Total Change in Key View VQE		2.5	1.5	5	7

Note: VQE = Visual Quality Evaluation. Scoring Key: [#] indicates the change in VQE Score. H = High [3], H/M = High/Moderate [2.5], M = Moderate [2], M/L = Moderate/Low [1.5], L = Low [1], (-) = Not Affected or Not Seen. VQE scores reflect qualitative changes to key views using the criteria of vividness, intactness, and unity. In general a lower VQE score (i.e., less qualitative change) is more desirable than a higher VQE score.

VPP scores for the build alternatives range from the 400s to the 500s, indicating that all build alternatives have at least moderate impacts as a result of new or updated roadway elements. The range of VPP scores also indicates that none of the build alternatives would result in impacts that are orders of magnitude different than the others.

VPP impact scores are summarized in Table 3.16-4.

Table 3.16-4. VPP score by alternative

Build Alternative	VPP Score
Cooper Creek	583
G South	508
Juneau Creek	460
Juneau Creek Variant	465

Note: VPP = View Prioritization Process

In addition to changes in visual qualities at Key Views, visual impacts would occur under all build alternatives as a result of project lighting at major intersections. Lighting at each major intersection would likely consist of approximately six poles, 20–30 feet high. One pole would light each approach to the intersection, particularly where there are left turn pockets, and two poles would be located at the intersection.

Intersection lighting could change the nighttime ambient light and views, particularly for areas farther from the alignment where additional light intrusion may be visible and could affect rural recreational nighttime views. In general, light reflecting off snow and low clouds would be more visible in the Kenai River Valley than it is today. For designated Wilderness areas, where managers strive to maintain a setting untrammeled by human development, the illumination would decrease the naturally dark night sky (except during June and July) and likely would diminish the wilderness experience.

Similarly, views from elevations above treeline in the Mystery Creek and Andrew Simons Wilderness units would be altered, as the highway under any alternative would create a wider engineered cut through the forest and larger cuts into hillsides, and the paved surface would be wider. Views from these vantage points include the existing highway and other development and are not seen by many people, but the construction of any build alternative would incrementally diminish the sense of wilderness and isolation and would be permanent.

The project corridor lies within the Sterling Highway Scenic Byway; however, none of the proposed build alternatives would result in a change to this designation. The Alaska Scenic Byways program, administered by the DOT&PF, recognizes and celebrates beautiful landscapes in the state, as well as routes that provide access to scenic, cultural, and recreational resources. Both the Alaska and National Scenic Byways programs support the development and management of scenic byways to serve the communities through which they pass. There are no State restrictions that apply to scenic byways, and the only Federal requirement of nationally designated byways is that new billboard construction is prohibited along nationally designated scenic byways that are Interstate, National Highway System, or Federal-aid primary highways. This is not an issue in Alaska because billboards were banned in 1998. All alternatives would be expected to provide motorists with outstanding scenic driving experiences.

Construction Impacts

Visual impacts would occur during construction for all build alternatives, affecting residents of and visitors to Cooper Landing and surrounding recreation sites. Affected viewer groups include people floating the Kenai River or fishing in the area and drivers passing through on the

highway. Impacts under all build alternatives would include fresh cuts in the earth and placement of fresh fill and rock. This includes placement of rock riprap armoring along the river edge that would be visible to river users. Fresh earth cuts and fills are predicted to have the largest visual impact during and immediately following construction due to vegetation removal. The overall impact of these roadway elements is likely to lessen as vegetation regrows.

Visual impacts during construction would also include movement of construction equipment. Similarly, bridge construction under all alternatives would involve the use of large cranes that would be onsite for many months for pile driving and girder placement. This equipment would be visible at a distance and would result in temporary visual impacts.

Mitigation

No specific mitigation for visual impacts is proposed. However, as part of the standard design, all cuts and fills would be constructed with care, and bare soils would be seeded for quick greening of the landscape. Large new bridges under all alternatives would be designed with aesthetics in mind as seen from recreationists passing near or under the bridge on trails or in boats.

The following sections describe the alternative-specific impacts on visual quality.

3.16.2.3 Cooper Creek Alternative

Direct and Indirect Impacts

The Cooper Creek Alternative has a VPP impact score of 583 points, the highest of the four build alternatives. This alternative deviates the least from the existing Sterling Highway corridor (it has only about 4 miles of new alignment) but has cuts and fills on a visible slope located just above eye level for viewers on the north side of the Kenai River, a heavily used and sensitive view location. These new roadway elements largely account for the higher VPP score.

The Cooper Creek Alternative would have visual quality impacts to the Cooper Creek Landscape Unit (Unit 5) and two associated Key Views. Key viewer groups in the Cooper Creek Landscape Unit include trail users, residents of Cooper Landing and users of facilities such as the community center, and visitors to the area, particularly those visiting the Kenai Princess Lodge.

The Cooper Creek Alternative would impact visual resources in the Cooper Creek Landscape Unit by fracturing the unity and intactness of the predominately forested, north-facing slope. Views from the Cooper Lake Dam Road looking southwest toward the enclosing forest (Key View 9) would be altered by direct views of the new roadway, lowering the VQE rating at Key View 9 from “high/moderate” to “low.” The Cooper Lake Dam Road is used as an informal recreational trail, although trail use is relatively low in comparison with other trails in the area. Most of the Cooper Creek Alternative would not be visible to trail users, due to dense vegetation and steep slopes, except when users pass directly under the highway. River users would generally not have views of the alternative because of the presence of banks and trees along the river edge.

The Cooper Creek Alternative would also reduce the VQE rating of the view from the Kenai Princess Lodge looking south (Key View 7B) from “high” to “moderate” because of visible cuts associated with the roadway in the middleground. Existing conditions at Key Views 9 and 7B and a visual simulation of the Cooper Creek Alternative from Key View 7B are presented in Table 3.16-5. Similar views from slightly higher elevations likely would be visible from

occasional points along the Resurrection Pass Trail and Bean Creek Trail, with similar effects, although foreground vegetation is expected to obscure the view across the valley for most of the pertinent length of these trails.

Stetson Creek Trail would be physically altered by the Cooper Creek Alternative, changing the location of its trailhead and rerouting a short segment. Views from the trail near the trailhead likely would look down on the highway and be within view of the new Cooper Creek Bridge, a substantial change in the view for a portion of the trail.

Motorists on the new Cooper Creek Alternative alignment would be provided views to the Kenai River Valley, with views to the Chugach Mountains north of the valley. These views are currently unavailable from much of the area due to the proximity of trees that often obscure views. Motorists using the existing highway would generally not have views to the Cooper Creek Alternative alignment because of the presence of banks and trees along the river edge.

Seven major intersections would be lighted for the Cooper Creek Alternative. These include Quartz Creek Road, Bean Creek Road, Snug Harbor Road/"old" highway (east), "old" highway (west), Russian River Campground driveway, Sportsman's Landing driveway, and Skilak Lake Road (see Map 2.5-2 in Chapter 2). For developed areas within Cooper Landing, the lighting would be directly visible from residences in the vicinity of the Bean Creek Road and Snug Harbor Road intersections. Highway lighting could change the nighttime ambient light and views, although lighted yards and driveways already exist at some private residences and commercial properties in these areas. For areas farther from the alignment, with broader vistas, additional light intrusion may be visible. For designated Wilderness areas, the illumination likely would diminish the wilderness experience.

Table 3.16-5. Key Views—Cooper Creek Alternative

Key View	Existing	Visual Impact
9	 This Key View photo was taken about 1 mile up the Cooper Lake Dam Road, approaching the powerline. The VQE rating for this Key View is high/moderate.	Because an accurate vantage point of this area could not be obtained, no visual simulation was prepared. The VQE rating for this Key View under the Cooper Creek alternative is low.
7B	 This Key View photo was taken from the south side of the Kenai Princess Lodge, looking south to the hillside above the Kenai River. The VQE rating for this Key View is high.	 At this Key View, the Cooper Creek Alternative would be located slightly above the elevation of the viewer and would be readily visible. The alternative would interject a conflicting horizontal element in a largely undisturbed landscape and would interject cut and fill that would contrast with color and patterns visible in the image. The VQE rating for the build condition is moderate.

Note: VQE = Visual Quality Evaluation

Construction Impacts

Visual impacts associated with the construction of the Cooper Creek Alternative are discussed above under Issues Applicable to the Build Alternatives (Section 3.16.2.2).

Mitigation

No specific mitigation for visual impacts is proposed. However, as part of the standard design, all cuts and fills would be constructed with care, and bare soils would be seeded for quick greening of the landscape. Large new and replacement bridges would be designed with aesthetics in mind as seen from recreationists passing near or under the bridge on trails or in boats.

3.16.2.4 G South Alternative

Direct and Indirect Impacts

The G South Alternative has a VPP score of 508. The alternative would largely stay within the existing highway corridor but would have a segment of about 5.5 miles built on a new alignment. The G South Alternative includes roadway elements such as cuts, fills, and bridges, which would more often be viewed in the foreground and middleground and would raise this alternative's VPP score.

Changes to visual resources of three Key Views and four Landscape Units would occur as a result of construction of the G South Alternative. These include Key Views 2, 7A, and 11 and Landscape Units 1 (Kenai Lake), 3 (Juneau Mountain), 6 (Juneau Creek Valley), and 4 (Kenai River East). Viewer groups include residents, users of a number of locally used trails in the vicinity, viewers from the Kenai Princess Lodge, and motorists. Foreground views are provided from a number of homes and from trails that are located in the area. Some of the trails would be directed along and/or across the road; thus views would be in the immediate foreground. Many views are affected by trees or topography; thus the effects are often location dependent.

The G South Alternative would reduce visual quality from existing conditions for Snug Harbor Road residents looking north (Key View 2) and in a view looking north from the Kenai Princess Lodge toward Juneau Mountain (Key View 7A), where viewers would see portions of the new alignment corridor in the middleground. As a result, the VQE rating at Key View 7A would fall from "moderate" to "moderate/low."

River users generally would not have views to the alternative except where the new bridge crossing connects to the existing highway, as seen from Key View 11 looking from the existing Sterling Highway toward Round Mountain. The construction of a new bridge crossing the Kenai River that would be visible from Key View 11 changes the VQE rating from "high/moderate" to "moderate." Visual simulations of the Key Views impacted by the G South Alternative are presented in Table 3.16-6.

Table 3.16-6. Key Views—G South Alternative

Key View	Existing	Visual Impact
2	This Key View photo was taken from Snug Harbor Road looking in the direction of the existing Sterling Highway (east of the Cooper Landing Bridge) and toward Juneau Mountain. The VQE rating for this Key View is high.	G South Alternative would run across the hillside and be intermittently visible to Snug Harbor Road residents. The VQE rating for the build condition is high/moderate.
7A	This Key View photo was taken from near the entrance to the Kenai Princess Lodge, looking north toward Juneau Mountain. The VQE rating for this Key View is moderate.	The G South Alternative cuts into the lower elevations (600 to 700 feet) of Juneau Mountain where there is no existing development. The VQE rating for the build condition is moderate/low.

Key View	Existing	Visual Impact
11	This Key View photo was taken from the south bank of the Kenai River along the existing Sterling Highway facing northwest toward Round Mountain. The VQE rating for this Key View is high/moderate.	A new bridge crossing the Kenai River would be visible in the distance (left side of this photo simulation). The VQE rating for the build condition is moderate.

Note: VQE = Visual Quality Evaluation

Recreational users of the Stetson Creek Trail and Cooper Lake Dam Road may have intermittent views to the north and northeast across the valley to the G South Alternative. Most views likely would be screened by vegetation or terrain, but when visible, the highway would present an engineered line through the otherwise mostly undisturbed natural landscape uphill of Cooper Landing.

Motorists driving along the G South Alternative alignment would be provided views to the Kenai River Valley and to Cooper Creek valley and background peaks. The alignment would also provide expansive views of the Kenai River Valley and Kenai Lake, views seldom seen by most visitors.

For the G South Alternative, lighting would be incorporated at the following six intersections: Quartz Creek Road, “old” highway (east), “old” highway (west), Russian River Campground driveway, Sportsman’s Landing driveway, and Skilak Lake Road (see Map 2.5-3 in Chapter 2). Because this alternative would be routed around most of the developed areas within Cooper Landing, the lighting would not be directly visible from residences, although light reflecting off snow and low clouds would be visible. For areas farther from the alignment encompassing broader vistas, additional light intrusion may be visible. For designated Wilderness areas, the illumination likely would diminish the wilderness experience.

Construction Impacts

Visual impacts associated with the construction of the G South Alternative are discussed above under Issues Applicable to the Build Alternatives (Section 3.16.2.2).

Mitigation

No specific mitigation for visual impacts is proposed. However, as part of the standard design, all cuts and fills would be constructed with care, and bare soils would be seeded for quick

greening of the landscape. Large new and replacement bridges would be designed with aesthetics in mind as seen by recreationists passing near or under the bridge on trails or in boats.

3.16.2.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

Juneau Creek Alternative. The Juneau Creek Alternative would deviate the most from the existing corridor (approximately 9.5 miles of new roadway alignment), but received the lowest overall VPP score of 460 points because cuts and fills would be typically less visible. In a number of locations, cuts and fills would be seen only as a "crease" in the landscape or would be hidden from view behind landforms. In some locations, especially for dispersed recreationists who have climbed the mountains above this alternative, resulting views of the existing natural and rural landscape would change to views with a linear man-made element and cleared vegetation in an undeveloped area. However, this alternative has a higher VQE total reduction for the number of Key Views impacted.

The Juneau Creek Alternative would result in visual impacts to six Key Views and five Landscape Units. These include Key Views 2, 7A, 12A, and 12B, 13, and 15 and Landscape Units 1 (Kenai Lake), 3 (Juneau Mountain), 6 (Juneau Creek Valley), 4 (Kenai River East), and 8 (West Kenai River Uplands). Viewer groups include residents, motorists, and visitors/recreationalists, including hikers, boaters/floaters, and fishermen.

The Juneau Creek Alternative would be seen by residents in the foreground and middleground distances, such as at Key View 2 looking north across Kenai Lake and the existing Sterling Highway from Snug Harbor Road. At this Key View, the new highway segment would be intermittently visible depending on the height of Snug Harbor roadside vegetation and topography. Snug Harbor Road residents would view a cut in the hillside and the highway traffic, changing the VQE rating at Key View 2 from "high" to "high/moderate." When views are available, motorists and recreationalists would typically have middleground views such as at Key View 7A, where the highway cut is visible on the mountain slope. This change would reduce the VQE rating looking north from the Kenai Princess Lodge toward Juneau Mountain from "moderate" to "moderate/low."

Impacts to the Resurrection Pass National Recreation Trail would occur at more than one vantage point: at the Juneau Creek Falls Lookout (Key View 12A), the Resurrection Trail Bridge Crossing (Key View 12B), and the Resurrection Pass National Recreation Trail (Key View 13). At the Juneau Creek Falls Lookout (Key View 12A), long views down Juneau Creek Canyon would be partially blocked by the new Juneau Creek Bridge. Similarly, mostly natural forest and tree canopy views along the existing trail at the Resurrection Trail Bridge Crossing (Key View 12B) would be replaced by a bridge overhead in the foreground. At both Key Views 12A and 12B, the existing "high" VQE rating would change to "moderate/low" because the Juneau Creek Bridge would block views down into Kenai River Valley and add a linear, man-made element in an undeveloped area. However, the architectural form of the bridge spanning Juneau Creek canyon would also introduce a striking, contrasting visual element that would add vividness to the view.

For hikers, passage under a bridge near Key View 12B could be a "gateway" to the more remote portions of the trail. The "gateway" concept would be muted by the fact that the existing trailhead is almost 3½ miles to the southwest, but offset to some degree by the introduction of a

new trailhead that would provide quick and easy access to Juneau Creek Falls and alpine areas of high visual quality, without the requirement to hike the first 3½ miles of trail in a forested, closed setting that offers few background (mountain) view opportunities.

The highway would be intermittently visible from the trail at Key View 13, particularly during the winter when the leafless deciduous vegetation allows views to middleground distances. However, most views from the Resurrection Pass National Recreation Trail toward the Juneau Creek Alternative alignment are blocked by trees or topography, which would limit the visual impact to ridgeline views and specific viewpoints. The VQE rating for Key View 13 would fall from "moderate/high" to "moderate/low."

Recreational users of the Stetson Creek Trail and Cooper Lake Dam Road, and possibly users of the Russian Lakes Trail and Russian River Angler's Trail, could have intermittent views of these alternatives across the valley at breaks in the forest cover. While foreground vegetation and surrounding terrain would be expected to screen most views of these alternatives, where the alternatives were visible, they would appear as a linear engineered element in an otherwise undeveloped slope.

River users generally would not have views to the alignment due to topography or visual limitations posed by vegetation. However, the alignment would be fully visible in the foreground where the Juneau Creek alignment joins the western end of the project above the north side of Kenai River (Key View 15) within the Kenai River Special Management Area (KRSMA). This impact would result in a lower VQE score, but the rating would remain in the "moderate" category.

Visual simulations of these Key Views impacted by the Juneau Creek Alternative are presented in Table 3.16-7.

Table 3.16-7. Key Views—Juneau Creek Alternative

Key View	Existing	Visual Impact
2	This Key View photo was taken from Snug Harbor Road looking in the direction of the existing Sterling Highway (east of the Cooper Landing Bridge) and toward Juneau Mountain. The VQE rating for this Key View is high.	The Juneau Creek Alternative would run across the hillside at a higher elevation than the existing highway and therefore be intermittently within view. The VQE rating for the build condition is high/moderate.

Key View	Existing	Visual Impact
7A	This Key View photo was taken from near the entrance to Kenai Princess Lodge, looking north toward Juneau Mountain. The VQE rating for this Key View is moderate.	The Juneau Creek Alternative would cut into the lower elevations (600 to 700 feet) of Juneau Mountain where there is no existing development. The VQE rating for the build condition is moderate/low.
12A	This Key View photo was taken looking southeast from a lookout below Juneau Falls along the Resurrection Pass National Recreation Trail. The viewpoint is accessible on foot and by mountain bike/horseback in summer and by ski/snowshoe and snowmobile in winter. The VQE rating for this Key View is high.	The Juneau Creek bridge crossing would be visible and would partially block views to the surrounding Juneau Creek Valley, Kenai River Valley, and Kenai Mountains. Because this is an informal but known scenic overlook, visual change would be notable. The VQE rating for the build condition is moderate/low.

Key View	Existing	Visual Impact
12B	This Key View photo was taken looking into the vegetated overstory approximately 0.5 mile south of Juneau Falls, at the proposed Juneau Creek bridge crossing. The VQE rating for this Key View is high.	The Juneau Creek Bridge would be fully seen from this Key View, from below the bridge. The VQE rating for the build condition is moderate/low.
13	This Key View photo was taken looking north approximately 1.5 miles along the Resurrection Pass National Recreation Trail. The VQE rating for this Key View is moderate/high.	Because an accurate vantage point of this area could not be obtained, no visual simulation was prepared.

Key View	Existing	Visual Impact
15	This Key View photo was taken from a raft on the Kenai River looking north toward the existing Sterling Highway, approximately 0.5 mile west of the Russian River Ferry. The VQE rating for this Key View is moderate.	The Juneau Creek Alternative would be seen from this view as it merged with the existing Sterling Highway. The VQE rating for the build condition is moderate.

*Except for Key View 15, the impacts illustrated in these views would apply to both the Juneau Creek Alterantive and the Juneau Creek Variant Alternative. Key View 15 does not apply to the Juneau Creek Variant Alternative. See further discussion of the Juneau Creek Variant Alternative below.

Note: VQE = Visual Quality Evaluation

Motorists on the Juneau Creek Alternative alignment would be provided excellent expansive views of the Kenai River Valley from a number of locations where cut and fill opportunities provide views to areas below. Motorists may also have views to Juneau Falls from the bridge crossing of Juneau Creek and from new turnouts/waysides near the bridge. Prime views for motorists would be from the long slopes at each end of the alternative that provide views up and down the valley. Views on the roadway would be similar to those offered along much of the Seward Highway.

For the Juneau Creek Alternative, lighting would be incorporated at the following four intersections: Skilak Lake Road, Quartz Creek Road, and both intersections where the old highway and new segment connect (see Map 2.5-4 in Chapter 2). Because this alternative would be routed around most of the developed areas within Cooper Landing, the lighting would not be directly visible from residences, although light reflecting off snow and low clouds would be visible. For areas farther from the alignment encompassing broader vistas, additional light intrusion may be visible, affecting rural recreational nighttime views. For designated Wilderness areas, for which managers strive to maintain a setting untrammeled by human development, the illumination would diminish the wilderness experience.

The Juneau Creek Alternative would create a new cleared swath of land through forest, mostly on CNF land, but also for some distance on KNWR land. This swath would appear as an engineered line in a largely natural landscape, and it likely would be visible from portions of the Andrew Simons Wilderness south of the Kenai River. The Surprise Creek Trail begins across the Kenai River from Jim's Landing and provides access up Surprise Creek through forest to alpine terrain above treeline (and outside the project area). Russian Mountain, at an elevation of about 3,500 feet, would block any view from the trail, but anybody who ventured across country to the

north side of Russian Mountain or to its summit would be able to view the Kenai River valley, including the existing highway and power transmission line cuts, Sportsman's Landing and Russian River Ferry parking areas, the USFS Russian River Campground, and the new highway. The new highway would be an additional and permanent engineered element to the view, and it would detract from the sense of wilderness and isolation in this designated Wilderness area. However, because other development already exists in the view, the character of the view would change incrementally but would not be a dramatic change in the same way that putting a highway through the heart of a Wilderness unit would. Also, because Surprise Creek Trail requires boating across the Kenai River with risk of entering rapids downstream, and because of the distance and elevation gain required to reach the alpine ridges from which these views would be visible, relatively few people access these views. It is anticipated that the change in the view would affect few individuals in any given year, but the impacts would be permanent.

Juneau Creek Variant Alternative. The visual effects of the Juneau Creek Variant Alternative would be very similar to those of the Juneau Creek Alternative. Both alternatives have the same VPP scoring for much of the Juneau Creek Variant's length, as much of the approximately 8.8 miles of new roadway would not be visible from view locations. The Juneau Creek Variant Alternative's overall VPP score of 465 is slightly greater than the VPP score for the Juneau Creek Alternative due to the high visibility of the interchange at the western terminus of the Juneau Creek Variant alignment and the length of improvements made directly adjacent to the Kenai River. These new elements would be visible to fisherman and floaters of the Kenai River.

The Juneau Creek Variant Alternative would have views and predicted changes similar to those discussed for the Juneau Creek Alternative. Exceptions include Key View 15 (view from the Kenai River where the Juneau Creek Alternative would merge with the existing highway), where no change from the existing visual quality is anticipated for the Juneau Creek Variant Alternative. However, the Juneau Creek Variant Alternative would have changes to Key View 14 (view from the Russian River Ferry/Kenai River Sanctuary) and Key View 16 (view from Russian River) that the Juneau Creek Alternative would not have. Impacts to Landscape Units under the Juneau Creek Variant Alternative would generally replicate those described for the Juneau Creek Alternative, although impacts to the West Kenai River Uplands (Landscape Unit 8) would be less under the Juneau Creek Variant Alternative due to the shorter roadway length.

The view from the Russian River Ferry (Key View 14) to the mountain slopes north of the parking area would change. The proposed bridge overpass over existing Sterling Highway would interject a more dominant traffic element into the view from both the Kenai River and the Russian River Ferry parking area. The overpass would also create views of exposed fill where forest currently exists. The overpass's location above the viewer (i.e., "superior" in view) would result in a more dominant presence of transportation infrastructure than now exists. Similarly, views from the Russian River within KRSMA (Key View 16) would also be altered. The area is heavily used for fishing, and sports fishers would have a direct view to the new roadway climbing toward the Juneau Creek Bridge crossing, except where a river bar with trees precludes the view. This change would lower the existing "moderate" VQE rating at both Key Views to "low."

Visual simulations of the Key Views are presented in Table 3.16-8.

Table 3.16-8. Key Views—Juneau Creek Variant Alternative[a]

Key View	Existing	Visual Impact
14	This Key View photo was taken looking north from the Sportsman's Landing boat launch. The VQE rating for this Key View is moderate	Cut and fill would be visible, and the bridge overpass structure would be clearly visible and close to the viewer. The VQE rating for the build condition is low.
16	This Key View photo was taken south of the Sportsman's Landing boat launch and Russian River Ferry. The VQE rating for this Key View is moderate	Cut and fill would be visible, and the bridge overpass structure would be clearly visible. The VQE rating for the build condition is low.

[a]The impacts illustrated in this table would be in addition to those listed above in Table 3.16-7, which are shared by the Juneau Creek Alternative and Juneau Creek Variant Alternative.

Note: VQE = Visual Quality Evaluation

For the Juneau Creek Variant Alternative, illumination would be incorporated at the following four intersections: Skilak Lake Road, Sportsman's Landing driveway/intersection of the new highway segment and "old" highway, Quartz Creek Road, and the eastern intersection where the old highway and new highway segment would connect (see Map 2.5-5 in Chapter 2). Because this alternative would be routed around most of the developed areas within Cooper Landing, the lighting would be less visible from residences, although diffuse light reflecting off snow and low clouds would be visible. For areas farther from the alignment encompassing broader vistas, additional light intrusion may be visible, thereby affecting rural recreational nighttime views. For designated Wilderness areas, the illumination would diminish the wilderness experience.

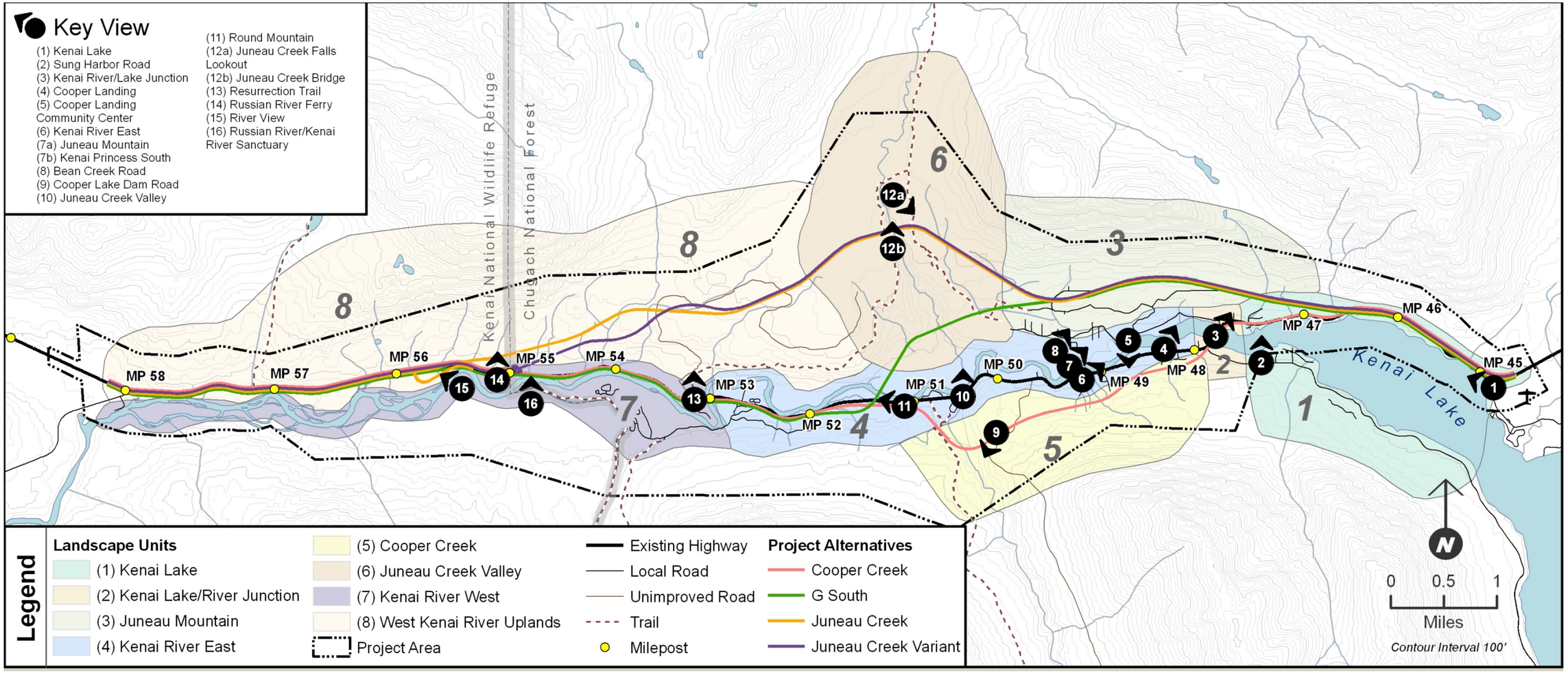
Impacts to views seen from the Russian Mountain area within Andrew Simons Wilderness (KNWR) would be similar to those described at the end of the Juneau Creek Alternative section, above. An exception is that there would be no new swath of trees cut within the KNWR as there would be for the Juneau Creek Alternative. Therefore, these visual impacts would be slightly reduced under the Juneau Creek Variant Alternative.

Construction Impacts

Visual impacts associated with the construction of the Juneau Creek and Juneau Creek Variant alternatives are discussed above under Issues Applicable to the Build Alternatives (Section 3.16.2.2).

Mitigation

No specific mitigation for visual impacts is proposed. However, as part of the standard design, all cuts and fills would be constructed with care, and bare soils would be seeded for quick greening of the landscape. The Juneau Creek Bridge would be designed with aesthetics in mind as seen by recreationists passing near or under the bridge on trails. The bridge and embankment facing Sportsman's Landing (Juneau Creek Variant Alternative) similarly would be designed with aesthetics in mind as seen by people using the boat launch area or fishing in and near the confluence of the Kenai and Russian rivers.



Map 3.16-1. Landscape units and key views in the project area

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3.17 Hazardous Waste Sites and Spills

3.17.1 Affected Environment

3.17.1.1 Hazardous Waste Sites

Known and potential hazardous waste sites in the project area were identified through the review of Federal and State databases, specifically:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System, which contains information on hazardous waste sites, potential hazardous waste sites, and remedial activities.
- Resource Conservation and Recovery Act (RCRA) Information System, used by the U.S. Environmental Protection Agency (EPA) to track entities regulated as hazardous waste handlers. It includes data on handlers, permit and closure status, compliance with regulations, and cleanup activities.
- Alaska Department of Environmental Conservation (ADEC) State databases:
  - Statewide Oil and Hazardous Substance Spills Database
  - Contaminated Sites Program Database (includes leaking underground storage tanks, or LUSTs)

Database research is summarized in the following paragraphs and in Table 3.17-1 and Table 3.17-2. No CERCLA sites were identified within the project area.

One RCRA record pertains to the project area. A "Fisher Fuels Sterling Hwy Spill Site" incident along the Sterling Highway at Milepost (MP) 52 is documented as an RCRA site in the EPA database. This site listing represents a fuel tank truck rollover with a spill of approximately 5,000 gallons of gasoline and diesel fuel on October 29, 2001 (RCRA handler identity number AKR000005041).

The ADEC databases document multiple kinds of contaminated sites. The ADEC Statewide Oil and Hazardous Substance Spills Database provides a list of documented spills having occurred within the East Kenai/Cooper Landing area (ADEC 2006a, 2012, 2013) since 1995. This search yielded information for 14 separate incidents within the project area (Table 3.17-1). The October 2001 Fisher Fuels spill was not included in the search results, but has been listed in Table 3.17-1 (ADEC 2006a, 2012). All but two spill sites have a cleanup status of Complete, No Further Action (NFA). NFA status indicates a determination by the ADEC that residual contamination remaining at the site does not pose a significant risk to human health and the environment (ADEC 2006a).

Table 3.17-1. Known spill sites in the project area

Spill Date	Spill Location	Quantity (gallons)/ Substance Released	Cleanup Status
07/17/1995	Sterling Highway, Near Kenai River bridge	1/diesel	NFA
08/10/1995	Sterling Highway, Cooper Landing	1/other	NFA
09/28/1995	Sterling Highway, MP 45, Sunrise Inn	1/other	NFA
11/10/1997	Sterling Highway, MP 43.5, near Quartz Creek	75/diesel	NFA
08/28/1998	Cooper Landing	8/diesel	NFA
07/13/2000	Sterling Highway, MP 52.3	0[a]/diesel	NFA
08/06/2001	Cooper Landing, near Quartz Creek	20/aviation fuel	NFA
10/29/2001	Sterling Highway, MP 52, near Gwin's Lodge	5,000/diesel and gasoline	NFA
07/03/2007	Sterling Highway, MP 52	200/diesel 20/engine lube oil	NFA
06/21/2010	Sterling Highway, MP 59.4	15/hydraulic oil	NFA
10/30/2011	Sterling/Snug Harbor Rd	10/gasoline	NFA
12/9/2011	Cooper Landing, Bean Creek Road	30/diesel	Open
02/06/2013	Sterling Highway, MP 57.5, semi truck accident	75/diesel 5/engine lube oil 4/antifreeze	Open
02/19/2013	Sterling Highway, MP 45, Sunrise Inn	50/gasoline	NFA
07/01/2013	Sterling Highway, MP 45, Sunrise Inn	5/gasoline	NFA

[a] Reported quantity of released substance is that reported by ADEC. This event was a collision with no recorded volume of released substance. This may indicate a minor fuel release that was unrecoverable due to rapid evaporation or extremely low quantity.

NFA = "No Further Action" because residual contamination remaining at the site does not pose a significant risk to human health and the environment (ADEC 2012).

Source: ADEC (2012, 2013); EPA (2013)

The ADEC Contaminated Sites Program Database (including LUSTs) contains five records for contaminated sites located within the project area (ADEC 2012). These properties and sites are listed in Table 3.17-2 and are identified in Map 3.17-1.

Table 3.17-2. Sites in the project area in the Contaminated Sites Program Database

Site Name and Location	Description	Cleanup Status
Cooper Landing Elementary School Bean Creek Road	Heating fuel contamination was encountered during underground tank removal. Excavation of contaminated soil was stopped because of concerns about structural integrity of school. Contamination above cleanup levels still exists in ground. If remodeling occurs or if contamination shows up in wells, then remaining contamination must be removed to site specific cleanup levels.	Cleanup Complete – Institutional Controls[a]
Sportsman's Lodge MP 55 Sterling Highway	Diesel-range petroleum contamination was encountered during underground storage tank removal.	Cleanup Complete
Hamilton's Place MP 48.5 Sterling Highway	Gasoline contamination was encountered during the removal of underground storage tanks in May 1994. Cleanup was initiated in 1999. Contaminated soil was excavated and trucked off site for treatment and disposal. Borings indicated groundwater contamination, and monitoring wells were installed. A long-term groundwater monitoring plan was established and is ongoing.	Cleanup Complete – Institutional Controls[a]
Sunrise Inn MP 45 Sterling Highway	Limited fuel contamination was encountered during removal of underground storage tank. Contamination levels were below site cleanup level.	Cleanup Complete
Sportsman's Landing MP 55 Sterling Highway	Diesel-range petroleum contamination was discovered during a site assessment. Soils transported offsite for treatment and disposal.	Cleanup Complete

[a]Institutional Controls are administrative tools used to limit human exposure to hazardous waste by restricting activity, use, and access to properties with residual contamination. Summary of known controls are identified in the Description column.

Source: ADEC (2012).

The ADEC Statewide Underground Storage Tank (UST) database was also reviewed (June 5, 2012). Within the project area, six USTs are reported as currently in use: three at Cooper Landing Elementary School (MP 47.7) containing heating oil, one at Sunrise Inn (MP 45) containing gasoline, one at Hamilton's Place (MP 48.5) containing gasoline, and one at the Alaska Department of Transportation and Public Facilities (DOT&PF) maintenance station containing diesel fuel. These tanks are in place but not leaking, and otherwise have not and are not currently creating a hazardous waste impact. The database also identifies three other locations with five USTs that are permanently out of use (four have been removed, and one is out of service but still in the ground; none are known to have created a hazardous waste impact).

3.17.1.2 Risk of Spills

The risk of vehicle crashes that would result in pollutants in the Kenai River or adjoining wetlands and connected waterways, particularly the risk of tanker trucks containing fuel or other chemicals overturning or otherwise spilling their loads, was a substantial concern voiced by residents and others during scoping for this project. All alternatives are located within the Kenai River watershed, which is a sensitive area due to the Kenai River's biologic and economic significance and its substantial human use. As noted above under Section 3.17.1.1, spills adjacent

to the Kenai River have occurred (see Table 3.17-1). Because of residents' concerns and the existing highway's proximity to the river and associated wetlands and tributaries, the risk of spills was examined.

Figure 3.17-1. Tanker truck traversing the Sterling Highway through the project area.

The *Kenai River Comprehensive Management Plan* (DNR, ADF&G, KPB 1997, see Section 3.2), which was endorsed by all land management agencies along the Kenai River, recommends that "public road construction projects in upland areas should be located away from the Kenai River" and advocates for a general setback standard of 300 feet for all non-water-dependent public facilities development adjacent to the river.

There are three primary environmental pathways for spill migration:

- Surface migration (surface waters and soil)
- Subsurface migration (groundwater transport)
- Atmospheric migration (air)

A risk evaluation was performed to characterize the sensitivity of the area resources to the alternative alignments. The report, *Emergency Response Assessment and Hazardous Materials Spill Control* (HDR 2003b), was used as a screening tool early in this project. While the alternatives have changed slightly since that time, the assessment remains valid to discuss and compare the relative risk posed by future spills along the alternatives under consideration (see Section 3.17.2).

3.17.2 Environmental Consequences

3.17.2.1 No Build Alternative

Direct and Indirect Impacts

No known hazardous waste sites would be affected by the No Build Alternative.

Currently, 77 percent of the Sterling Highway in the project area is within 500 feet, and 56 percent of the highway is within 300 feet, of the Kenai River and its tributaries. This proximity presents a risk of automobile or tanker truck crashes that could spill pollutants into the river, adjoining wetlands, or connected waterways with little buffer or opportunity for cleanup. This risk is heightened because the highway does not meet current standards created, in part, to help prevent vehicles from leaving the roadway or overturning. The No Build Alternative would retain the highway as a narrow road at or near its maximum capacity for traffic.

3.17.2.2 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

Contaminated Sites. Table 3.17-1 and Table 3.17-2 summarize the status of known hazardous waste and spill sites in the project area. Of the 19 known sites of past spills or contamination, 17 have been closed, closed with institutional controls, or designated as NFA by ADEC. It is anticipated that the two open sites would be resolved and closed prior to any construction. No major risk to the project and no major risk of impact to human health from construction of any of the alternatives have been identified as a result of this preliminary investigation. Because most spills are small and most cases have been closed, this analysis does not further report on which sites are most closely associated with the various build alternatives.

Following the Federal Highway Administration record of decision on this Supplemental Environmental Impact Statement (SEIS), further investigation into known and suspected contaminated sites will be necessary if a build alternative is selected. A Phase I Environmental Site Assessment (ESA) would be conducted in accordance with the American Society for Testing and Materials Standard E1527-05. The Phase I ESA would build on the records research already done and would include interviews with property owners, a review of historical sources, regulatory agency file reviews and consultation, and a visual reconnaissance of the alignment. It would identify recognized environmental conditions that could affect the preferred alternative. If the Phase I ESA were to identify a likely presence of hazardous materials, a Phase II site investigation would be undertaken. The investigation would determine the extent of the release, establish an approach to site design and construction to avoid contamination to the extent possible, and recommend management strategies for unavoidable contamination encountered.

Risk of Spills. The transport of commodities on the segment of each build alternative that would be built on a new alignment would increase the risks of contaminant spills and other releases from crashes in areas where such risks do not currently exist. However, use of the new alignment would reduce risk of hazardous material releases impacting the Kenai River, in the area of new alignment located away from the river. The length of each of these segments differs among the alternatives, as further described in the following sections.

All build alternatives would be built to current rural principal arterial standards, which incorporate design features meant to improve safety conditions that may have contributed to spills and crashes adjacent to the Kenai River. For example, upgrading the road design to include wider lanes, shoulders, and clear zones and avoid sharp curves would allow room for recovery before a rollover happened. Shoulders would improve emergency response capabilities to minimize spill-related impacts should a hazardous transportation spill occur along the Sterling Highway. However, the increased average vehicle speed along the improved highway may increase the severity of any crashes and resultant spills. Reduced traffic, specifically by commercial trucks, on the “old” highway under any of the build alternatives would reduce risk of crashes and spills in that area.

Numerous factors affect the amount of impact associated with a chemical release to the environment, including location, weather, stream flow, soil permeability, time of year, toxicity and quantity of spilled compound, and species present at the time of the release. However, any release of a chemical compound to the environment would likely adversely affect natural resources that came into contact with the compound. Spills into surface migration pathways (surface waters and soils) pose the greatest potential to quickly impact sensitive areas such as the

Kenai River or surface and shallow drinking water sources. In general, it is reasonable to presume that the risk of a spill entering the Kenai River diminishes the farther away from the Kenai River the spill occurs. A greater distance from the Kenai River allows more time for responders to contain the spilled material and prevent it from reaching the river. Tributaries to the Kenai River, riparian areas, and wetlands are areas of special concern.

Subsurface migration pathways are difficult to identify with certainty; however, private residences downgradient from alternative alignments are identified as sensitive areas because they likely have private drinking water wells (there is no public water supply in the Cooper Landing area). Atmospheric migration pathways are highly unpredictable and are not examined.

Environmental sensitivity of each alignment to risks associated with hazardous materials is evaluated in this SEIS using seven different metrics, as defined below:

- Steep side slopes, represented as a percentage of the alignment length that has steep slopes (6-10 percent) adjacent to surface water bodies or residential areas where a spill could quickly migrate overland into sensitive areas.
- Downgradient residences, represented as a percentage of residential property downslope from the alternative alignment.
- Proximity to Tier I water bodies, represented as a percentage of the alignment within the 300 foot buffer setback identified by the *Kenai River Comprehensive Management Plan*. Tier I waterbodies in the project area are the Kenai River, Kenai Lake, and their immediate tributaries, which include the Russian River, Cooper Creek, and Juneau Creek.
- Proximity to Tier I water bodies, represented as a percentage of the alignment length within a 500-foot riparian buffer. This more conservative buffer was used in the 2003 report.
- Proximity to Tier II water bodies, represented as a percentage of the alignment length within a 500-foot riparian buffer. Tier II streams are tributaries to Tier 1 streams. Surface migration pathways of Tier II streams can affect large areas and important habitat but are potentially slower than Tier I stream pathways.
- Proximity to palustrine wetlands, which are bogs hydrologically connected to Tier I or Tier II streams.

Table 3.17-3 summarizes data associated with these metrics, and the relative risk is discussed below under each build alternative. Map 3.17-2 shows the alternative alignments with the 300-foot and 500-foot buffer zone areas near Tier 1 streams in the project area.

Construction Impacts

Should contamination be encountered during construction of any of the build alternatives, the ADEC would be notified and the response efforts would be handled in accordance with an ADEC-approved Corrective Action Plan. Hazardous materials that would be used, transported, or stored within the project right-of-way as part of the construction activities could adversely affect the environment if they were not properly handled and contained. These materials would include asphalt, concrete, and fuel and lubricants for vehicles and other equipment.

Mitigation

Construction contractors would be required to meet all Federal, State, and local regulatory requirements regarding the discovery and use of hazardous materials. These regulatory requirements include worker right-to-know and safety training for the use of hazardous materials, as well as the recognition and reporting of hazardous materials discovery.

Hazardous materials used during project construction would be stored and handled according to State and Federal regulations. As part of standard specifications for highway construction, the contractor would develop a Hazardous Material Control Plan (HMCP) and a Spill Prevention, Control, and Countermeasure Plan. Detailed best management practices and housekeeping measures regarding hazardous materials would be outlined in a site-specific HMCP, which is a required part of the contractor's Storm Water Pollution Prevention Plan. The contractor would be required to practice proper hazardous material storage and handling and adhere to the DOT&PF emergency response procedures, which stipulate that all work must stop immediately and the site be secured to prevent unauthorized access if hazardous materials are encountered. The contractor would be expected to isolate the area and prevent migration of any contaminants. In addition, the appropriate regulatory authorities must be notified immediately.

Table 3.17-3. Sensitive resources in spill migration pathway by alternative

	No Build	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Length of alignment (miles)	14.1	14.2	14.1	14.7	14.3
Down-gradient residences	37.2%	44.9%	40.6%	34.4%	36.6%
Percent with steep down-gradient side slopes	6.7%	7.6%	24%	24.1%	32.6%
Percent length within 300 feet of Tier I streams	56%	43%	33%	15%	16%
Percent length within 500 feet of Tier I streams	77%	56%	45%	25%	26%
Percent length within 500 feet of Tier II streams	1.5%	1.5%	10.7%	22.5%	25%
Percent length within 500 feet of wetlands hydrologically connected to Tier I or Tier II streams[a]	1.3%	2.1%	6.8%	12.1%	12.1%

[a] This represents the incremental risk posed by a spill beyond 500 feet from a Tier I or Tier II stream, but within 500 feet of wetlands that are hydrologically connected to a Tier I or Tier II stream. The geographic information systems (GIS) analysis performed to generate this data used older, National Wetland Inventory mapping and may not correlate directly with the analysis discussed in Section 3.20, Wetlands and Vegetation.

Source: *Emergency Response Assessment Hazardous Materials Spill Control Report* (HDR 2003b); Tier 1 stream buffer zone percentages (both 300 and 500 feet) were recalculated in 2013 for this table to account for current alternatives.

3.17.2.3 Cooper Creek Alternative

Direct and Indirect Impacts

Hazardous Waste Sites. The MP 52 site that is the location of three spills, one of which was a 5,000-gallon fuel spill, would be subject to earth moving during reconstruction of the existing highway for the Cooper Creek Alternative. Work at this site would be more likely to unearth previously undetected contaminated soils than at other areas along the alignment, and presents a slightly elevated risk to DOT&PF of additional time and costs to the project for cleanup. See Section 3.17.2.2 for issues applicable to all build alternatives.

Spill Risk. The Cooper Creek Alternative would have low exposure to steep side slopes, Tier II tributaries, and wetlands but would have a high exposure to downgradient residences and Tier I streams. Almost 8 miles of the 14.2-mile alignment would be within 500 feet of the Kenai River and other Tier 1 streams, of which about 6 miles would be within 300 feet. West of Cooper Creek, the alternative largely follows the existing highway alignment along the Kenai River, which poses a relatively high level of risk to the Kenai River. However, the highway would be reconstructed throughout to meet current standards and improve safety.

Construction Impacts

Construction impacts for all build alternatives, as related to known contamination, are addressed in Section 3.17.2.2.

Mitigation

Mitigation for all build alternatives is addressed in Section 3.17.2.2.

3.17.2.4 G South Alternative

Direct and Indirect Impacts

Hazardous Waste Sites. The MP 52 site that is the location of three spills, one of which was a 5,000-gallon fuel spill, would be subject to earth moving during re-construction of the existing highway for the G South Alternative. Work at this site would be more likely to unearth previously undetected contaminated soils than at other areas along the alignment, and presents a slightly elevated risk to DOT&PF of additional time and costs to the project for cleanup. See Section 3.17.2.2 for issues applicable to all build alternatives.

Spill Risk. About one-quarter of the G South Alternative alignment has exposure to steep side slopes adjacent to water bodies. Approximately 6.4 miles of the alignment (45 percent) would be within 500 feet of the Kenai River and other Tier 1 streams, of which about 4.7 miles (33 percent of the total) would be within 300 feet. The G South Alternative has moderate exposure to Tier II streams and wetlands that are hydrologically connected to the Kenai River. A substantial portion of this alternative would be built on the existing alignment near the Kenai River. However, the highway would be reconstructed throughout to meet current standards and improve safety.

Construction Impacts

Construction impacts for all build alternatives, as related to known contamination, are addressed in Section 3.17.2.2.

Mitigation

Mitigation for all build alternatives is addressed in Section 3.17.2.2.

3.17.2.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

Hazardous Waste Sites. The direct and indirect impacts from hazardous waste sites are the same as those discussed in Section 3.17.2.2.

Spill Risk. The Juneau Creek Alternative's 14.7-mile length contains approximately 3.8 miles (26 percent) of roadway within 500 feet of Tier I streams, of which 2.4 miles (16 percent of the total) would be within 300 feet. The Juneau Creek Variant Alternative is 14.3 miles long, and would contain 3.6 miles (25 percent) of roadway within 500 feet, of which 2.2 miles (15 percent of the total) would be within 300 feet of the Tier I water bodies.

Both of these alternatives have moderate exposure to steep side slopes and high exposure to wetlands. However, these alternatives provide separation from the Kenai River and other streams over the longest distance, likely providing responders more time to protect the Kenai River in the event of a spill. The western segments of these alternatives built on the existing alignment would remain relatively near the Kenai River, posing greater risk than the segment built on a new alignment. However, the highway would be reconstructed throughout to meet current standards and improve safety.

Construction Impacts

Construction impacts, as related to known contamination for the Juneau Creek and Juneau Creek Variant alternatives, are addressed in Section 3.17.2.2.

Mitigation

Mitigation for all build alternatives is addressed in Section 3.17.2.2.

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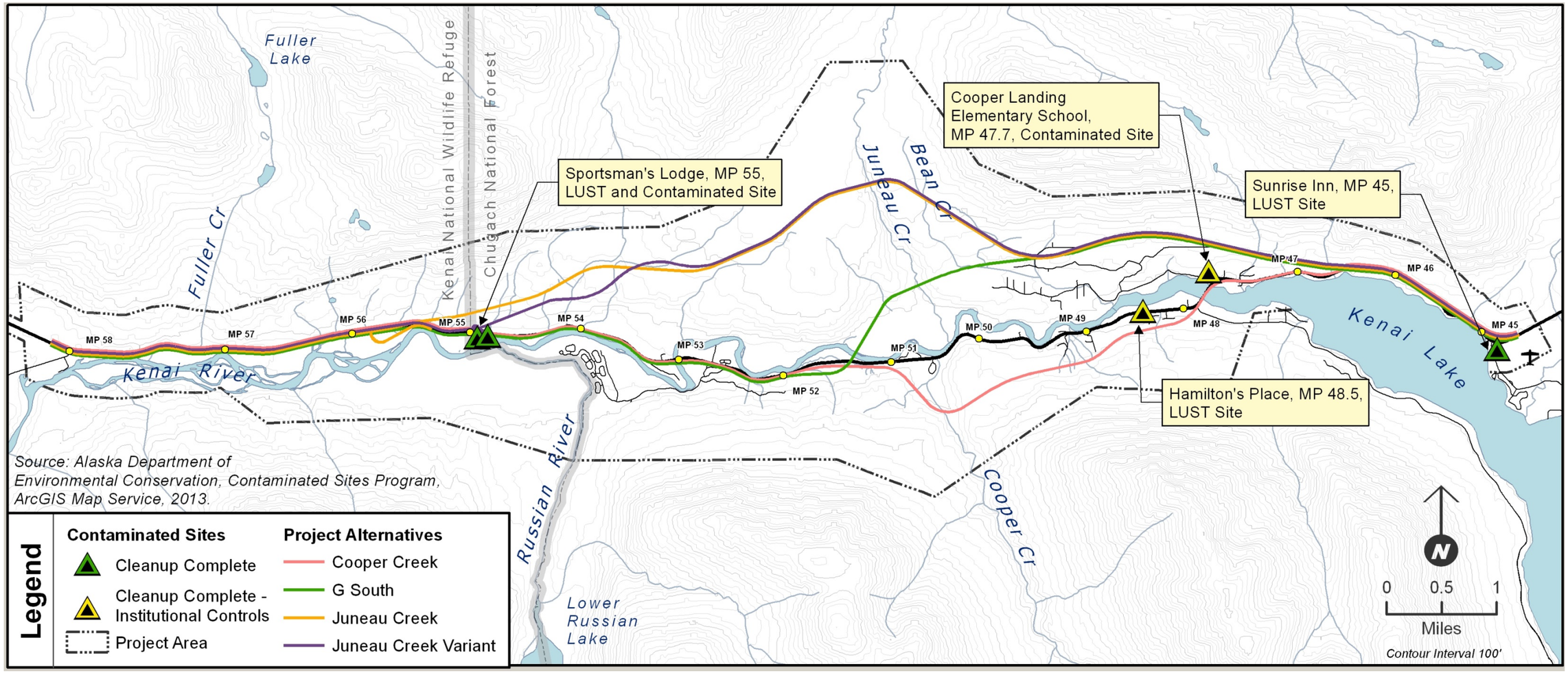

Map 3.17-1. Hazardous material sites

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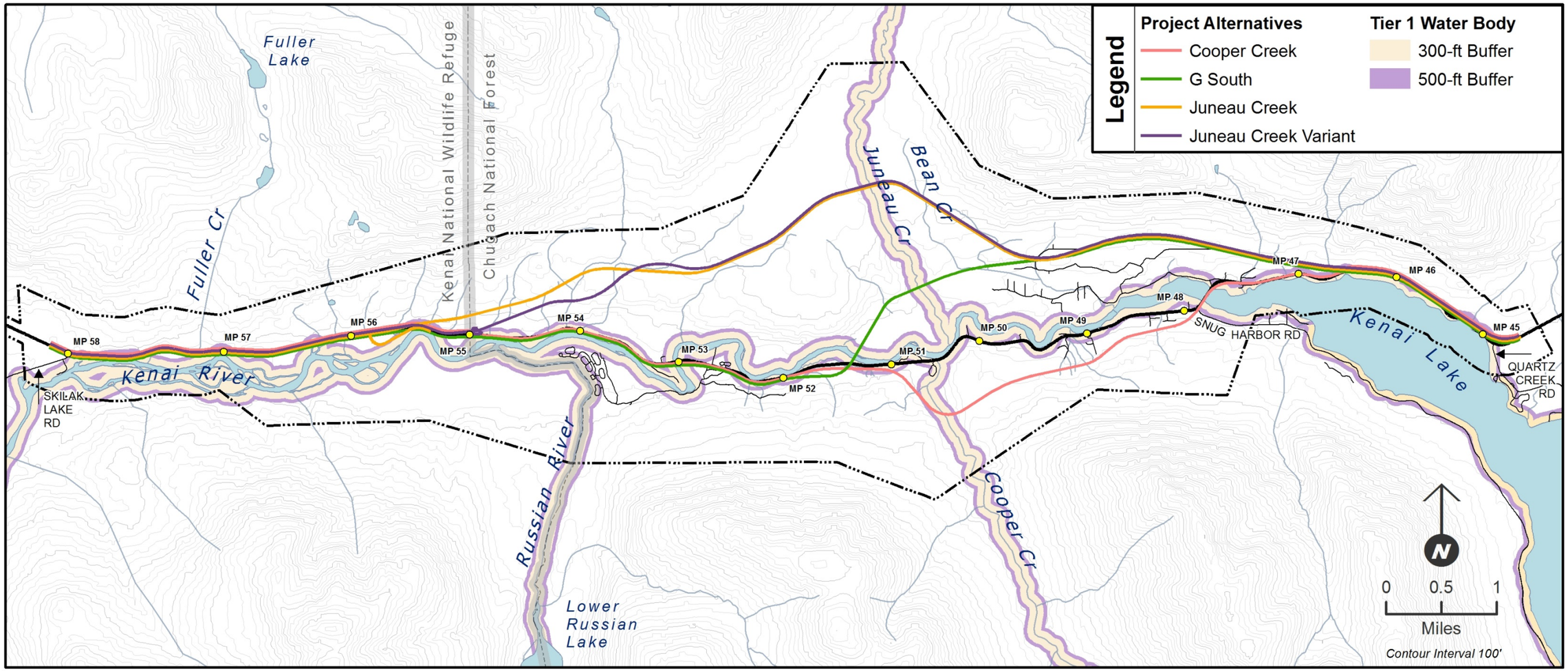

Map 3.17-2. Buffer zone areas near Tier 1 streams

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3.18 Energy

3.18.1 Affected Environment

This section addresses energy consumption associated with road construction and use. Energy consumption related to highway projects involves construction and operational energy. Construction energy is that required to build the highway facility. Energy is consumed to construct and operate transportation facilities, manufacture materials during construction, move vehicles and transport materials, and operate construction machinery.

Operational energy is the direct consumption of fuel by vehicles using the roadway and the energy required to conduct routine, ongoing maintenance of the facility. Operational energy consumption includes fuel consumed by vehicles using the facility, which is the largest energy use over time and includes fuel consumed both during travel and while vehicles idle during traffic delays. A negligible amount of energy is also used for signals and lighting. Routine maintenance (e.g., snow plowing, pothole repair, and restriping), as well as more infrequent maintenance (e.g., guardrail replacement, repaving, and erosion protection), also requires ongoing use of energy. Emergency response to highway incidents is an ongoing operation associated with the highway that also uses energy.

In addition to engine efficiency, aerodynamic drag force, rolling friction, vehicle and load weight, and other variables, fuel consumption is influenced by vehicle types, roadway grades and other geometric characteristics, traffic speeds, and delays caused by congestion and intersection stop conditions.

3.18.2 Environmental Consequences

All alternatives are anticipated to have the same travel demand as the No Build Alternative. None of the build alternatives would substantially reduce or increase travel distances.

3.18.2.1 No Build Alternative

Direct and Indirect Impacts

Under the No Build Alternative, congestion on the existing highway would be expected to increase as traffic volumes increased. This increase would cause more vehicle delays and less efficient facility operation, which requires more operational energy consumption. Periodic roadway maintenance such as resurfacing and patching would occur over time until the condition of the roadway warranted complete reconstruction.

3.18.2.2 Issues Applicable to the Build Alternatives

Because none of the build alternatives would substantially increase or reduce travel distances or traffic volumes, there would be no substantial change in fuel use as a result of altered travel. Similarly, the availability of energy in the form of petroleum fuels for motor vehicles would not change as a result of implementation of any of the build alternatives.

Although the lengths of the segments of each alternative built on new alignments would differ slightly, the overall length of each alternative would be approximately 14.5 miles, which is

similar to the length of the existing highway. Therefore, no substantial change in energy consumption based on length of travel is anticipated.

The elevation gains for each build alternative would differ. The Cooper Creek, G South, and two Juneau Creek alternatives would climb to maximum roadway elevations of 700 feet, 830 feet, and 1,180 feet, respectively. All build alternatives have maximum roadway elevations greater than the existing highway (575 feet). Because vehicles would use more fuel to climb hills, vehicle energy requirements would increase for all build alternatives. This energy consumption increase may be offset by improvements in level of service (LOS) and roadway efficiency under all of the build alternatives, which would result in energy efficiency through reduced travel times through the project area.

Energy consumed through implementation of any of the build alternatives would be chiefly for the purpose of facilitating traveler mobility. Vehicle fuel consumption is affected by road grades, through-traffic vehicle speeds, and lowered efficiencies at lower vehicle speeds associated with congestion and delay at intersections. Legislated improvements in fuel efficiencies by 2025 would affect all vehicles on all alternatives more or less equally.[1] Because newer vehicles tend to run more efficiently at slightly higher, steady speeds (approaching 50–60 miles per hour [mph] for cars), those alternatives that demonstrate higher average projected through-traffic speeds should consume less fuel. The alternatives vary in projected 2043 congestion and in delays associated with the steepness of their grades, their geometries, the number and extent of passing lanes, and their intersections (see Section 3.6, Transportation). Congestion, as well as frequent stops and starts, reduces fuel efficiency. Constantly accelerating and decelerating can cut fuel efficiency by as much as 33 percent (Oak Ridge National Laboratory 2002).

Fuel consumption for cars increases by approximately 30 percent when speeds drop from 30 mph to 20 mph; and a drop from 30 mph to 10 mph results in a 100 percent increase in fuel use. Above 55 mph to 60 mph, fuel use also increases. While every engine, transmission, and wheel combination is different, smaller, lighter, and more aerodynamic cars generally achieve their best mileage at speeds considered intermediate to that approaching highway speed. Bigger, heavier, and less aerodynamic vehicles (e.g., recreation vehicles or trucks) achieve their best mileage at lower speeds.

Even accounting for the elevation changes that motorists would have to negotiate in traveling the build alternatives, the fuel savings associated with better LOS and shorter intersection delays likely would mean less overall fuel use for any of the build alternatives than for the No Build Alternative. The Juneau Creek alternatives, with the fewest intersections, would operate most efficiently and at the most consistent speeds, likely resulting in the least overall fuel use. The G South and Cooper Creek alternatives would fall between the No Build and the Juneau Creek alternatives in fuel consumed because of more intersections. The Cooper Creek Alternative, in particular, would contend with many driveways and side roads in Cooper Landing. While still an

[1] Since the early 1980s, fuel efficiencies of new vehicles sold largely doubled, plateauing at the 2007 level, when fuel efficiency for new cars sold had approached 25 miles per gallon (mpg). That improvement was chiefly attributable to implementation of the Corporate Average Fuel Economy requirements established by Congress, coupled with sharply rising gasoline prices. Fuel efficiencies since 2007 have improved markedly because of innovations in engine design and penetration of hybrid vehicles into the market share of new vehicles sold. Federal regulations require a near-doubling in the average gas mileage for passenger vehicles to 54.5 mpg by 2025. (This is actually based on a technical regulatory formula; in real-life driving, it is expected to translate to 37–40 mpg.) Of course, the fuel efficiency of new vehicles sold is not the same as that of the fleet of all vehicles on the roads at any one time. Turnover of the entire extant vehicle fleet takes decades.

improvement over the No Build Alternative, it likely would result in greater fuel use than other build alternatives. All alternatives would have fuel consumed in the process of ongoing maintenance activities.

Construction Impacts

Energy consumption for each of the build alternatives depends on the duration of construction, the types of construction equipment required, the amount of earth material to be moved, and the distance it must be moved. In general, the build alternatives with longer distances of new construction away from the existing highway are likely to require more earth moving and somewhat greater energy use. Energy supply for construction is expected to be adequate.

Mitigation

To conserve energy, the Alaska Department of Transportation and Public Facilities could require the use of more efficient light bulbs for construction site illumination, such as Light Emitting Diode bulbs that produce more lumens and last substantially longer than incandescent or other bulbs. The contractor would produce a traffic management plan to address operational traffic delays and detours during construction that would make more efficient use of construction operations time and energy. Construction equipment and material, such as batch plants and aggregate, would be located close to the project construction site to reduce hauling distance and energy consumption.

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3.19 Floodplains

Floodplains provide numerous benefits by providing temporary storage of floodwaters, and absorbing and distributing excess water and associated suspended solids, nutrients, and pollutants. Floodplains help improve and maintain water quality in streams by filtering and absorbing storm water runoff resulting from substantial rainfall and larger flood events by storing and slowly releasing floodwaters. Floodplains attenuate stream flows during flood events and increase the ability of stream channels to move flood flows downstream. Natural floodplain habitats are important because undeveloped areas within the floodplain provide recharge to groundwater, a link in the food chain and nutrient cycle, a filtering mechanism for pollutants that might otherwise reach the stream or river, and protection from storm and flood waters (Boggs et al., 1997; DNR, ADF&G, KPB, 1997). Floodplains also provide unique environments that contribute to wetland and upland habitat complexes. The Kenai River floodplain also provides a variety of recreational opportunities from fishing to wildlife viewing. These types of impacts are discussed relative to the types of natural resources that exist in floodplain areas, such as wetlands and vegetation (Section 3.20), water bodies and water quality (Section 3.13), wildlife (Section 3.22), fish and essential fish habitat (Section 3.21), and parks and recreation resources (Section 3.8).

3.19.1 Affected Environment

3.19.1.1 Regulatory Setting

Executive Order 11988, "Floodplain Management," requires the Federal Highway Administration (FHWA) to follow established procedures for assessing and avoiding potential floodplain impacts. Encroachment by a road may be a floodplain impact if there could be "a significant potential for interruption…of a transportation facility which is needed for emergency vehicles," for example, if the road washed out during a flood. According to 23 CFR § 650, a proposed action within the limits of a 100-year floodplain ("base floodplain") is considered to be a floodplain encroachment. Significant encroachments, as defined in 23 CFR § 650.105, must be avoided to the extent practicable (23 CFR § 650.113).

The Kenai Peninsula Borough (Borough) has developed a floodplain ordinance that regulates construction and improvements in flood hazard areas. The Borough Floodplain Development Ordinance (KPB, 1988) requires that floodplain encroachments not result in any increase in flood levels during the occurrence of the base flood discharge. This no-net-rise policy applies to areas both upstream and downstream of any floodplain encroachment.

According to Borough Code Chapter 21.06.050, within floodways (designated portions of the flood hazard area) "all encroachments, including fill, new construction, substantial improvements, and other development are prohibited unless certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge."

The FHWA requires a Location Hydraulic Study (LHS) during the planning of highway improvements where construction may encroach on mapped floodplains or regulatory floodways (23 CFR § 650, Subpart A). The purpose of the LHS is to determine whether a highway location alternative encroaches on a regulatory floodplain/floodway, whether there are practicable

alternatives to this encroachment, and mitigation measures to minimize environmental impacts of encroachments on floodplains. A *Location Hydraulic Study* has been prepared for this project and is included as Appendix E of this Supplemental Environmental Impact Statement.

3.19.1.2 Effective and Preliminary (100-Year) Floodplain Mapping

The 100-year floodplain is the area adjacent to a stream or river that is subject to a one percent chance of flooding in any given year (Kuwada, 2001). The 100-year floodplain for the Kenai River extends from its mouth at Cook Inlet to the upper end of Kenai Lake. Within the project area, mapped floodplains exist for only the area between approximately Milepost (MP) 47 to MP 55 for a portion of the Kenai River and Cooper Creek (Map 3.19-1). The 100-year floodplain was originally mapped by the Federal Emergency Management Agency (FEMA) using approximate methods and was adopted by the Borough in 1981. The 1981 mapping is the Borough's officially adopted floodplain.

The Borough has been working with the U.S. Army Corps of Engineers (USACE) and FEMA to update the regulatory floodplain maps for certain areas within the Borough, including updates made in 2008 on the Kenai River near Cooper Landing. The preliminary floodplain mapping extends from approximately the outlet of Kenai Lake, near MP 47, to just downstream of the Cooper Creek confluence, near MP 51 (Map 3.19-1). FEMA has released preliminary drafts of the new floodplain maps, including floodways, which are currently under public review. Official adoption of the preliminary mapping is estimated to occur in late 2014 or later; however, the updates are considered the best available data and are currently being used as the regulatory floodplain boundaries (Bevington, personal communication, 2013). The 1981 Zone A 100-year flood zone for the Cooper Landing area was mapped as an "approximate" zone, meaning that flood elevations and other detailed information had not been generated (Kenai River Center, 2011). The recent USACE floodplain analysis has resulted in more detailed information to allow the Borough to regulate with greater accuracy.

3.19.1.3 Kenai River Flood Levels at Cooper Landing

Table 3.19-1 provides a list of various Kenai River flood levels and the associated impacts to features within the community of Cooper Landing and the existing highway. The Alaska Department of Transportation & Public Facilities has historically made repairs to the Sterling Highway in the project area where flood waters have damaged the highway embankment. There is no alternative to the Sterling Highway to use in case of flooding or flood damage. As noted in the table, the highway surface is known to flood at MP 54.

Table 3.19-1. Flood levels on the Kenai River at Cooper Landing

Water level[a]	Water level description
16.5	Many houses and businesses along Sterling Highway MP 48–50 will begin to flood. Quartz Creek and North Cooper Creek Campgrounds will be underwater. Water will also be over the Sterling Highway at MP 54. Exceeded once (17.18 feet) since 1960.
15.0	Quartz Creek Campground boat ramp is submerged and water encroaches on campsites that are located next to Kenai Lake. Water should start to approach foundation level of buildings along Sterling Highway MP 48–50. North Cooper Creek Campground begins to flood. Water in slough at MP 54 will encroach on the Sterling Highway. Exceeded seven times since 1960.
14.0	Properties along the Sterling Highway MP 48–50 begin to see water in their yards. USGS gauge house adjacent to Cooper Landing Bridge begins to flood. Bottom of wooden walkway at boat ramp starts to be submerged. Exceeded 18 times since 1960.
13.0	Official National Weather Service flood stage. Exceeded 24 times since 1960.
11.0	High water level—Class II+ whitewater above Jim's Landing; Class III below Jim's Landing.
9.0	Medium water level—Class II whitewater above Jim's Landing; Class II+ below Jim's Landing.
6.0	Low water level—Class II whitewater above and below Jim's Landing.

[a] Measured in feet on the Cooper Landing Bridge gauge. Highest recorded is 17.18 feet on September 21, 1974. Floods typically occur in Sept–Oct, but twice have occurred in June.

Source: NOAA (2005).

3.19.2 Environmental Consequences

This section summarizes the findings of the LHS (refer to Appendix E for the full report). This section describes, by alternative, encroachments on the regulatory floodplain and floodway and mitigation measures to minimize the environmental impacts to floodplains.

3.19.2.1 No Build Alternative

Direct and Indirect Impacts

No changes to the roadway within the 100-year floodplain are anticipated under the No Build Alternative. The existing highway situated within or near the Kenai River and Kenai Lake 100-year floodplain would remain unchanged. The existing highway would continue to be maintained as needed. In floods of 15 feet or higher (seven times since 1960), the existing highway surface would continue to flood at MP 54, and depending on the severity of the flood event, the highway could require emergency repairs.

3.19.2.2 Issues Applicable to the Build Alternatives

Each of the build alternatives would have varied impacts to floodplains within the project area. Both the Cooper Creek and G South alternatives entail new bridges to be constructed within the official and preliminary mapped floodplains and floodway associated with the Kenai River. For the Cooper Landing Bridge under the Cooper Creek Alternative, construction would occur

within the preliminary floodway. The Cooper Creek Bridge under the Cooper Creek Alternative would clear span the floodplain associated with Cooper Creek and have no effect to floodplains at this location. The new bridges over Juneau Creek required for the Juneau Creek or Juneau Creek Variant alternative would not affect mapped floodplains. Encroachment calculations are estimated by alternative to account for potential floodplain impacts resulting from bridge piers, fill embankment required for bridge approaches, and longitudinal encroachments where roadway widening would extend into mapped floodplains. See Table 3.19-2 for a summary of encroachment upon official and preliminary floodplains and preliminary floodway. See Map 3.19-1 for locations of floodplain encroachments by alternative.

Table 3.19-2. Area of floodplain and floodway encroachment for each build alternative (acres)

Alternative	Approximate Encroachment Area in Official Mapped Floodplains	Approximate Encroachment Area in Preliminary USACE Floodplains	Approximate Encroachment Area in Preliminary USACE Floodway
Cooper Creek	5.5	0.5	0.2
G South	6.4	0	0
Juneau Creek	0	0	0
Juneau Creek Variant	<0.01	0	0

Source: Geographic Information System analysis by HDR, 2013, HDR (2011a)
Note: USACE = U.S. Army Corps of Engineers

Measures to minimize negative effects to floodplains, mapped or unmapped, have been incorporated into the design of each alternative. These include locating alignments away from floodplains, increasing bridge lengths at new crossings, and upgrading cross-drainage through culvert placement. Additional measures will be implemented during the project design phase.

No revision to the official or preliminary floodplain or floodway is required as a result of implementation of any of the build alternatives. Little or no change to historic drainage patterns is expected within or downstream of the project area. Impacts to the floodplain are minimized by following standard stream crossing design criteria and avoiding direct impacts on stream channels, where possible. Additional specific mitigation measures are described below under each alternative.

3.19.2.3 Cooper Creek Alternative

Direct and Indirect Impacts

The Cooper Creek Alternative intersects FEMA mapped floodplains of the Kenai River in seven places: two bridge crossings and five longitudinal encroachments where the cut and fill footprint of the alignment intersects the floodplain.

The Cooper Creek Alternative would replace the existing Cooper Landing Bridge with a longer bridge immediately adjacent to the existing structure. The new Cooper Landing Bridge would involve approximately 0.75 acre of fill within the official floodplain. Based on the preliminary mapping, the encroachment area of the bridge approaches would total approximately 0.5 acre.

Preliminary floodway encroachment would total approximately 0.21 acre: 0.06 acre for bridge approaches and 0.15 acre for bridge piers. Because of its longer spans, flood conveyance capacity would be increased over existing conditions, resulting in a net benefit to the floodplain function. Floodway encroachments would be developed pursuant to Borough Code, Chapter 21.06.050, and not result in any increase in flood levels during the occurrence of a base flood discharge.

South of the Kenai River, the proposed alignment would cross Cooper Creek and its mapped floodplain upstream of the existing Cooper Creek Bridge. The new Cooper Creek Bridge abutments and associated fill would be placed outside of the official floodplain and outside of the active stream channel. Floodplain encroachment of the bridge piers is estimated to be 0.15 acre.

The alignment crossing of the Kenai River and replacement of Schooner Bend Bridge at MP 53 would be located approximately 80 feet downstream of the existing bridge. The new Schooner Bend Bridge would be slightly longer than the existing bridge. Effective floodplain encroachment would total approximately 0.58 acre: 0.5 acre for bridge approaches and 0.075 acre for bridge piers. The old bridge and piers would be removed and replaced by the new structure.

Longitudinal encroachments on floodplains occur on the floodplain fringe where the alignment footprint is wider than the existing footprint. Floodplain encroachment would result from placement of fill and riprap, and installation of culverts to accommodate road widening. Five encroachments occur within the official floodplain (at MPs 47.2, 52, 53.5, 53.9, and 54.7), with a total area of impact of approximately 4 acres.

In addition to the Kenai River and Cooper Creek, this alternative would cross approximately 57 small streams or drainages. Most of the stream crossings are outside the official floodplain, and none of these streams has an established regulatory floodplain. All of these stream crossings would have new or replaced culverts that would be sized to accommodate the base flood and to avoid a rise in water surface elevation during storm events. The elevation of the reconstructed highway in the MP 54 area that is prone to flooding would be raised during reconstruction to reduce the likelihood of flooding. This alternative would require replacing approximately 10 existing culverts located in or adjacent to the effective floodplain in the MP 53 to 55 segment.

Construction Impacts

During bridge construction, work platforms may be temporarily placed within the floodplain. During the Borough floodplain development permit review process, or other permit reviews required for bridge construction, permit requirements relative to allowable fill in the floodplain would be established.

Mitigation

The Cooper Landing Bridge design incorporates several features that will minimize and mitigate impacts to mapped floodplains. The overall structure would be longer than the existing structure, resulting in a flood conveyance capacity greater than the existing bridge. Retaining walls would be used at the north and south approaches to the bridge to limit impacts to the Kenai River floodplain and floodway and the existing boat launch.

The new Schooner Bend Bridge would be slightly longer than the existing bridge, which would increase the flood conveyance capacity over existing conditions.

Longitudinal encroachments on the floodplain occur in areas that are on the "Old Sterling Highway." These locations are in areas where the "Old Sterling Highway" already encroaches on the Kenai River historic floodplain and includes protection for the roadway. During final design, the amount of impact to the floodplain will be minimized when possible, and in many cases may be avoided by a slight alignment shift or other engineering solution.

The surface elevation of the rebuilt highway in the MP 54 area that is prone to flooding would be raised to reduce the likelihood of flooding.

3.19.2.4 G South Alternative

Direct and Indirect Impacts

The G South Alternative would encroach on the mapped floodplain in six locations: two new bridges and four longitudinal encroachments where the cut and fill footprint of the upgraded alignment is wider than the current highway. The G South Alternative would encroach upon approximately 6.4 acres of the Kenai River floodplain, but would not encroach upon the preliminary floodplain or floodway.

The Schooner Bend Bridge impacts are identical to those described for the Cooper Creek Alternative. There are four locations of longitudinal encroachments to the Kenai River (at MPs 52, 53.5, 53.9, and 54.7), totaling 3.74 acres of impact to the Kenai River floodplain (Map 3.19-1).

The G South Alternative includes a new bridge over Juneau Creek, which does not have a mapped floodplain, and a new bridge over the Kenai River. Fill placed into the floodplain for bridge abutments and piers to construct the Kenai River Bridge would affect approximately 1.98 acres of the Kenai River floodplain.

In addition to the major bridge crossings, the G South Alternative would cross approximately 73 small streams or drainages. Most of the stream crossings are outside the official floodplain, and none of these streams has an established regulatory floodplain. All of these stream crossings would have new or replaced culverts sized to accommodate the base flood and to avoid a rise in water surface elevation during storm events. The elevation of the highway surface in the MP 54 area, which is currently prone to flooding, would be raised during highway reconstruction to reduce the likelihood of flooding. This alternative would require replacing approximately 10 existing culverts located in or adjacent to the mapped floodplain in the MP 53 to 55 area.

Construction Impacts

During bridge construction, temporary work platforms may be placed within the 100-year floodplain. During the Borough floodplain development permit review process, or other permit reviews required for bridge construction, permit requirements relative to allowable fill in the floodplain would be established.

Mitigation

The new Schooner Bend Bridge would be slightly longer than the existing bridge, which would increase the flood conveyance capacity over existing conditions.

Longitudinal encroachments on the floodplain occur in areas that are on the "Old Sterling Highway." These locations are in areas where the "Old Sterling Highway" already encroaches on the Kenai River floodplain and includes protection for the roadway. During final design, the

amount of impact to the floodplain will be minimized when possible, and in many cases may be avoided by a slight alignment shift or other engineering solution.

The surface elevation of the rebuilt highway in the MP 54 area that is prone to flooding would be raised to reduce the likelihood of flooding.

3.19.2.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

The Juneau Creek Alternative would not encroach on official floodplains or the preliminary floodplain and floodway mapped areas, and would not require bridge crossings of any regulatory floodplains.

The Juneau Creek Variant includes a less than 0.01-acre longitudinal encroachment on the mapped Kenai River floodplain at approximately MP 54.9. This alternative would not require bridge crossings of any regulatory floodplains.

The Juneau Creek and Juneau Creek Variant alternatives would require a new bridge over Juneau Creek as well as crossing approximately 63 small streams or drainages, including Bean Creek. None of these streams, including Juneau Creek, has an established regulatory floodplain. All of these crossings would have new or replaced culverts that would be sized to accommodate the base flood and avoid a rise in water surface elevation during storm events.

Construction Impacts

During bridge construction, temporary work platforms may be placed within the 100-year floodplain. During the Borough floodplain development permit review process, or other permit reviews required for bridge construction, permit requirements relative to allowable fill in the floodplain would be established.

Mitigation

Longitudinal encroachments occur in areas that are on the “Old Sterling Highway.” This location is in an area where the “Old Sterling Highway” already encroaches on the Kenai River floodplain and includes protection for the roadway. During final design, the amount of impact to the floodplain will be minimized, when possible, and in many cases may be avoided by a slight alignment shift or other engineering solution.

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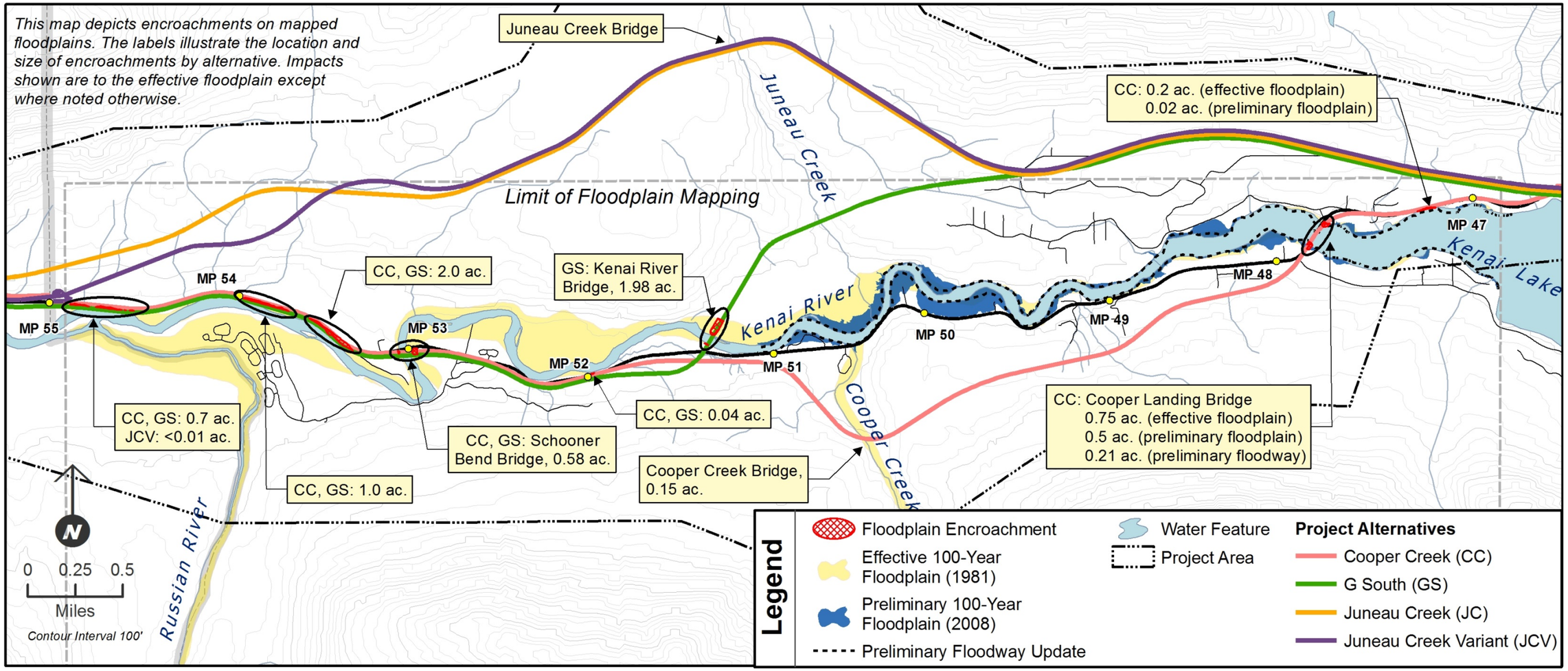

Map 3.19-1. Floodplain impacts in the project area

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3.20 Wetlands and Vegetation

3.20.1 Affected Environment

This section includes a description of the existing environment as it relates to wetlands and vegetation in the project area, including discussion of threatened and endangered plant species, sensitive plant species, and invasive plant species.

3.20.1.1 Wetlands

Section 404 of the Clean Water Act and Executive Order 11990, *Protection of Wetlands*, require avoiding and minimizing wetland impacts. The project must avoid wetlands unless there is "no practicable alternative," and if an alternative uses wetlands, it must undergo "all possible planning to minimize harm." Additional information is included in the wetlands mapping found in the *Preliminary Jurisdictional Determination* (HDR 2010b) and the corresponding *Wetland Functional Assessment* (HDR 2010c).

An office-based geographic information system (GIS) evaluation was conducted to identify possible hydrologic connections between wetlands and other regulated waters mapped in the project area. The Kenai River and Kenai Lake are Federally listed traditional navigable waters, and all major streams in the project are tributaries to these waters, suggesting that wetlands identified in the project area are under the jurisdiction of the U.S. Army Corps of Engineers (USACE). The USACE asserts jurisdiction over all traditional navigable waters, wetlands adjacent to traditional navigable waters, non-navigable tributaries to traditional navigable waters that are relatively permanent and wetlands that directly abut such tributaries. As such, potential impacts to jurisdictional wetlands and water bodies in the project area are subject to permit approval by the USACE. Understanding the wetland value and function loss from a proposed project is an element of the USACE permitting process.

Approximately 90 percent of the project area is uplands. The remaining 10 percent is composed of wetlands and water bodies. Wetlands in the project area that could be affected by project alternatives were mapped and field verified in a one-quarter-mile corridor along the proposed alternative alignments and including an area adjacent to the existing Quartz Creek material site (HDR 2010c). The mapping limits comprise 4,414.4 acres within the project area (the mapped area). In addition to wetlands, many water bodies, typically ponds are found in the project area. These ponds are generally small and are located near the Kenai River. Map 3.20-1 shows the locations and types of wetlands in the project area (more detailed depictions can be found in the documents mentioned above). Table 3.20-1 shows acreage and percentages of areas mapped by wetland type.

Wetlands identified within the project area are palustrine. Palustrine wetlands are shallow and nontidal. They are adjacent to rivers and lakes, on floodplains, or self-contained in isolated basins on uplands and slopes. Typical vegetation in the project area includes spruce, shrubs, emergent plants, mosses, and lichens. Water regimes vary between saturated and semi-permanently flooded. The palustrine wetlands in the project area are categorized into five broad types based on dominant vegetation type: forested wetland, deciduous shrub thicket wetland, shrub-dominated bog wetland, emergent wetland, and pond wetland. The majority of wetlands in the project area are connected to the Kenai River system and likely perform important

hydrological, ecological, and water quality functions. In addition, the majority of the project area wetlands are relatively undisturbed. Most wetlands adjacent to the existing Sterling Highway, however, have been affected by development, which has lowered the quality of these wetlands. Wetlands adjacent to the existing highway likely retain sediment and pollution from highway runoff and improve the water quality in downstream water bodies, including the Kenai River.

Table 3.20-1. Mapped wetland types

Type	Mapped Acres	Percent (%) of Mapped Area
Forested Wetland	223.5	5.1
Deciduous Shrub Thicket Wetland	63.0	1.4
Shrub-Dominated Bog Wetland	64.0	1.5
Emergent Wetland	78.5	1.8
Pond Wetland	10.5	0.2
Upland (non-wetland)	3,974.8	90.0
Total	**4,414.4**	**100**

Note: Acreage differs slightly from those reported in HDR (2010c) due to minor updates of project area wetlands mapping conducted since 2010.

Wetland functions are the chemical, physical, and biological processes or attributes that contribute to the self-maintenance of a wetland and relate to the ecological significance of wetland properties without regard to subjective human values (ASTM 1999). Individual wetlands vary with respect to the type and degree of functional performance. The location and size of a wetland may determine what functions it will perform (Novitzki et al. 1997). Scientists used a combination of wetlands field data and best professional judgment to assign wetland functions in the project area (HDR 2010c).

Wetland types connected to the Kenai River or its tributaries provide valuable aquatic habitat for rearing anadromous fish species and provide nutrients for the aquatic ecosystem. The palustrine wetlands near the Kenai River and its tributaries provide enriched organic material, which serves as a primary food for aquatic invertebrates and habitat for terrestrial insects and other invertebrates, in turn providing important food sources for juvenile salmon and resident fish. Riparian wetland vegetation provides a number of additional functions, including providing protective cover for fish and providing feeding areas and travel corridors for wildlife such as moose and brown bear (DNR, ADF&G, KPB 1997). Wetlands that are contiguous to the Kenai River and its tributaries also regulate water flow by acting as areas for groundwater recharge/discharge and as a natural retention area for storm and floodwater events. These wetlands also provide runoff water filtration by accumulating sediments, reducing nutrient loads, and increasing the oxygen content of the waters that pass through them. Drainage characteristics, sedimentation, and flushing characteristics of upland and lowland water flows are also influenced by these wetlands.

General descriptions and functions these wetland types are likely to perform are provided below. Additional information regarding project area wetland functions is included in the *Wetland Functional Assessment* (HDR 2010c).

***Forested Wetlands*.** Forested wetlands are the most abundant wetland type mapped in the project area, covering approximately 223.5 acres (5.1 percent) of the mapped area. This wetland type is dominated by an overstory of black spruce (more than 20 feet tall) with an understory comprised of a mix of low-bush cranberry, crowberry, cloudberry, Barclay's willow, bog blueberry, Sitka alder, northern Labrador tea, meadow horsetail, field horsetail, and bluejoint reedgrass. All forested wetlands sampled in the field had saturated soils and evidence of drainage features (i.e., low-lying depressions, swales, rivulets, etc.). Identified functions of these forested wetlands are:

- Groundwater recharge
- Groundwater discharge
- Sediment retention and pollution removal
- Food chain support
- Wildlife habitat
- Human non-consumptive values and uses

***Deciduous Shrub Thicket Wetlands*.** Approximately 63.0 acres of deciduous shrub thicket wetlands were identified (1.4 percent of the mapped area). Most of these are adjacent to streams or ponds. Characteristics typical of this wetland type include a dense overstory dominated by Sitka alder and Barclay's willow. Traces of black spruce, Lutz spruce, or paper birch were found at some sites. Dominant herbaceous species included meadow horsetail, dwarf dogwood, and bluejoint reedgrass. Identified functions of these deciduous shrub thicket wetlands are:

- Groundwater recharge
- Groundwater discharge
- Streamflow moderation
- Shoreline, stream bank, and soil stabilization
- Sediment retention and pollution removal
- Food chain support
- Wildlife habitat
- Fish habitat

Shrub Bog Wetlands. Shrub bogs cover approximately 64.0 acres (1.5 percent of the mapped area). Dominant shrubs in this wetland type include stunted black spruce (less than 20 feet tall), bog blueberry, dwarf birch, crowberry, northern Labrador tea, shrubby cinquefoil, sweet gale, Sitka alder, and Barclay's willow. Common herbs include bluejoint reedgrass, field horsetail, northern scouring rush, and water sedge. Identified functions of these shrub bog wetlands are:

- Groundwater recharge
- Groundwater discharge

- Streamflow moderation
- Shoreline, stream bank, and soil stabilization
- Sediment retention and pollution removal
- Food chain support
- Wildlife habitat
- Human non-consumptive values and uses

Emergent Wetlands. In the project area, emergent wetlands are located in old sloughs or channels of the Kenai River or on benches on the mountain slopes north of the river. Approximately 78.5 acres of emergent wetlands were identified (1.8 percent of the mapped area). General characteristics include a dense mat comprised of a mix of beaked sedge, water sedge, narrow-leaved cotton grass, Chamisso's cotton grass, northern scouring-rush, and few-flowered sedge. Higher areas within emergent wetlands support stunted black spruce, shrubby cinquefoil, dwarf birch, Sitka alder, and northern Labrador tea. Emergent wetlands are the wettest of the project area wetlands; all of the sites visited in the field were saturated at the ground surface or appeared to experience periodic inundation. Identified functions of these emergent wetlands are:

- Groundwater recharge
- Groundwater discharge
- Streamflow moderation
- Shoreline, stream bank, and soil stabilization
- Sediment retention and pollution removal
- Food chain support
- Wildlife habitat
- Fish habitat, where wetlands are connected to fish bearing waters

Pond Wetlands. Most ponds within the project area are located near or directly adjacent to the Kenai River. These ponds are generally small and shallow, and some support aquatic vegetation. Approximately 10.5 acres of ponds were identified (0.2 percent of the mapped area). Identified functions of pond wetlands are:

- Groundwater recharge
- Groundwater discharge
- Streamflow moderation
- Shoreline, stream bank, and soil stabilization
- Sediment retention and pollution removal
- Food chain support
- Wildlife habitat
- Fish habitat

- Human non-consumptive values and uses
- Uniqueness and heritage

3.20.1.2 Vegetation

Vegetation in the project area that could be affected by alternatives was delineated in a one-quarter-mile corridor around project alternatives, and extended beyond the one-quarter-mile corridor in areas where alternatives would require major creek/river crossings. Six main vegetation types dominate the project area: needle-leaved forests, broad-leaved forests, mixed needle-leaved and broad-leaved forests, shrub thickets, dry meadows, and wet meadows. Map 3.20-2 shows the locations and types of vegetation in the project area. Table 3.20-2 provides acreages and percentages of the mapped vegetation.

Table 3.20-2. Mapped vegetation types

Type	Mapped Acres	Percent (%) of Mapped Area
Needle-Leaved Forests	1,803	36
Broad-Leaved Forests	383	8
Mixed Needle-Leaved and Broad-Leaved Forests	2,049	41
Shrub Thickets	98	2
Dry Meadows	40	1
Wet Meadows	76	2
Non-vegetated[a]	523	10
Total	**4,972**	**100**

[a] Non-vegetated cover type includes unvegetated mudflats, gravel bars, water, roads, buildings, disturbed fill embankments, and all other cleared or developed areas within the mapped area.

Additional information regarding vegetation is available in the *Preliminary Jurisdictional Determination* (HDR 2010b) and the *Biological Evaluation for Plants* (HDR 2006c). General descriptions of these vegetation types are provided below.

Needle-Leaved Forests. Needle-leaved forests are found throughout the project area and are dominated by evergreen species such as Lutz spruce, black spruce, or mountain hemlock. More than one evergreen tree species can be present in these forests and the density of the canopy ranges from 10 to 60 percent. Needle-leaved forests comprise approximately 36 percent of the mapped project area. Understory species in these forests are variable depending upon a variety of factors including overstory species, slope, aspect, soil conditions, and hydrology.

Spruce bark beetle infestation has impacted the upland needle-leaved forest on the Kenai Peninsula in the project area. In infested areas, spruce mortality is high, creating a dramatically increased potential for large, intense wildfires. Additional areas of the Chugach National Forest (CNF) in the project area have recently been manually or mechanically cleared to reduce fire fuels accumulation. To enhance moose habitat in these stands, some areas have been burned and

seeded to promote hardwood sapling growth. Forest stands that have been cleared have substantially reduced canopy densities, typically ranging from 10 to 25 percent.

Broad-Leaved Forests. Broad-leaved forests are scattered throughout the project area and are dominated by paper birch, quaking aspen, or black cottonwood. More than one species of tree can be present and understory species are variable. Canopy closure in these forests ranges from 10 to 100 percent. Broad-leaved forests comprise approximately 8 percent of the mapped project area.

Mixed Needle-Leaved and Broad-Leaved Forests. Mixed needle-leaved and broad-leaved forests are the most common vegetative type in the project area, comprising approximately 41 percent of the mapped project area. These areas are dominated by a mix of needle-leaved and broad-leaved trees, including Lutz spruce, black spruce, mountain hemlock, paper birch, quaking aspen, and black cottonwood. Canopy closure ranges from 10 to 100 percent and understory species are variable.

Shrub Thickets. Shrub thickets are dominated by broad-leaved shrubs such as Sitka alder and various willow species. Shrub thickets usually have dense canopies and are typically located adjacent to streams. This cover type comprises 2 percent of the mapped project area.

Dry Meadows. Dry meadows are dominated by bluejoint reedgrass or fireweed with lesser amounts of other plants, including Sitka alder and oak fern. Dry meadows comprise approximately 1 percent of the mapped project area and are primarily found in disturbed areas (such as adjacent to the existing highway and in avalanche chutes).

Wet Meadows. Wet meadows are wetlands that are dominated by a variety of herbaceous plants including beaked sedge, water sedge, and Chamisso's cotton grass. This vegetation type comprises 2 percent of the mapped project area and is found either in close proximity to the Kenai River or in the Juneau Creek Valley.

3.20.1.3 Threatened and Endangered Plant Species

There are no plants listed as endangered and threatened under the Endangered Species Act of 1973, as amended, in the project area; therefore, impacts to endangered and threatened species are not discussed in this Supplemental Environmental Impact Statement (SEIS).

3.20.1.4 Sensitive Plant Species

The 2009 U.S. Forest Service (USFS) Alaska Region Sensitive Species[1] List identified plant species for which population viability is a concern. The list, updated from 2002 to add seven new species, designated 18 plants found in Alaska as sensitive species. Thirteen of these species were known or suspected to occur within the CNF and nine species were known or suspected to occur specifically in the Seward Ranger District (Table 3.20-3).

In 2003 and 2006, sensitive plant field surveys (based on the 2002 Sensitive Species List) were conducted to identify any rare plants within a 200-foot corridor of the build alternatives (HDR 2006c). No sensitive plant species, as designated from the 2002 List, were discovered on potentially affected CNF lands within the project area during the survey (HDR 2006c).

[1] Sensitive Species: "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: a. significant current or predicted downward trends in population numbers or density, or b. significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." (USFS 1997)

The 2009 revision to the 2002 Alaska Region Sensitive Species List states that current or planned USFS actions that are underway at the time the updated sensitive species list goes into effect are exempt from the requirement to conduct a biological evaluation for the newly added species (Goldstein, Martin and Stensvold 2009). This allows actions, such as the road construction proposals evaluated in this SEIS, which have been planned using the 2002 list of sensitive species, to progress using that list. Regardless, a GIS analysis was conducted to evaluate the likelihood of the occurrence of the seven newly added species. The likelihood of occurrence was evaluated based on the availability of appropriate habitat within the project area, review of all plants observed in all habitat types in the project area during the 2003 and 2006 sensitive plant surveys, and discussion with USFS scientists with knowledge of the occurrence of sensitive plants in the CNF and throughout Alaska.

Table 3.20-3. USFS sensitive plant species in Chugach National Forest

Known	Suspected
Eschscholtz's little nightmare (*Aphragmus eschscholtzianus)* [a]	Moosewort fern (*Botrychium tunux*) [a]
Pale poppy (*Papaver alboroseum)* [a]	Moonwort fern, no common name (*Botrychium yaaxudakeit*) [a]
Unalaska mist-maid (*Romanzoffia unalaschcensis)* [a]	Spatulate moonwort (*Botrychium spathulatum*)
	Sessileleaf scurvygrass (*Cochlearia sessifolia*) [a]
	Mountain lady's slipper (*Cypripedium montanum)*
	Large yellow lady's slipper (*Cypripedium parviflorum* var. *pubescens)*
	Alaska rein orchid *(Piperia unalascensis)* [a]
	Dune tansy (*Tanacetum binnatum* ssp. *huronense*) [a]
	Calder's lovage (*Ligusticum calderi)*
	Spotted lady's slipper *(Cypripedium guttatum)* [a]

Source: Goldstein, Martin, and Stensvold (2009) and Erickson, personal communication (2013).
[a] Species that are known or suspected to occur in the Seward Ranger District.
Note: USFS = U.S. Forest Service

Two of the added species (sessileleaf scurvygrass and dune tansy) were excluded from evaluation due to their association with habitats not identified within the project area (marine estuaries and sand dunes, respectively). Based on the associated habitat types, the remaining five species (spatulate moonwort, spotted lady's slipper, mountain lady's slipper, large yellow lady's slipper, and Alaska rein orchid) may potentially occur in the project area since the area contains appropriate habitat and is within the known or suspected range of the plants. Of these species, the two most likely to occur in the project area are the spotted lady's slipper and the Alaska rein orchid, as they are the only two of the five that are suspected to occur in the Seward Ranger District. The remaining three are not suspected to occur in the Seward Ranger District, but are suspected to occur within the larger CNF.

Review of daily plant lists from 2003 and 2006 field surveys did not identify presence of the five sensitive species in question. While the field surveys were not specifically designed to search for the five species, both efforts covered all appropriate habitats in which the five species have the potential to occur. Field surveys also documented all plant species found in all habitat types and would have documented the presence of the five species in question if they had been located. Additionally, the four orchid species are visually dramatic, and would be unlikely to be

overlooked by the botanists conducting the surveys. This review suggests that it is unlikely that any of the five sensitive species in question occur in the project area. This conclusion was confirmed by USFS biologists (HDR 2011d).

3.20.1.5 Invasive Plant Species

The term "invasive species" used in this section is defined by the Department of Interior's National Invasive Species Council as "a species that are non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health" (NISC 2008). Executive Order 13112 (1999) requires all Federal agencies to prevent the introduction of invasive species; provide for their control; and minimize their impact to the local economy, ecology, and human health.

Presence and distribution of non-native plant species in the area that could be affected by project alternatives were identified using records from the Alaska Exotic Plant Information Clearinghouse (AKEPIC). AKEPIC is an internet-based, publicly available database created to track occurrences of non-native plants in Alaska that is administered by the University of Alaska Anchorage. The AKEPIC dataset has more than 19,000 records of 97 non-native plant species on the Kenai Peninsula, with nearly 1,500 records of 46 non-native plant species in the project area.

AKEPIC records and surveys indicate that non-native plants in the project area are concentrated in close proximity to existing right-of-way. Records of invasive plant species have been noted along the Sterling Highway and Skilak Lake Road, along the Kenai River, within the Russian River Campground, along the Russian Lakes trail, and under power lines. At these locations, invasive plant populations occupy roadsides, gravel parking lots, trailheads, trail-sides, and gravel river bars (DeVelice, et al. 1999, Duffy 2003, Chumley and Klausner 2005, Cortes-Burns and Carlson 2006, Barnett and Simonson 2007, AKEPIC 2013).

Not all non-native plants are invasive. Invasiveness is the ability of a plant to establish itself in an undisturbed native community and out-compete native vegetation. The Alaska Natural Heritage Program developed a ranking system to assess the invasiveness of a plant species based on its ecological impacts, biological attributes, distribution, and response to control measures (Carlson, et al. 2008). This ranking system categorizes non-native plants as extremely invasive, highly invasive, moderately invasive, modestly invasive, weakly invasive, and very weakly invasive. Extremely invasive and highly invasive plants are of the greatest concern to land managers. Table 3.20-4 lists invasive plants with highest record of occurrence in the project area and the highest categories of invasiveness ranking. There are approximately 50 records of four extremely invasive or highly invasive plants in the project area.

Invasive species are not regulated by law at the state level; however, the State of Alaska has developed a list of prohibited and restricted noxious weeds to protect agriculture and the public interest (AAC 1987). Three of the 16 Alaska prohibited noxious weeds found in the project area, Canada thistle, hempnettle, and quackgrass, are also listed in Table 3.20-4.

Experts agree that reed canary grass poses one of the greatest concerns in Alaska (AKEPIC 2013). Surveys on the Kenai Peninsula have documented the presence of reed canary grass in and near wetlands and streams that are important for water quality, flooding, and erosion, and that also support a variety of wildlife, including anadromous fish. In the project area, reed canary grass is restricted to areas with disturbed soil and vegetation. None of the records indicate that this plant has been observed affecting a native plant community or reducing open water.

Table 3.20-4. Invasive plant species with highest [a] categories of invasiveness ranking documented in the project area

Scientific Name	Common Name	AKNHP Rank/State Regulation
Phalaris arundinacea	Reed canary grass	Extremely invasive
Melilotus alba	White sweet clover	Extremely invasive
Cirsium arvense	Canada thistle	Highly invasive / prohibited noxious weed
Vicia cracca ssp. cracca	Bird vetch	Highly invasive
Galeopsis tetrahit	Hempnettle	Modestly invasive / prohibited noxious weed
Elymus repens	Quackgrass	Modestly invasive / prohibited noxious weed

[a] Table includes invasive species ranked in the three highest categories of invasiveness ranking as defined by the AKNHP (Carlson, et al. 2008).
Note: AKNHP = Alaska Natural Heritage Program

3.20.2 Environmental Consequences

This section describes the potential impacts of the project on wetlands and vegetation, as well as efforts made to avoid and minimize harm to wetlands. Upland (non-wetland) and wetland vegetation are important to wildlife as food sources and habitat. Impacts to vegetation are most often reflected in wildlife habitat functions. Impacts related to vegetative loss and the consequential effect on wildlife are further discussed in Section 3.22, Wildlife. Vegetation also is important in both capturing and reducing surface runoff from the roadway, a water quality benefit. See Section 3.13, Water Bodies and Water Quality, for a discussion related to water quality impacts. The evaluation of effects of the alternatives on vegetation is described in detail in the *Biological Evaluation for Plants* (HDR 2006c).

3.20.2.1 Wetland and Vegetation Impact Assessment Methods

This assessment of impacts is based on the best design information available at this stage of project development. The *Wetland Preliminary Jurisdictional Determination* and *Wetland Functional Assessment* (HDR 2010b, 2010c) provide details about the impacts on wetlands and vegetation, including wetland functions and values that could be lost as a result of the project alternatives.

For the purpose of direct impact evaluation, the cut and fill limits have been assumed to be the direct impact zone for both wetlands and vegetation. The amount of wetlands and vegetation within this zone was calculated with GIS and reported as acres lost. The functions assigned to each wetland within the cut and fill limits were calculated with GIS and reported as acres of wetland function lost. Direct impacts on sensitive species and invasive species are more appropriately discussed in qualitative terms, so these impacts are not discussed as acres.

For the purpose of an indirect impact evaluation for wetlands, land 300 feet beyond the designed cut and fill limits has been assumed to be within the indirect impact zone. The amount of wetlands within this zone was calculated with GIS and reported in acres. The size of the indirect impact zone was based on the area in which indirect adverse impacts of development and construction activities are most likely to occur, as established in the Anchorage Debit Credit Method that was developed by the USACE Alaska Region, U.S. Environmental Protection Agency Region 10, and the Municipality of Anchorage (USACE 2011). The indirect impact zone extends 300 feet from the edges of developed areas and other proposed construction zones that

may cause indirect impacts to neighboring aquatic areas. Existing undeveloped areas outside these limits are not expected to be indirectly impacted from this project. Indirect impacts to water bodies are discussed in Section 3.13, Water Bodies and Water Quality.

Indirect impacts on vegetation are more appropriately described in qualitative terms. Therefore, the indirect impacts on vegetation types, sensitive species, and invasive species are not discussed in terms of acres.

3.20.2.2 No Build Alternative

Direct and Indirect Impacts

Wetlands. In terms of direct impacts, there would be no fill in or loss of wetlands under the No Build Alternative. Storm water runoff from the existing highway would continue to contribute sediment and pollutants to adjacent wetlands. With continued high use of the existing highway, there remains a higher potential for trucking accidents to spill hazardous materials in vegetated areas adjacent to the Kenai River, some of which are wetlands. See Section 3.17, Hazardous Waste Sites and Spills, for additional discussion of hazardous material spill risk.

Continued long-term indirect impacts on approximately 60 acres of wetlands and ponds located within 300 feet of the existing highway are expected. These impacts include, but are not limited to, ongoing changes to natural wetland hydrology, continued reductions to the hydrological connectivity of wetlands to water bodies, decreased water quality, increases in invasive plant species, reductions in species richness, and continued human use of these wetlands. Potential future hazardous material spills in wetlands and other impacts on wetlands adjacent to the existing highway could result because roadway characteristics (e.g., curve design, sight distance, grades, and lane and shoulder widths) would not be upgraded. As these impacts have already occurred, their effects are addressed in Section 3.27, Cumulative Impacts.

Vegetation. In terms of direct impacts, there would be no fill in, or loss of, vegetation under the No Build Alternative. There would be continued long-term indirect impacts on vegetated areas adjacent to the existing highway as a result of the No Build Alternative, including alterations to native plant communities. Native plant communities would be altered by the continued presence of invasive and exotic plant species and disturbance from road maintenance activities, including the introduction of sand and gravel (for traction) and the effects of pollutants from runoff and roadway trash and debris.

3.20.2.3 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

Wetlands. All build alternatives would cross wetlands and would result in the filling of wetlands for construction of the new road, resulting in permanent loss of wetlands. In developing the alignments for each of the alternatives, the Alaska Department of Transportation & Public Facilities (DOT&PF) attempted to avoid and minimize the extent to which aquatic ecosystems (e.g., wetlands) would be excavated or filled as much as practicable. Map 3.20-3 shows the locations of alternatives relative to wetlands in the project corridor. Direct impacts to wetlands and ponds are shown in Table 3.20-5. The following sections present more detail on direct impacts by wetland type and function. Impacts to water bodies, such as the Kenai River, are discussed in Section 3.13, Water Bodies and Water Quality. Fish-related impacts associated with the fill of wetlands are discussed in Section 3.21, Fish and Essential Fish Habitat.

Table 3.20-5. Direct impacts on wetlands

Wetland Type	Approximate Area of Fill (acres)			
	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Forested	2.3	17.6	24.2	24.2
Deciduous Shrub	1.7	3.1	4.7	3.0
Shrub bogs/fens	3.7	2.6	2.2	1.5
Emergent	1.1	1.1	6.3	6.7
Ponds	2.2	2.2	1.1	2.1
Total wetlands and ponds filled	11.0	26.6	38.5	37.5

Wetland degradation occurring outside of but adjacent to the footprint of transportation projects can result in changes to water quality, quantity, and flow rates; increases in pollutant inputs; and changes in species composition as a result of disturbance and introduction of non-native species. With all the build alternatives, permanent impacts to wetlands functions in the indirect impact zone, adjacent to segments built on new alignment, would be expected. The amount of wetlands affected by these indirect impacts is shown in Table 3.20-6. Impacts to water bodies, including acreage of the Kenai River that is within the 300-foot indirect impact zone, are not included in this table.

Table 3.20-6. Indirect impacts on wetlands, acreage of wetlands adjacent to alternatives

Amount of wetlands within indirect impact zone[a]	Wetland Area by alternative (acres)				
	No Build	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
New alignment	—	14	67	130	119

[a] The indirect impact zone is defined as 300 feet beyond each side of the cut and fill limits of each build alternative. For the No Build Alternative, the indirect impact zone is 300 feet from the edge of pavement of the existing highway. The amount of wetlands contained within the indirect impact zone includes wetlands affected by construction activities.

Changes to hydrological, water quality, ecological, and socioeconomic functions performed by wetlands in the indirect impact zone would be likely. As is the case with the existing Sterling Highway along its alignment through the KNWR, roads can impound a wetland, even if culverts are used. Such inadvertent impoundment and hydrologic alteration can change the functions of the wetland. The placement of a new road prism in wetlands can slow the movement of water through the entire wetland complex, altering the existing hydrology of adjacent wetlands. In addition, a reduction in the overall hydrological connectivity of the wetland complex to water bodies could result. With an increase in the amount of impervious surface, a decrease in groundwater recharge within the watershed is likely, which reduces water flow into wetlands. Contaminants contained in runoff from the new alignments could be introduced to adjacent wetlands, reducing water quality. Wildlife use of wetlands adjacent to new alignments could also be affected by the physical fragmentation of habitat as well as increased noise levels from operation. Fish that use stream and pond habitat in wetlands near the new alignments could be affected by reduced water quality.

Wetlands closer to the build alternative alignments would likely experience more indirect effects and at a larger magnitude than those wetlands located farther from these alignments. The wetlands located within the indirect impact zone of the alternatives may also be indirectly affected by other developments, including local roads, driveways, homes, and businesses.

Vegetation. All build alternatives would require permanent removal of vegetation. Table 3.20-7 presents the approximate acreage of each vegetation type that would be removed by project alternatives. Acreages were calculated by comparing the construction footprint areas with the mapped vegetation in the project area.

Table 3.20-7. Areas of vegetation, by type removed under build alternatives (acres)

Vegetation Type	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Needle-leaved forest	88	64	127	122
Broad-leaved forest	11	26	25	17
Mixed needle- and broad-leaved forest	79	104	102	105
Shrub thicket	4	3	4	1
Dry meadow	5	4	4	4
Wet meadow	1	1	7	7
Total	**188**	**202**	**269**	**256**
Non-vegetated areas[a] *(not included in totals)*	57	50	31	36

[a] Non-vegetated cover type primarily includes existing road surfaces and disturbed fill embankments associated with the existing highway and located within the proposed cut/fill construction limits of the build alternatives.

Under the Juneau Creek and Juneau Creek Variant alternatives, a new trailhead would be constructed for the Resurrection Pass Trail near where the alignment would cross the existing trail. The new trailhead would result in additional impact to vegetation beyond those acreages noted in Table 3.20-7.

Permanent removal of vegetation will result in a net loss of that vegetation type. While removal of vegetated cover is not subject to permitting authority, vegetation is a factor of consideration for additional area resources, including water quality, wildlife, wetlands, hydrology, recreational use, and visual impacts. Permanent vegetation loss affects the ability of these resources to function as effectively as they would in an undisturbed condition.

Long-term impacts on vegetation adjacent to new alignments of the build alternatives would be expected. Road maintenance activities, such as the introduction of sand and gravel (for traction) and the effects of pollutants from runoff and roadway trash and debris, could also affect vegetation in areas adjacent to new alignments.

Impacts on vegetation from build alternatives would result in the loss of wildlife habitat (see Section 3.22 for effects on wildlife species) and an increase in surface runoff volume (see Section 3.13 for effects on water bodies).

Sensitive Species. Based on the review of published data, field survey data, and consultation with USFS biologists, there is a low likelihood of USFS recognized sensitive plant species occurring within the project area; therefore, the project build alternatives are not expected to adversely impact USFS sensitive plant species.

Invasive Species. Continued long-term impacts on vegetated areas adjacent to the existing highway include alterations to native plant communities. Changes to native plant communities would be primarily from the presence of invasive and exotic plant species and from disturbance resulting from road maintenance activities. For example, the introduction of sand and gravel (for traction) and the effects of pollutants from runoff and roadway trash and debris would disturb native plants. Improved access to trails could increase the number of trail users, which may lead to an increased of spread of invasive plant species along the trails in the project area.

Construction Impacts

Wetlands. Construction of the build alternatives would result in temporary impacts on wetlands and associated wetland functions and values. Road and bridge construction activities can increase sediment loading to wetlands and can also disrupt habitat continuity, driving out more sensitive, interior plant species, and providing habitat for hardier opportunistic edge and non-native species. Further, borrow pits (used to provide fill for road construction) that are adjacent to wetlands can degrade water quality through increased turbidity of runoff water leading to sediment deposition in adjacent wetlands.

Permit stipulations and recommendations will be developed that would include specification of techniques and timing of activities that will further minimize impacts during construction. Additionally, best management practices (BMPs) would be used during construction of all build alternatives to minimize wetland impacts (see mitigation detail below). No cleared vegetation and excess soil disposal sites or access roads would be located in wetlands to the extent practicable. Temporary fill in wetlands for staging areas adjacent to proposed bridge locations would be required for material stockpiling and equipment operation. Only the necessary area required for construction activities would be impacted during the construction process. At the conclusion of construction, the fill will be removed, disposed of in an approved disposal area, and the wetlands reestablished. Wetland areas within 10 feet of the cut and fill limits are likely to be disturbed by equipment operation. Table 3.20-8 lists the total acreage of wetlands (by type), including ponds, affected by construction activities for each build alternative. Approximate temporary fill totals for wetlands also are presented.

Vegetation. Construction activities required for any build alternative would temporarily affect vegetation outside the cut and fill prism. Impacts to vegetation from equipment operation and use of staging areas, disposal sites for cleared vegetation and unusable or excess soils, access roads, and ground 10 feet immediately adjacent to the cut and fill limits are unavoidable. These impacts would be temporary and would not permanently remove vegetation; these areas would be restored to near original contours and revegetated with native vegetation if needed following construction. Table 3.20-9 presents the approximate acreage of vegetation (of all types) that would be directly, temporarily affected by each project alternative during construction.

Slash (cut vegetation) generated from clearing for construction will be disposed of in accord with the *Chugach National Forest Revised Land and Resource Management Plan*. As such, sediment, ash, and debris would not enter riparian areas (see Section 3.2.1.2).

Sensitive Species. Based on the review of published data, field survey data, and consultation with USFS biologists, there is a low likelihood of sensitive plant species occurring within the project area; therefore, construction activities are not expected to adversely impact USFS listed sensitive plant species.

Invasive Species. Because invasive plant species commonly thrive in disturbed areas, construction activity can create favorable conditions for invasive plants to spread and become established. Removal of native vegetation and top soil can create perfect conditions for invasive plants to take hold. Construction materials, such as gravel or sand imported from material source sites, may introduce new, or allow the spread of existing, invasive plant species into the area.

Table 3.20-8. Construction impacts to wetlands and ponds by build alternative (acres)

Wetland Type	Edge Disturbance	Temporary fill[a]
Cooper Creek Alternative		
Forested	0.2	0.0
Deciduous shrub thickets	0.3	0.0
Shrub bogs	0.5	0.0
Emergent	0.3	0.0
Ponds	0.6	0.0
Total edge disturbance and temporary fill area	**1.9**	
G South Alternative		
Forested	2.2	0.0
Deciduous shrub thickets	0.5	0.3
Shrub bogs	0.5	0.0
Emergent	0.3	0.0
Ponds	0.6	0.0
Total edge disturbance and temporary fill area	**4.4**	
Juneau Creek Alternative		
Forested	2.9[b]	2.1
Deciduous shrub thickets	0.6[b]	0.0
Shrub bogs	0.3[b]	0.1
Emergent	1.0[b]	4.0
Ponds	0.3[b]	0.0
Total edge disturbance and temporary fill area	**11.3**	
Juneau Creek Variant Alternative		
Forested	2.9[b]	2.1
Deciduous shrub thickets	0.6[b]	0.0
Shrub bogs	0.2[b]	0.1
Emergent	1.1[b]	4.0
Ponds	0.4[b]	0.0
Total edge disturbance and temporary fill area	**11.4**	

[a] Temporary fill for staging area/vegetation/soils disposal areas.
[b] Disturbance of areas within 10 feet of edge of the project's cut/fill prism or footprint.

Table 3.20-9. Areas of construction disturbances to vegetation types under build alternatives (acres)

Disturbance Type	Build Alternative			
	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Areas within 10 feet of cut/fill prism	31	32	34	34
Staging areas	5	20	17	17
Access roads	2	3	4	4
Vegetation/soils disposal sites	47	57	46	45
Total	**85**	**112**	**101**	**100**

Practicable Measures to Minimize Harm/Mitigation

The close proximity of the project to Kenai Lake, Kenai River, Cooper Creek, Juneau Creek, and unnamed tributaries and their wetland complexes makes complete avoidance of wetlands impractical; there is no practicable build alternative that would avoid construction in wetlands. Throughout project development, proposed alignments were considered with respect to identified wetlands in order to minimize harm by avoiding and minimizing placement of fill into wetlands. Impacts to wetlands and vegetation are anticipated following the construction of all build alternatives.

Wetlands. Topographical, geotechnical, cost, and other environmental constraints limit the practicality of avoiding all wetland impacts. DOT&PF is committed to minimizing unavoidable impacts to wetlands and waters of the U.S. Where avoidance is not practicable, the following general design commitments are proposed:

- The roadway will be constructed using the minimum-width fill footprint necessary to provide a stable road base
- The roadway will be constructed with a low-profile embankment to limit the fill footprint

If a build alternative is selected as the preferred alternative, a detailed discussion of the unavoidable impacts to waters of the U.S. and a demonstration that the preferred alternative is the least environmentally-damaging practicable alternative in compliance with Section 404(b)(1) guidelines would be included with the Final SEIS.

DOT&PF is committed to paying a fee to a qualified land trust to fund appropriate wetland conservation or enhancement activity in lieu of completing such a project itself. This action would compensate for the unavoidable impacts to wetland and waters of the U.S. to offset wetland loss remaining after all appropriate and practicable steps have been taken. A compensatory mitigation plan with sufficient information about how the proposed compensatory mitigation relates to the individual and cumulative impacts to aquatic resources within the proposed project area, including an assessment to quantify debits and credits for aquatic resource function impacts, will be provided in the Final SEIS.

Should one of the build alternatives be selected, the following BMPs would be used to mitigate construction-related impacts to wetlands:

- Cleared vegetation and unusable soils would not be permanently located in wetlands.
- To the extent practicable, staging areas and temporary construction roads would be located in uplands; however, it may be necessary to locate staging areas required for river or creek crossings in wetlands. Temporary fill may be required at these sites. Where temporary fill would be required, the construction contractor will be required to place temporary fill on geotextile mats or other suitable materials of sufficient thickness to facilitate the removal of the fill when no longer needed for construction. Wetlands would be stabilized against erosion once protective mats were removed. Wetlands that had been temporarily filled would be restored by reseeding and revegetating the disturbed areas as necessary with native plant materials.
- Erosion and sedimentation control measures would be employed prior to ground disturbing activity. Permanent erosion control measures would be employed as early in construction as practical. Only clean fill material would be used for the roadway embankment.
- Construction limits would be clearly staked prior to construction to ensure that ground disturbing impacts are limited.
- Riprap would be used to stabilize toes of slopes at ponds and stream crossings.
- Riprap would incorporate vegetation where practicable.
- Road slopes would be revegetated. Topsoil would be applied to the surface of road slopes to promote revegetation. Native plant species would be used for vegetating road slopes to protect the integrity of the existing plant communities, except non-native annual grasses would be used to provide initial soil stabilization.
- No grubbing would be done outside of the construction footprint.
- Silt fences would be used adjacent to waterways just beyond the estimated toe of fill.
- Ditch check-dams would be used to reduce erosion during construction.
- Sedimentation basins would be used, as necessary, during construction.
- Roadside swales would be designed to keep surface water within the natural drainage basins.
- Culverts would be installed through fill slopes in appropriate locations to maintain existing flow patterns for surface water.
- No vehicles or equipment would be fueled or serviced within 100 feet of wetlands or fish bearing streams, with the exception of “low-mobility” equipment used for pile driving, drilled shaft construction, or other bridge construction. A plan would be provided detailing the process for fueling this equipment within 100 feet of wetlands or fish-bearing streams. Fueling and service vehicles would be equipped with adequate materials (e.g., sorbent pads, booms, etc.) to immediately contain and commence clean-up of spilled fuels and other petroleum products. Fuel would be stored a minimum of 100 feet from any wetland or water body.

- Spill response equipment would be readily available and construction personnel would be trained in spill response to contain accidental leaks of oil or fuel from construction equipment.

***Vegetation*.** Loss of vegetative cover would be mitigated primarily through native plant revegetation, while the composition of vegetation would be maintained through invasive plant prevention measures employed during construction.

***Sensitive Species*.** As previously mentioned, no USFS listed sensitive plant species are expected to be affected under any of the build alternatives. Impacts to vegetation that are most likely to occur are loss of vegetative cover and alteration of the site's vegetation composition.

Invasive Species. To minimize the spread of invasive plant species, weed management best practices should be implemented during construction. Such BMPs might include:

- Eradicate existing infestations prior to construction
- Wash and clean vehicles, equipment, and tools prior to entering/exiting the site or moving to another site
- Minimize clearing and grading
- Clear areas in winter to minimize spreading of invasive weed seeds and vegetative propagules (i.e., a bud or other offshoot that aids in dispersal of the species)
- Clear with a hydroaxe to minimize soil disturbance
- Use fill material only from invasive species-free sites
- Use certified invasive-free mulches, topsoils, or seeds purchased from a local provider
- Use only Alaska native plant species for landscaping, per Alaska Department of Natural Resources' *A Revegetation Manual for Alaska* for reseeding and vegetating of disturbed areas
- Gating all access roads to limit access by others
- Sequencing of reseeding efforts should begin with areas uninfested by invasive plant species and work towards area infested by invasive plant species to minimize spread of invasives
- Educating workers about management practices to reduce spread of weeds

To monitor and manage the spread of invasive plant species along the highway during road maintenance activities such as mowing in the summer and applying sand and gravel in the winter, DOT&PF Maintenance and Operations implements the following BMPs:

- Cleaning vehicles and equipment regularly
- Re-vegetating disturbed areas with native, local, and/or non-invasive plant species
- Avoiding known contaminated areas, if practicable
- Managing uninfested areas before moving toward infested areas
- Coordinating with local groups that are managing invasive species

- Timing mowing to prevent seed production of invasive plants, as practicable
- Using certified weed-free materials whenever possible
- Identifying locations of known invasive plant infestations
- Recording and reporting locations of invasive plants to the University of Alaska Fairbanks (UAF) Cooperative Extension Service

3.20.2.4 Cooper Creek Alternative

Direct and Indirect Impacts

Wetlands. Table 3.20-10 presents the acreage of permanent loss of wetlands, by type and function. Impacts to forested and shrub bog wetlands would occur primarily near the intersection of the existing highway and Snug Harbor Road. Impacts to deciduous shrub thickets would occur primarily at proposed stream crossings. Emergent wetland and pond impacts would occur primarily along the western end of the Cooper Creek Alternative where it maintains the same alignment as the existing highway and where impacts result from the four build alternatives' common alignment. The functions that would be most impacted, based on acreage, would be sediment retention and pollution removal, food chain support, groundwater recharge, and wildlife habitat.

Approximately 14 acres of wetlands are located in the indirect impact zones along the new alignment for the Cooper Creek Alternative and could be indirectly affected under this alternative (Table 3.20-6). Indirect impacts are discussed in Section 3.20.2.2. Additionally, the 60 acres of wetlands currently located in the indirect impact zone of the existing highway would continue to be indirectly affected by the existing highway, as discussed in Section 3.20.2.1.

Table 3.20-10. Approximate area of wetland fill—Cooper Creek Alternative

Acreage filled, by wetland function[a]		Acreage filled, by wetland type[a]	
Groundwater recharge	9.13	Forested	2.3
Groundwater discharge	1.98	Deciduous shrub thicket	1.7
Stream flow moderation	3.68	Shrub bog	3.7
Shoreline, stream bank, and soil stabilization	3.33	Emergent	1.1
Sediment retention and pollution removal	10.84	Ponds	2.2
Food chain support	9.73	***Total wetland loss***	**11.0**
Wildlife habitat	9.02	***Associated fill volume (cy)***	***154,410***
Fish habitat[b]	2.42		
Human non-consumptive values and uses	1.85		
Human consumptive values and uses	0		
Uniqueness and heritage	1.85		

[a] Acres lost by function does not match acres lost by type, because a given wetland type may have multiple functions.

[b] Fish habitat includes (1) wetlands with open water and ponds that are adjacent to mapped fish streams, (2) wetlands with surface water and a defined and consistent inlet and outlet, (3) wetlands bordering streams and ponds that may provide shade over areas of open water, enhancing fish habitat, and (4) wetlands that have plant species that typically produce large quantities of annual biomass (e.g., leaves, stems, and seeds) that fall to the ground, decompose, and are exported to downstream aquatic habitats.

Construction Impacts

Construction impacts applicable to all build alternatives are described above in Section 3.20.2.3. There are no construction impacts unique to the Cooper Creek Alternative.

Practicable Measures to Minimize Harm/Mitigation

Wetland mitigation and commitments common to all alternatives are described above and in Section 3.20.2.3. During preliminary engineering, project engineers evaluated options to reduce impacts to wetlands. While topographical, geotechnical, and other constraints limited the opportunities for design modifications to minimize wetland impacts, riprap was integrated into the design of the Cooper Creek Alternative to allow steeper slopes and minimize total wetlands impacts.

3.20.2.5 G South Alternative

Direct and Indirect Impacts

Wetlands. Table 3.20-11 presents the acreage of permanent loss of wetlands. Forested wetlands would be impacted primarily north of the Kenai River and east of Juneau Creek. Impacts to deciduous shrub thickets would occur primarily at stream crossings. Shrub bogs, emergent wetlands, and ponds would be impacted intermittently along the length of the alignment. The functions expected to incur the greatest impact, based on acreage, are food chain support, wildlife habitat, sediment retention and pollution removal, and groundwater recharge.

Table 3.20-11. Approximate area of wetland fill—G South Alternative

Acreage filled, by wetland function[a]		Acreage filled, by wetland type[a]	
Groundwater recharge	19.78	Forested	17.6
Groundwater discharge	3.32	Deciduous shrub thicket	3.1
Stream flow moderation	3.68	Shrub bog	2.6
Shoreline, stream bank, and soil stabilization	0.34	Emergent	1.1
Sediment retention and pollution removal	21.49	Ponds	2.2
Food chain support	23.01	***Total wetland loss***	26.6
Wildlife habitat	22.46	***Associated fill volume (cy)***	*602,691*
Fish habitat[b]	3.82		
Human non-consumptive values and uses	2.64		
Human consumptive values and uses	0.00		
Uniqueness and heritage	1.85		

[a] Acres lost by function does not match acres lost by type, because a given wetland type may have multiple functions.

[b] Fish habitat includes (1) wetlands with open water and ponds that are adjacent to mapped fish streams, (2) wetlands with surface water and a defined and consistent inlet and outlet, (3) wetlands bordering streams and ponds that may provide shade over areas of open water enhancing fish habitat, and (4) wetlands that have plant species that typically produce large quantities of annual biomass (e.g., leaves, stems, and seeds) that fall to the ground, decompose, and are exported to downstream aquatic habitats.

Approximately 67 acres of wetlands are located in the indirect impact zones along the new alignment for the G South Alternative (Table 3.20-6). These wetlands could be indirectly

affected under this alternative. Indirect impacts are discussed in Section 3.20.2.2. Additionally, the 60 acres of wetlands currently located in the indirect impact zone of the existing highway would continue to be indirectly affected by the existing highway, as discussed in Section 3.20.2.1.

Construction Impacts

Construction impacts applicable to all build alternatives are described above in Section 3.20.2.3. There are no construction impacts unique to the G South Alternative.

Practicable Measures to Minimize Harm/Mitigation

Wetland mitigation and commitments common to all alternatives are described above in Section 3.20.2.3. Specific G South Alternative mitigation is proposed for the vegetation removal anticipated along the Bean Creek Trail. To lessen potential impact, following construction the Bean Creek Trail area would be reseeded wherever construction disturbance occurs or trailside vegetation is disturbed.

3.20.2.6 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

Juneau Creek Alternative

Wetlands. Table 3.20-12 presents the acreage of permanent loss of wetlands. Forested wetlands would be impacted primarily north of the Kenai River and east of Juneau Creek. Impacts to deciduous shrub thickets would occur primarily at proposed stream crossings. Shrub bogs would be impacted intermittently along the length of the alignment. Impacts to emergent wetlands would occur primarily west of Juneau Creek. Impacts to ponds would occur primarily where the alternative maintains the same alignment as the existing highway. Sediment retention and pollution removal, wildlife habitat, food chain support, and groundwater recharge functions would be most affected, based on acreage, by the alternative.

Under the Juneau Creek Alternative, a new trailhead would be constructed for the Resurrection Pass Trail near where the alignment would cross the existing trail. There are wetlands in this general area, and the location and general layout of the trailhead have been coordinated with the USFS. The proposed location of the trailhead could result in more people entering wetlands in the area. Potential wetland impacts resulting from proposed mitigation have not been quantified and are not included in Table 3.20-12.

Approximately 130 acres of wetlands are located in the indirect impact zone along the new alignment of the Juneau Creek Alternative (Table 3.20-6). These wetlands could be indirectly affected under the Juneau Creek Alternative. Indirect impacts are discussed in Section 3.20.2.2. Additionally, the 60 acres of wetlands currently located in the indirect impact zone of the existing highway would continue to be indirectly affected by the highway, as discussed in Section 3.20.2.1.

Table 3.20-12. Approximate area of wetland fill—Juneau Creek Alternative

Acreage filled, by wetland function[a]		Acreage filled, by wetland type[a]	
Groundwater recharge	29.05	Forested	24.2
Groundwater discharge	11.06	Deciduous shrub thicket	4.7
Stream flow moderation	6.73	Shrub bog	2.2
Shoreline, stream bank, and soil stabilization	3.28	Emergent	6.3
Sediment retention and pollution removal	37.42	Ponds	1.1
Food chain support	35.54	***Total wetland loss***	38.5
Wildlife habitat	36.19	***Associated fill volume (cy)***	*742,460*
Fish habitat[b]	5.07		
Human non-consumptive values and uses	2.63		
Human consumptive values and uses	0.00		
Uniqueness and heritage	8.55		

[a] Acres lost by function does not match acres lost by type, because a given wetland type may have multiple functions.

[b] Fish habitat includes (1) wetlands with open water and ponds that are adjacent to mapped fish streams, (2) wetlands with surface water and a defined and consistent inlet and outlet, (3) wetlands bordering streams and ponds that may provide shade over areas of open water enhancing fish habitat, and (4) wetlands that have plant species that typically produce large quantities of annual biomass (e.g., leaves, stems, and seeds) that fall to the ground, decompose, and are exported to downstream aquatic habitats.

Juneau Creek Variant Alternative

Wetlands. Table 3.20-13 presents the acreage of permanent loss of wetlands. Forested wetlands would be impacted primarily north of the Kenai River and east of Juneau Creek. Impacts to forested wetlands would primarily occur north of the Kenai River and east of Juneau Creek. Impacts to deciduous shrub thickets would occur primarily at proposed stream crossings. Shrub bogs would be impacted intermittently along the length of the alignment. Impacts to emergent wetlands would occur primarily west of Juneau Creek. Impacts to ponds would occur primarily where the alternative maintains the same alignment as the existing highway. Wildlife habitat, food chain support, sediment retention and pollution removal, and groundwater recharge functions would be most affected, based on acreage, by the alternative.

Under the Juneau Creek Variant Alternative, a new trailhead would be constructed for Resurrection Pass Trail near where the alignment would cross the existing trail. There are wetlands in this general area, and the location and general layout of the trailhead have been coordinated with the USFS. The proposed location of the trailhead could result in more people entering wetlands in the area. Potential wetland impacts resulting from proposed mitigation have not been quantified and are not included in Table 3.20-13.

Approximately 119 acres of wetlands are located in the indirect impact zone along the new alignment of the Juneau Creek Variant Alternative (Table 3.20-6). These wetlands could be indirectly affected under the Juneau Creek Variant Alternative. Indirect impacts are discussed in Section 3.20.2.2. Additionally, the 60 acres of wetlands currently located in the indirect impact zone of the existing highway would continue to be indirectly affected by the highway, as discussed in Section 3.20.2.1.

Table 3.20-13. Approximate area of wetland fill—Juneau Creek Variant Alternative

Acreage filled, by wetland function[a]		Acreage filled, by wetland type[a]	
Groundwater recharge	29.96	Forested	24.2
Groundwater discharge	8.26	Deciduous shrub thickets	3.0
Stream flow moderation	7.13	Shrub bogs	1.5
Shoreline, stream bank, and soil stabilization	3.28	Emergent	6.7
Sediment retention and pollution removal	35.28	Ponds	2.1
Food chain support	35.94	***Total wetland loss***	**37.5**
Wildlife habitat	36.59	***Associated fill volume (cy)***	***661,500***
Fish habitat[b]	3.28		
Human non-consumptive values and uses	3.42		
Human consumptive values and uses	0		
Uniqueness and heritage	1.84		

[a] Acres lost by function does not match acres lost by type, because a given wetland type may have multiple functions.

[b] Fish habitat includes (1) wetlands with open water and ponds that are adjacent to mapped fish streams, (2) wetlands with surface water and a defined and consistent inlet and outlet, (3) wetlands bordering streams and ponds that may provide shade over areas of open water enhancing fish habitat, and (4) wetlands that have plant species that typically produce large quantities of annual biomass (e.g., leaves, stems, and seeds) that fall to the ground, decompose, and are exported to downstream aquatic habitats.

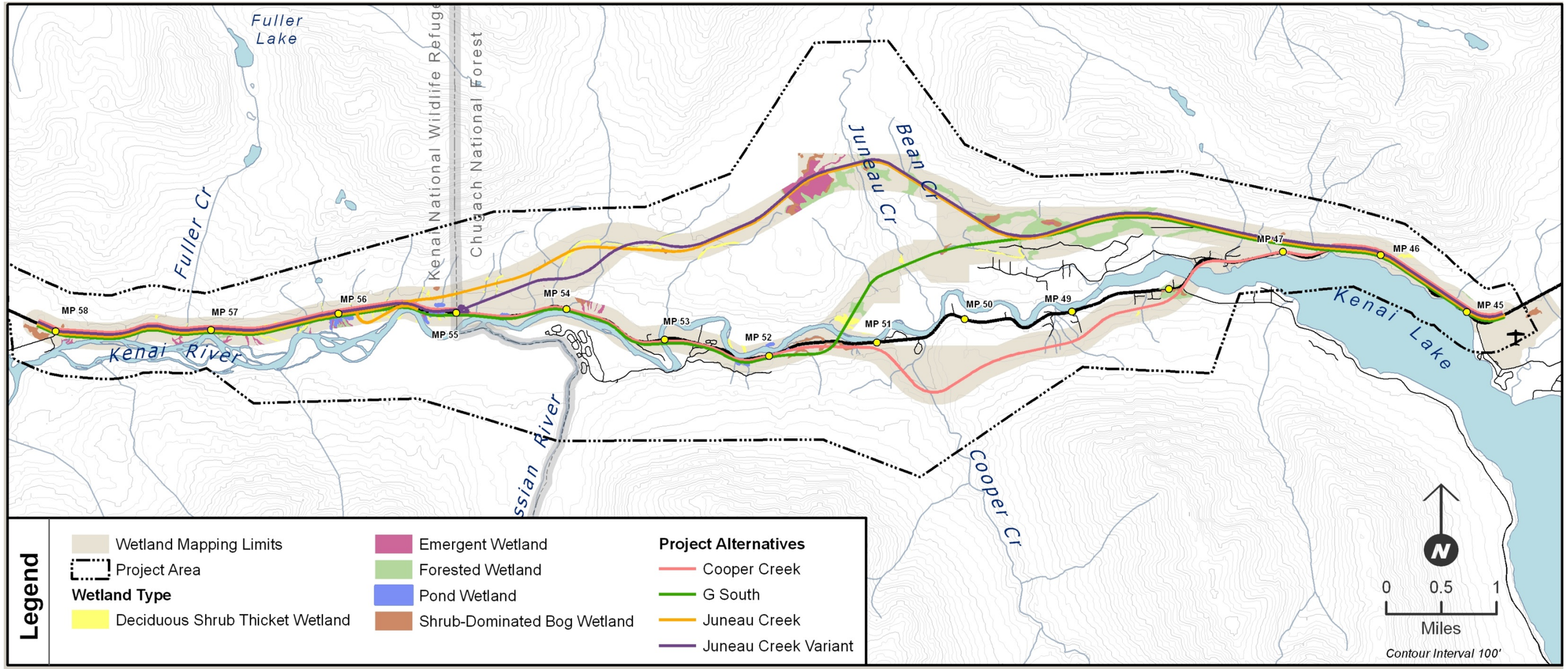
Construction Impacts

Construction impacts applicable to all build alternatives are described above in Section 3.20.2.3. There are no construction impacts unique to the Juneau Creek and Juneau Creek Variant alternatives.

Practicable Measures to Minimize Harm/Mitigation

Wetland and vegetation mitigation and commitments common to all alternatives are described above in Section 3.20.2.3. Specific to the Juneau Creek and Juneau Creek Variant Alternatives, the Bean Creek Trail area would be reseeded following construction wherever embankment material is removed or trailside vegetation disturbed.

Under the Juneau Creek and Juneau Creek Variant alternatives, the Juneau Creek Bridge drainage could deflect rainwater away from vegetation. In order to mitigate this potential impact, the bridge drainage would be designed to direct rainwater runoff beneath bridge and promote retention of natural vegetation buffer between the Resurrection Pass National Recreation Trail and the bridge abutment.



Map 3.20-1. Wetlands in the project area

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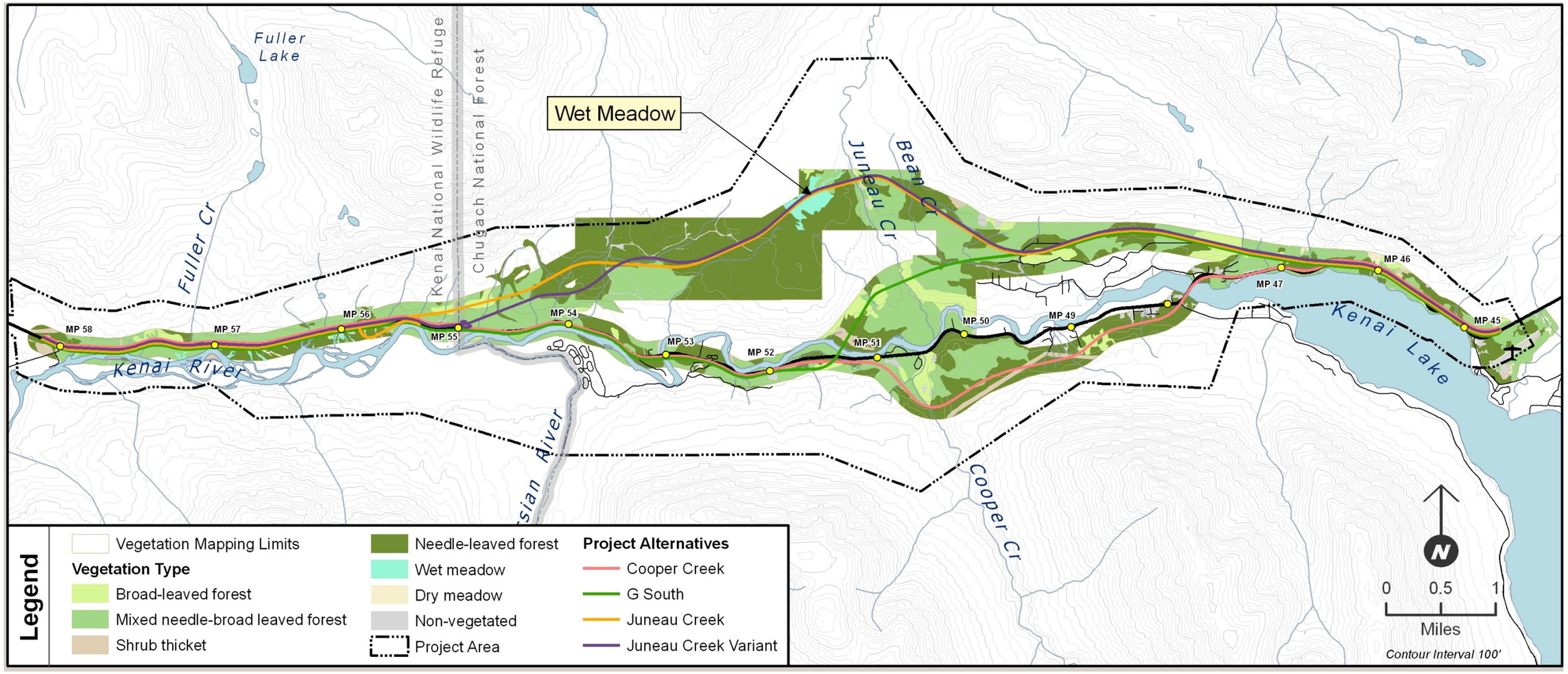

Map 3.20-2. Vegetation types in the project area

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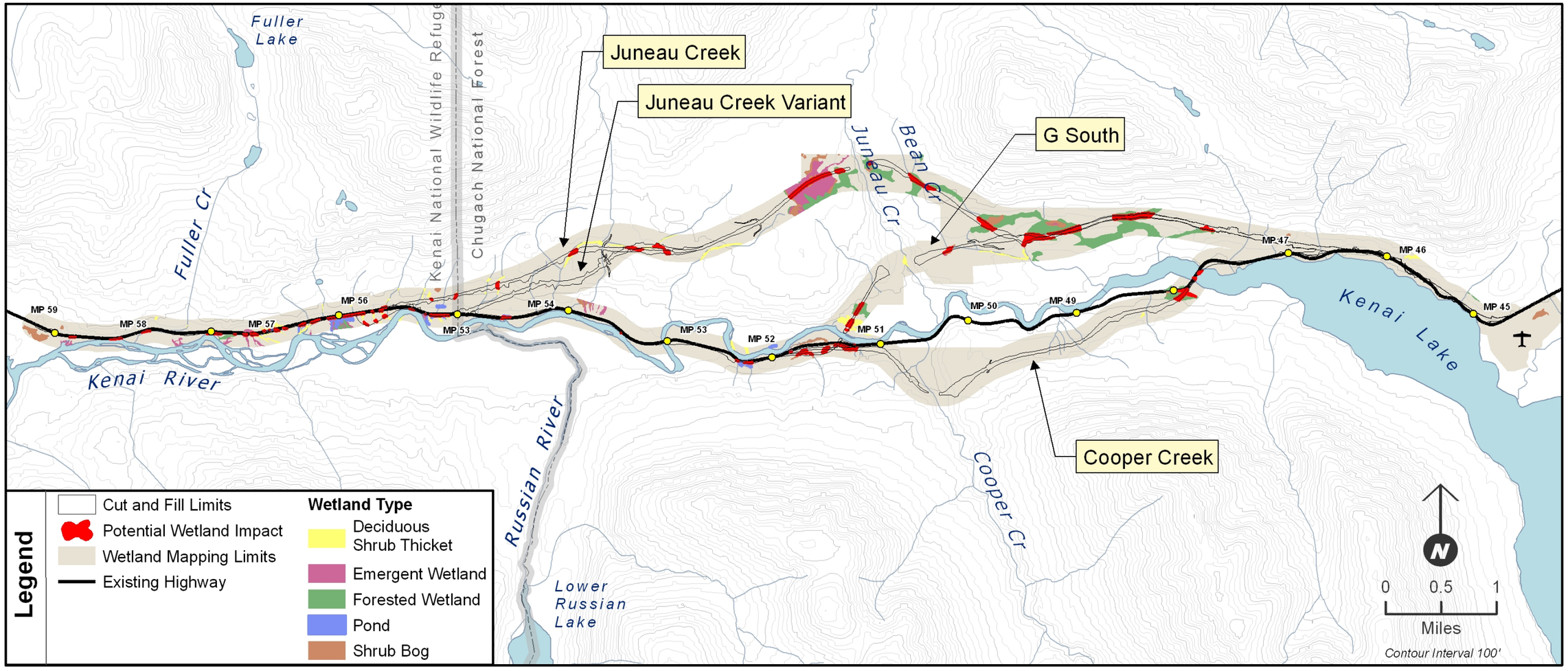

Map 3.20-3. Wetland impacts in the project area

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3.21 Fish and Essential Fish Habitat

3.21.1 Affected Environment

3.21.1.1 Fish in the Project Area

Species Occurrence. The project area, as a part of the greater Kenai River system, is home to a variety of vertebrate and invertebrate aquatic species. The Alaska Department of Fish and Game (ADF&G) has documented fish species occurrence within the Kenai River as a whole, primarily to support management of the popular fisheries (Miller, Burwen and Fleischman 2012), and in some tributaries included in the *Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes* (ADF&G 2014c). The Kenai River supports 34 fish species; 30 are native to the Kenai River and 4 are introduced species. Twelve species are residents that spend their entire life cycle in the river; 11 species are anadromous, spending part of their life cycle in the river and part in salt water; and 11 species are found in the lower river associated with the marine or brackish water environment where fresh and salt water mix (DNR, ADF&G, KPB 1997).

As of 2012, there have not been specific surveys to determine all of the fish species that are present in the project area and such comprehensive studies are beyond the scope of this SEIS. Fish species distribution in some of the smaller project area tributaries was unknown prior to fish characterization studies completed along the proposed build alignments during September 2004 and August 2005. These studies documented the occurrence of Chinook salmon, coho salmon, Dolly Varden, and sculpin in several previously uninvestigated streams (HDR 2011a). For detailed locations of captured fish and stream habitat information, refer to the *Fisheries Evaluation* (HDR 2011a).

Within project area waters, there are 18 species of resident and anadromous fish that are known or likely to occur during some part of their life cycle (Table 3.21-1). Salmon species include anadromous Chinook, coho, sockeye, and pink salmon. Chum salmon are present in the Kenai River, but are rarely observed (DNR, ADF&G, KPB 1997). Other salmonids that occur in the Kenai River drainage include rainbow trout, Dolly Varden, Arctic grayling, lake trout, and round whitefish. Although the anadromous form of rainbow trout, steelhead, occur in the Kenai River drainage, it is not known to what extent they occur or how far they migrate above Skilak Lake into the project area (ADF&G 2014c). The ADF&G *Anadromous Waters Catalog* depicts steelhead in the Kenai River upstream to the Funny River (ADF&G 2014c). Conversely, the catalog depicts eulachon in the lower Kenai to downstream of Beaver Creek; however, eulachon have been observed upstream to lower Skilak Lake (ADF&G 2014c). Anadromous Pacific lamprey and Arctic lamprey inhabit the main-stem of the Kenai River and have been observed in the Moose River, a tributary to the Kenai River, at approximately river mile (RM) 36 (near the town of Sterling, 35 miles west of the project area). Resident longnose sucker inhabit numerous lakes in the drainage, and coastrange sculpin, slimy sculpin, three spine stickleback, and nine spine stickleback are widely distributed throughout the drainage (DNR, ADF&G, KPB 1997).

Table 3.21-1. Fish species (known or which may occur), uses, and habitats in the project area

Common Name	Scientific Name	Occurrence	Uses[a]	Primary Kenai River Habitats[b]
Chinook salmon	*Oncorhynchus tshawytscha*	Anadromous	Subsistence, personal use, and recreation	River, tributaries, and lakes
Coho salmon	*Oncorhynchus kisutch*	Anadromous	Subsistence, personal use, and recreation	River, tributaries, and lakes
Sockeye salmon	*Oncorhynchus nerka*	Anadromous	Subsistence, personal use, and recreation	River, tributaries, and lakes
Pink salmon	*Oncorhynchus gorbuscha*	Anadromous	Subsistence and recreation	River and tributaries
Chum salmon	*Oncorynchus keta*	Anadromous	None	River and tributaries
Dolly Varden	*Salvelinus malma*	Resident/ Anadromous	Subsistence and recreation	River and lakes
Rainbow trout/ Steelhead	*Oncorhynchus mykiss*	Resident/ Anadromous	Subsistence and recreation	River, tributaries, and lakes
Lake trout	*Salvelinus namaycush*	Resident	Subsistence and recreation	Lakes
Arctic grayling	*Thymallus arcticus*	Non-native Resident	Recreation	River, tributaries, and lakes
Round whitefish	*Prosopium cylindraceum*	Resident	None	Lakes
Pacific lamprey	*Lampetra tridentate*	Anadromous	None	River
Arctic lamprey	*Lampetra japonica*	Anadromous	None	River
Longnose sucker	*Catostomus catostomus*	Resident	None	River and lakes
Burbot	*Lota lota*	Non-native Resident	None	Lakes
Coastrange sculpin	*Cottus aleuticus*	Resident	None	River and tributaries
Slimy sculpin	*Cottus cognatus*	Resident	None	River and tributaries
Threespine stickleback	*Gasterosteus aculeautus*	Resident	None	River and lakes
Ninespine stickleback	*Pungitius pungitius*	Resident	None	River and lakes

[a] From ADF&G (2011a) and USFWS (2013).

[b] From Marsh, personal communication (2006), USFS (2002b), ADF&G (2012a), Johnson and Blanche (2011), and DNR, ADF&G, KPB (1997).

Agency Status. There are no Federal or State-listed threatened or endangered fish species in Alaska (NOAA 2013, ADF&G 2011b), nor are there species with other special Federal or State status in the project area. The USFS removed coho and pink salmon and Dolly Varden as management indicator species for the Chugach National Forest in 2012 (USFS 2012a). The State of Alaska Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222, effective 2000, amended 2001) directs the ADF&G to identify any salmon stock in the state that present a concern; there are currently no Kenai River salmon stocks designated as such (Munro and Volk 2012).

Non-native and Invasive Species. Four fish species native to other locations in Alaska have been introduced to the Kenai River watershed: Arctic grayling, burbot, Alaska blackfish, and northern pike. Of these, two (Arctic grayling and burbot) are known to exist in the project area. Arctic grayling were first introduced to Crescent Lake in the 1950s and are established in the upper Kenai River where they are occasionally caught by anglers (DNR, ADF&G, KPB 1997). Burbot are believed to have been first introduced into Juneau Lake. They entered the Kenai River via Juneau Creek and have been documented as being caught by anglers in Skilak Lake (DNR, ADF&G, KPB 1997). Alaska blackfish were first identified from samples taken from fresh water ponds in the lower Kenai watershed (between Cook Inlet and Kenai RM 21), and in their native range they are most commonly found in lakes (DNR, ADF&G, KPB 1997). They have not been documented in the project area. Northern pike were introduced in the Soldotna Creek drainage in the mid-1970s (DNR, ADF&G, KPB 1997, McKinley 2014). Northern pike are considered an invasive species in Southcentral Alaska because they are known to negatively impact resident salmonid populations where they have been introduced. Northern pike use the Kenai River as a migratory corridor and are established in the Soldotna Creek drainage (McKinley 2014), but have not been documented in the project area.

Fish Habitat, Life History, and Resources. Major water bodies supporting fish habitat within the project area include Kenai Lake, Kenai River, Bean Creek, Juneau Creek, Cooper Creek, Russian River, and Fuller Creek. The 34 species present in the Kenai River utilize various habitat types depending on the species of fish, time of year, and life cycle stage. The project area contains important migration corridors and spawning, rearing, feeding and overwintering habitats for salmon and other fish species. Essential Fish Habitat (EFH) information for the five Pacific salmon species is detailed below in Section 3.21.1.2.

Fish are important biological components in the greater Kenai River system. Fish species in the upper Kenai River system have complicated life histories consisting of early- and late-season runs and intricate migratory and seasonal distributions, much of which biologists are still trying to understand. All five species of Pacific salmon occur in the Kenai River, and over one million salmon return to the Kenai each year to spawn. Because of its high productivity, the Kenai River system contributes to a major commercial fishery and some of the largest recreational fisheries for Chinook, coho, and sockeye salmon. Additionally, fish resources of the Kenai River provide for important personal use and subsistence harvests. In fact, the Kenai River is the most heavily fished river in Alaska, both by rod and reel, and dip net (ADF&G 2013c). Table 3.21-2 lists seasonal information for fish resources in the project area.

Table 3.21-2. Seasonal information for selected fish species in the project area

Common Name	Activity	General Season	Known Water Bodies in Project Area
Chinook (king) salmon	Adult migration and spawning	May to August	Kenai River, Kenai Lake, Russian River, Juneau Creek
	Juvenile rearing and outmigration	Year round	Kenai River, Kenai Lake, Russian River, Juneau Creek, Cooper Creek, Bean Creek, unnamed creek 4
Coho (silver) salmon	Adult migration and spawning	July to March	Kenai River, Kenai Lake, Russian River, Cooper Creek
	Juvenile rearing	Year-round	Kenai River, Kenai Lake, Russian River, Juneau Creek, Cooper Creek, Bean Creek, Fuller Creek, and unnamed creeks 1–4
	Juvenile outmigration	May to July	Same locations as juvenile rearing
Sockeye (red) salmon	Adult migration and spawning	May to October	Russian River, Kenai River, Kenai Lake, Juneau Creek, Cooper Creek, Bean Creek
	Juvenile rearing	Year-round	Kenai Lake
	Juvenile outmigration	May to July	Kenai River and Kenai Lake
Pink salmon	Adult migration and spawning	June to August	Kenai River and Russian River
	Juvenile rearing	N/A	N/A
	Juvenile outmigration	May to June	Kenai River and Russian River
Chum salmon	Adult migration and spawning	July to September	Kenai River and Kenai Lake
	Juvenile rearing	N/A	N/A
	Juvenile outmigration	April to May	Kenai River and Kenai Lake
Rainbow trout/ Steelhead	Steelhead migration	July to October	Kenai River and Russian River
	Spawning	Mid-April through June	River and tributaries
	Juvenile rearing	Year round	River, tributaries, and lakes
	Adult overwintering	Late September to April	Kenai River and Kenai Lake
Dolly Varden	Anadromous migration	July to October	River, tributaries, and lakes
	Spawning	September to November	River and tributaries
	Juvenile rearing	Year-round	River, tributaries, and lakes
	Adult overwintering	Late September to April	Kenai River and Kenai Lake
Lake Trout	All life stages	Year-round	Kenai Lake

Common Name	Activity	General Season	Known Water Bodies in Project Area
Lamprey	Anadromous migration and spawning	May to July	Kenai River and Kenai Lake
	Juvenile rearing	Year-round	Kenai River and Kenai Lake
	Juvenile outmigration	August to November	Kenai River and Kenai Lake

Sources: ADF&G (2013c); Bethe, et al. (2002); Burger, Wangaard, et al. (1983); Burger, Wilmot and Wangaard (1985); Boggs, Davis and Milner (1997); Bendock and Alexandersdottir (1992); Booth (1990); Davis, King and Tarbox (1994); DNR, ADF&G, KPB (1997); Dodge and MacCrimmon (1970); Lindsey et al. (1959); Miller et al. (2012); Palmer (1998); Scott and Crossman (1973); Lang, personal communication (2014).

Chinook Salmon. Chinook salmon populations in the Kenai River system consist of two distinct spawning runs: an early run and a late run (Burger, Wangaard, et al. 1983, Burger, Wilmot and Wangaard 1985). The early run consists of Chinook salmon that enter the Kenai River prior June 30. Chinook salmon entering the Kenai River after June 30 are considered part of the "late run" (Boggs, Davis and Milner 1997). See Table 3.21-2 for a list of known water bodies in the project area that provide habitat throughout the Chinook salmon life cycle. The majority of early-run Chinook salmon spawn in the lower river tributaries, although early-run Chinook spawning does occur in the upper Kenai River and its tributaries from late July to the middle of August (Burger, Wangaard, et al. 1983, Bendock and Alexandersdottir 1992). In addition to the main stem Kenai River, upper river tributaries used for spawning by Chinook salmon include the Russian River, Juneau Creek, Quartz Creek, Crescent Creek, and Ptarmigan Creek (Begich, et al. 2010, Reimer 2013).

The Kenai River fisheries are managed by the State of Alaska's respective Sport, Commercial, and Subsistence Fish Divisions. The Chinook salmon sport fishery is very popular because of the large size of the fish harvested. It is also the most controversial because of competition for the fully allocated resource among sport, commercial, subsistence, and personal use fisheries. ADF&G intensively manages the Chinook fishery as two distinct runs with the early run harvested mainly by sport anglers and the late run harvested mainly by commercial, personal use, and sport fisheries (Miller, Burwen and Fleischman 2012).

Coho Salmon. Coho salmon, like Chinook salmon, enter the Kenai River in two overlapping runs. The early run of coho enters the river in late July (Booth 1990), and the majority of the late-run fish enter the river by the end of September, extending into November and December (Boggs, Davis and Milner 1997).

Coho salmon enter spawning streams in the project area from July to November, usually during periods of high runoff. Adults hold in pools until they ripen, then move into spawning grounds. The eggs develop during the winter, hatch in early spring, and the embryos remain in the gravel utilizing the egg yolk until they emerge in April or May. The emergent fry occupy shallow stream margins, and, as they grow, establish territories that they defend from other salmonids. They live in ponds, lakes, and pools in smaller streams in the project area and in the Kenai and Russian rivers, usually among submerged woody debris—quiet areas free of current—from which they dart out to seize drifting insects (ADF&G 1994). Outmigration occurs between May and July.

Sockeye Salmon. Sockeye salmon return to freshwater systems from the ocean during the summer months. Similar to coho and Chinook salmon, sockeye salmon enter the Kenai River as two temporally distinct runs (Boggs, Davis and Milner 1997). See Table 3.21-2 for a list of known water bodies in the project area that provide habitat throughout the sockeye salmon life cycle. The early run enters the Kenai River near the middle of May, and 50 percent of the late run has usually entered by the middle of July (Davis, King and Tarbox 1994). Spawning usually occurs in streams associated with lakes or in the lakes themselves where the juveniles rear. Within the project area, this would include the Kenai Lake, Kenai River, Russian River, Juneau Creek and Cooper Creek.

Pink Salmon. Pink salmon exhibit strong spawning runs in the Kenai River system during even-numbered years. Spawning and egg development take place in the lower reaches of streams and inter-tidal areas (PSMFC 2002). See Table 3.21-2 for a list of known water bodies in the project area that provide habitat throughout the pink salmon life cycle. Within the project area, pink salmon migrate and spawn in the Kenai and Russian rivers. Pink salmon fry do not overwinter in streams but migrate directly to the sea shortly after emergence. Compared to other salmon species, pink salmon spend the least amount of time in freshwater environments.

Chum Salmon. Within the project area, chum salmon migrate and spawn in the Kenai River and Kenai Lake. See Table 3.21-2 for a list of known water bodies in the project area that provide habitat throughout the chum salmon life cycle. Chum salmon often spawn in small side channels and other areas of large rivers where upwelling springs provide excellent conditions for egg survival. Chum salmon fry, similar to pink salmon, do not overwinter in streams but migrate out of the streams directly to the sea shortly after emergence. The range of this out migration can occur between February and June, but most fry leave the streams during April and May. Chum salmon fry tend to linger and forage in the intertidal areas at the head of bays (ADF&G 1994).

Rainbow Trout and Steelhead. In Alaska, there are two commonly recognized forms of rainbow trout. Distinction between the two forms is based primarily on where they spend their time feeding and maturing. The most common rainbow trout in Alaska is the stream-resident form that lives its life entirely in freshwater, occasionally spending short periods of time in estuarine or near-shore marine waters. The second form, commonly known as steelhead, leaves freshwater as a juvenile and migrates long distances in the ocean where it grows to maturity before migrating back to its original home waters. See Table 3.21-2 for a list of known water bodies in the project area that provide habitat throughout the rainbow trout and steelhead life cycle.

Rainbow trout occur throughout the Kenai River drainage. They spawn in tributaries and lake outlets during the spring, generally from mid-April to late June (Lindsey et al. 1959). Spawning generally occurs on fine gravels located above pool habitats (Dodge and MacCrimmon 1970). Some juveniles may remain in their natal streams, while others may migrate to larger rivers or lakes where feeding and overwintering conditions are likely more favorable (Scott and Crossman 1973). During post-spawning periods, rainbow trout return to feeding areas that are often associated with salmon spawning areas. Upper Kenai River rainbow trout can exhibit strong fidelity to summer feeding and overwintering areas. Rainbow trout have been located in feeding areas in the upper Kenai River (between Kenai and Skilak lakes) from mid-June through late September, and adult rainbow trout move to overwintering areas in the upper Kenai River during late September to late November (Palmer, Palmer 1998).

The Kenai River is near the northern boundary of steelhead distribution, and Kenai River steelhead are not as abundant as in lower Kenai Peninsula streams (e.g., Anchor River). No specific Kenai River steelhead spawning locations have been identified in the project area.

Dolly Varden. Both resident and anadromous Dolly Varden populations occur in Alaska. Dolly Varden occur throughout the Kenai River drainage, and resident populations are likely present in the main river throughout the entire year (ADF&G 2013c). The anadromous population is believed to enter the Kenai River in July. Dolly Varden spawn in the fall, and some anadromous post-spawners begin outmigrating in late September and October.

Freshwater-resident Dolly Varden in the project area migrate seasonally between lake and riverine habitats, with Kenai and Skilak lakes providing the majority of their overwinter habitat; this migration strategy is supported by the readily accessible habitat, abundant food supplies, and relatively few competitors found in the project area (Palmer and King 2005). Dolly Varden move to overwintering lake habitat between October and December and return to riverine habitat between June and September. Dolly Varden spawn between late September and October. Spawning aggregates have been identified in Cooper Creek, Quartz Creek, and the upper main stem of the Kenai River (Palmer and King 2005).

Other species. Life history information of the other species that occur in the Kenai River is limited to generalized observations. Lake trout spawn and rear in Skilak, Kenai, Hidden, and Trail lakes. Pacific and Arctic lamprey have been observed in the main stem Kenai River, and Pacific lamprey have been observed in spring apparently spawning in the Moose River. See Table 3.21-2 for a list of known water bodies in the project area that provide habitat throughout the lake trout and lamprey life cycles. The longnose sucker, threespine stickleback, and ninespine stickleback spawn in small tributaries and rear in the drainage's lakes.

Round whitefish spawn in the fall and are found throughout the main stem Kenai River and its major lakes. Although specific life history has not been studied in the project area, whitefish are caught in the upper Kenai River by trout anglers and in the Russian River more commonly in the late summer and fall. Whitefish are fall spawners. Life history from glacial rivers of interior areas of Alaska show distinct migrations from glacial rivers in the summer to clear water tributaries during the spawning season. It is not known what upper Kenai River tributaries may be important spawning grounds for round whitefish of the Kenai River.

The coastrange and slimy sculpin likely spawn and rear in the main stem as well as tributary streams (DNR, ADF&G, KPB 1997).

3.21.1.2 Essential Fish Habitat

EFH is defined under the Magnuson-Stevens Fishery and Conservation Management Act (Pub.L. 94-265), as amended by the Sustainable Fisheries Act of 1996 (Pub.L. 104-297), as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH is designated by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) for species of marine, estuarine, and anadromous finfish, as well as certain mollusks and crustaceans, managed under a Federal Fishery Management Plan (FMP). Under the definition of EFH, necessary habitat is that which is required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. EFH designations emphasize the importance of habitat protection to healthy fisheries.

Of the species that occur in the project area, anadromous salmon species are Federally managed. Consultation with NMFS and ADF&G confirmed that the following five species of Pacific salmon occur within the project area (Marsh, personal communication 2006):

- Sockeye (red) salmon (*Oncorhynchus nerka*)
- Chinook (king) salmon (*O. tshawytscha*)
- Coho (silver) salmon (*O. kisutch*)
- Pink salmon (*O. gorbuscha*)
- Chum salmon (*O. keta*)

NMFS considers all waters that support anadromous fish species to be EFH and has designated waters identified as anadromous by ADF&G as EFH. In the project area, 10 streams and one lake are anadromous and thus are designated as EFH for the five species of salmon listed above (ADF&G 2014c). These water bodies are Kenai Lake, the Kenai River, the Russian River, Juneau Creek, Bean Creek, Fuller Creek, Cooper Creek, and four unnamed creeks (see Map 3.21-1). Table 3.21-3 identifies salmon species occurrence in the water bodies in the project area identified as EFH. These water bodies also support populations of Dolly Varden, rainbow trout, and other species, but as these species are not included in a Federal FMP they are not considered in the evaluation of EFH. No marine fish species have EFH in the project area.

The Kenai River ecosystem is a productive, diverse system that supports a wide variety of anadromous and non-anadromous fish species. Geographically, this system is contained within a large-scale terrain setting comprised of lakes, streams, wetlands, mountains, and glaciers that are connected to the Cook Inlet and the greater Gulf of Alaska ecosystem. The Kenai River ecosystem has consistent high flows for extended periods that provide salmon species ample time for spawning and migration. Skilak and Kenai lakes, as associated with the Kenai River ecosystem, regulate stream flow fluctuations, reduce sediment movement downstream, and provide excellent rearing and overwintering habitat. Many of the Kenai River's associated tributaries also provide fish with rearing, overwintering, and spawning habitat (USGS 2001, Dorava and Liepitz 2004). In many areas of the Kenai River ecosystem, the stream banks consist of zones with slower currents and back eddies. These areas provide streamside vegetation of grasses, roots, and overhanging trees. Streamside vegetation serves several important functions, including providing bank stabilization, cover, and feeding zones for juvenile fish.

Table 3.21-3. Project area EFH represented by salmon streams

Salmon streams	Sockeye salmon	Chinook salmon	Coho salmon	Pink salmon	Chum salmon
Kenai Lake	Present / Rearing	Present	Present	Present	Present
Upper Kenai River[a]	Present	Present	Present	Spawning	Present
Bean Creek[b]	—	Rearing	Rearing	—	—
Juneau Creek	Spawning [b]	Spawning [b] / Rearing [c]	Spawning [c]	Spawning [c]	—
Cooper Creek[ce]	Spawning[c]	Rearing [c] —	Spawning [b] / Rearing [b]	Present	Present
Lower Russian River [c]	Present	Present	Present	Present	—
Fuller Creek[b]	—	—	Rearing	—	—
Unnamed Creek 1 [b]	—	—	Rearing	—	—
Unnamed Creek 2 [b]	—	—	Rearing	—	—
Unnamed Creek 3 [b]	—	—	Rearing	—	—
Unnamed Creek 4		Present [d]	Rearing [b]		

[a] Upper reach. (farthest upstream sampling location; may not be an upper reach of the entire stream)
[b] Upper and lower reaches.
[c] Lower reach.
[d] Anadromous fish documented by ADF&G during Sterling Highway MP 45–60 Resurfacing Project.
[e] Fish presence documented by USFS as part of a weir study on Cooper Creek between 2010 and 2014.
Note: Dash indicates species does not occur in the water body.
Sources: ADF&G (2014c) Lang, personal communication (2014).

Kenai Lake. The western end of Kenai Lake is located within the project area, and the Sterling Highway parallels the lake shore from Milepost (MP) 45 to 48. All five species of Pacific salmon are present in Kenai Lake (ADF&G 2014c). Adult Chinook salmon spawn in Kenai Lake in late May through July. By mid-July, late-run sockeye salmon begin to spawn in the nearshore areas of Kenai Lake. Juvenile sockeye and Chinook salmon overwinter in Kenai Lake. The Chinook salmon spend 1 year as free-swimming juveniles, while the sockeye can spend up to 2 years rearing in a lake environment before migrating to the sea (Marsh, personal communication 2006).

Kenai River. The Kenai River runs from Kenai Lake westward through the project area. The Sterling Highway from MP 48 to 58 closely parallels the river and crosses it twice. The ADF&G *Anadromous Waters Catalog* (2014c) documents the upper reaches of the Kenai River as spawning habitat for sockeye, Chinook, pink, and coho salmon. Chum salmon occur in small numbers in the Kenai River watershed and may utilize the Kenai for spawning. While some pink salmon are likely present in the Kenai River annually, they are documented as spawning in the Kenai River every other year (Marsh, personal communication 2006) because of their distinct odd- and even-year spawning populations. Chinook, coho, and sockeye salmon each have two spawning runs in the Kenai River. The first Chinook run (from May to late June) occurs mainly in the tributaries, while the later run (from late June to August) occurs in the main stem from Kenai Lake downstream (Liepitz 1994, Boggs et al. 1997, DNR et al. 1997). The early coho run

enters the Kenai River in late July and spawns primarily in tributaries. The late run begins in September, and extends into November and December, with salmon spawning in the main stem of the Kenai River. Spawning coho have been observed at the Sterling Highway Bridge as late as February (Marsh, personal communication 2006). The main stem of the Kenai River near the outlet of Kenai Lake is productive habitat for coho spawning. Sockeye salmon have an early run in the Kenai River from mid-May to mid-July (Davis et al. 1994). Late run sockeye salmon spawn in tributaries and the main stem of the Kenai River from early July through early August (Boggs et al. 1997).

Bean Creek. Bean Creek is a small stream originating on the south-facing slopes north of Cooper Landing and occurs almost entirely within the project area. The upper and lower reaches of Bean Creek are documented as rearing habitat for Chinook and coho salmon (ADF&G 2014c). The habitat is mainly riffles and pools, and the stream bed contains small to large gravel and small cobbles. There is abundant overhanging vegetation and woody debris with some undercut bank habitat (HDR 2006c).

Juneau Creek. Juneau Creek originates well north of the project area and flows south through a canyon to join the Kenai River just west of the Cooper Landing community. Salmon do not migrate above the 128-foot-high Juneau Creek Falls, located approximately 4.5 miles from the Sterling Highway. The lower reaches of Juneau Creek (below the falls) are within the project area and are documented as spawning habitat for sockeye salmon, and spawning and rearing habitat for Chinook salmon (ADF&G 2014c). The habitat consists of riffles with small to large gravel and small cobbles. There is abundant overhanging vegetation and woody debris with some undercut bank habitat (HDR 2006c). HDR conducted juvenile surveys in 2004 and 2005 in this stream, and no fish were captured during the surveys (2011a). However, later studies conducted by Reimer and Begich found Chinook salmon, both present and spawning, in the project area section of Juneau Creek (Begich, et al. 2010, Reimer 2013).

Cooper Creek. Cooper Creek originates south of the project area at Cooper Lake Dam and flows north into the Kenai River, passing under the Sterling Highway near MP 51. The upper and lower reaches of Cooper Creek are documented as spawning and rearing habitat for coho salmon (ADF&G 2014c). Field surveys have documented coho and sockeye salmon spawning in Cooper Creek (HDR 2011a); and the *Anadromous Waters Catalog* documents sockeye spawning in the lower reach and coho rearing in the upper and lower reaches (ADF&G 2014c). A weir study conducted by the USFS between 2010 and 2014 documented the presence of Chinook, pink, and chum salmon in Cooper Creek (Lang, personal communication 2014). Cooper Creek also provides limited spawning habitat for a small number of Chinook salmon (FERC 2006). Stream habitat consists of pools, riffles, and glide. The substrate is comprised primarily of boulder and gravel substrate. Cooper Creek has moderate flow. Since the construction of the Cooper Lake Dam in 1959, normal outflow from Cooper Lake has been directed into Kenai Lake via a tunnel outside the project area. This has significantly reduced flows at the mouth of Cooper Creek (FERC 2006). An approved diversion of Stetson Creek, a primary Cooper Creek tributary, into Cooper Lake and the construction of a bypass structure to allow for the release of warmer water from Cooper Lake into Cooper Creek through the dam, is intended to create stream flows and corresponding fish habitat in Cooper Creek similar to what existed before the construction of the Cooper Lake Dam (USFWS 2011).

Russian River. Current alternatives do not cross the Russian River; however, it is included because of its proximity and importance for spawning salmon in the Kenai watershed. The

Russian River is a major tributary of the Kenai River, flowing north from Upper Russian Lake and joining the Kenai River at approximately MP 55. The Russian River supports runs of Chinook, coho, sockeye, and pink salmon (Marsh, personal communication (2006) and ADF&G (2014c)). The Russian River makes up only 3 percent of the drainage area of the Kenai River, yet it accounts for an average of 25 percent of late-run sockeye escapement to the Kenai River (ADF&G 1994). The other 93 percent of the Kenai River drainage area is responsible for the remaining 75 percent of late-run sockeye escapement. In other words, even though the Russian River is comparatively small, it is extremely productive for early- and late-run sockeyes (approximately 8.5 times more productive than the rest of the entire Kenai River system). The Russian River has tens of thousands of sockeye salmon migrating upstream to the Russian Lakes from mid-June until the end of August (ADF&G 1994). Russian River sockeye salmon use the main stem river as well as the tributary streams to spawn. Coho salmon arrive in the Russian River by late July or early August to spawn. Pink salmon spawn during even-numbered years in the Russian River system (Marsh, personal communication 2006). Chinook salmon are also known to occur in the segment of the Russian River located within the project area.

Fuller Creek. Fuller Creek flows south from mountain lakes to the Kenai River and passes under the Sterling Highway near MP 57. The upper and lower reaches of Fuller Creek are documented as rearing habitat for coho salmon (ADF&G 2014c). The streambed is approximately 11 to 12 feet wide and contains large gravel to small cobbles. Fuller Creek has moderate flow consisting of riffles, small pools, and cascades. During unusually dry seasons, it has been known to go dry. Fuller Creek was verified as flowing in September 2003 and is on the list of anadromous fish streams. Fuller Creek was dry during the 2004 field survey, but flowing during the 2005 survey; fish were not captured or observed during either survey (HDR 2011a).

Unnamed Creek 1. This small tributary originates along the base of slopes within the community of Cooper Landing. It flows along the Sterling Highway and passes under Snug Harbor Road, just south of the Cooper Landing Bridge near MP 48. This tributary has low flow, running between approximately 1.6 inches to 1 foot deep with a few deeper pools. The site is in close proximity to the Kenai River and provides off-channel rearing habitat for coho salmon fry (ADF&G 2014c). Coho salmon were captured during fisheries surveys conducted in 2004 (HDR 2011a). This tributary was again visited in June 2012 to investigate fish presence in response to proposed construction for the Sterling Highway MP 45–58 resurfacing project. Fish trapping efforts (DOT&PF 2012a) recorded the presence of juvenile Chinook and coho salmon on the east side of Snug Harbor Road as well as about 100 feet west of Snug Harbor Road.

Unnamed Creek 2. This small tributary flows in an east-west direction and is located immediately north of the Sterling Highway, at approximately MP 51.5. This tributary is approximately 3 to 4 feet wide and 2 to 9 inches deep, and had moderate flow during a field survey in 2004. The stream bed is comprised of organic materials and silts. The ADF&G *Anadromous Waters Catalog* (ADF&G 2014c) documents this tributary as rearing habitat for coho salmon. Coho salmon were captured during the fish survey for this project (HDR 2011a).

Unnamed Creek 3. This small tributary is located at approximately MP 54 and passes underneath the Sterling Highway before joining the Kenai River. This tributary is approximately 660 feet in length and was documented as anadromous in 2012 (ADF&G 2014c). This tributary is documented as providing rearing habitat for coho salmon.

Unnamed Creek 4. This tributary is approximately 350 feet long and flows underneath the Sterling Highway at approximately MP 54.3. Field surveys in 2004 and 2005 documented coho and Chinook salmon in this tributary (HDR 2011a); however, the ADF&G *Anadromous Waters Catalog* (ADF&G 2014c) documents this tributary only as rearing habitat for coho salmon.

3.21.2 Environmental Consequences

This section provides an analysis of the potential adverse[1] effects of the project alternatives on EFH and the fish that rely on that habitat. Conclusions regarding the effects of the alternatives on EFH and a summary of proposed measures to avoid and minimize adverse effects are provided in this section.

3.21.2.1 No Build Alternative

Direct and Indirect Impacts

The No Build Alternative would have no new direct or indirect impacts on EFH in the project area. However, increased traffic on the existing highway would result in greater runoff of roadway debris and pollutants, which would adversely affect EFH immediately adjacent to the highway. Existing indirect impacts such as sediment delivery and potential water quality degradation from storm water runoff, potential contamination from spills due to vehicle crashes, and concentrated fishing pressure and associated stream bank erosion would be expected to increase as population and recreational use increased.

The projected growth in travelers to the project area could create additional pressures on fish resources and EFH located along the existing Sterling Highway. If poorly managed, additional fishing pressure could adversely affect EFH (primarily through trampling of river banks and riparian vegetation coupled with associated erosion, siltation, and habitat destruction), which could cumulatively affect the sustainability of the fishery. The Kenai River watershed fishery is managed and regulated by the ADF&G to maintain the structural and functional integrity of the riparian habitat along the Kenai River. With proper management, the increase in traffic and associated fishing pressure are not anticipated to cause a long-term adverse effect on EFH. For additional information on indirect effects closely related to EFH, see Section 3.10, Subsistence. Recreational changes related to the numerous sport fish access and recreation facilities are described in Section 3.8, Parks and Recreation Resources, and Section 4(f).

3.21.2.2 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

Construction in or near EFH could have permanent impacts to stream habitat. The four build alternatives would impact different parts of the project area, which are detailed in the Alternatives sections below. All alternatives could result in some direct and indirect impacts to fish and EFH as a result of the installation of culverts. The primary impacts of culverts would be 1) permanent changes in stream flow that could affect fish passage under the highway (making it potentially more difficult or easier for fish to pass), and 2) elimination of habitat, including loss

[1] Subpart J, Section 600.810, of the Magnuson-Stevens Fishery and Conservation Management Act identifies an adverse effect as "any impact which reduces quality and/or quantity of EFH" and also notes that "adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, or reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR § 600.810).

of riparian vegetation, and reduction of habitat quality where culverts would replace natural habitat. Where old culverts under the existing highway would be replaced with new culverts built to modern standards and often at larger diameter, it is possible that fish passage would be established where it had previously been cut off. See each alternative's section below for the estimated area of natural stream channel EFH being impacted by the installation of culverts.

The number of bridges and culverts crossing streams with resident or anadromous fish is a contributing factor to adverse effects on EFH. Additionally, the area of wetland and vegetation loss and new impermeable surface (area of new roadway) affects the volume of storm water runoff, which may carry accumulated oils, debris, and contaminants. This impact is most pertinent in areas where the roadway intersects with, or is immediately adjacent to, water bodies. Impacts to EFH, as calculated through geographic information systems, were determined by comparing the acreage of overlap between the alignments' cut-and-fill boundaries and the mapped EFH. The acreage of EFH adversely affected by each alternative is presented in the sections below, and Map 3.21-1 depicts the locations of anadromous stream crossings for the various alternatives. Impacts to EFH from bridge replacement would be partially offset by removal of the old bridge piers and any abutments that might be in the water. Additional information related to effects on EFH can be found in Section 3.13, Water Bodies and Water Quality.

The projected growth in number of travelers to and through the project area could create additional pressures on fish resources and EFH located along the existing Sterling Highway. Proposed actions to improve access and reduce local traffic congestion could create additional demand for vehicle parking and access to fishing resources. Without active management, additional fishing pressure could adversely affect EFH (primarily through trampling of river banks and riparian vegetation coupled with associated erosion, siltation, and habitat destruction), which could cumulatively affect the sustainability of the fishery. The Kenai River watershed fishery is managed and regulated by the ADF&G and adjacent owners of public land (USFS and USFWS) to maintain the structural and functional integrity of the riparian habitat along the Kenai River. With proper management, the increase in traffic and associated fishing pressure is not anticipated to cause a long-term adverse effect on EFH.

For additional information on indirect effects closely related to EFH, see Section 3.10, Subsistence. Recreational changes related to the numerous sport fish access and recreation facilities are described in Section 3.8, Parks and Recreation Resources, and Section 4(f). Effects to fish and EFH as described above are the same as noted for the No Build Alternative.

Construction Impacts

Construction of any build alternative would require permits or other regulatory approvals to provide for the protection of fish and EFH. These include a U.S. Army Corps of Engineers Section 404 Permit, an ADF&G Title 16 Fish Habitat Permit, an Alaska Department of Environmental Conservation (ADEC) Section 401 Certificate of Reasonable Assurance, a Borough Floodplain Development Permit, and requirements of an ADF&G-Department of Transportation and Public Facilities (DOT&PF) Memorandum of Agreement (MOA). The ADF&G Title 16 permit process, in particular, ensures that construction and operation of any build alternative will be conducted using best management practices (BMPs) to minimize the amount of time in-water work is conducted, minimize siltation of water bodies during

construction, and provide for fish passage during construction and operation. Additional information can be found in Section 3.24, Permits.

For any build alternative, roadway construction would require crossing anadromous and resident fish streams. Temporary diversions of these streams would be required during culvert installation and possibly during construction of small bridges, which would temporarily alter the streambed. Placement of culverts in fish-bearing streams could temporarily affect anadromous fish populations by eliminating eggs incubating in the streambed or by creating turbid water and scour downstream. Deposition of material could suffocate incubating eggs downstream as well as affect rearing and foraging of juvenile salmon. Direct disturbance of habitat from in-water work, and siltation downstream could displace fish temporarily. Construction in or near EFH habitat will temporarily impair the normal habitat functionality of the area.

In-water work would be required for the replacement and construction of bridges over the Kenai River. Pile driving, augering, or both would be necessary for placement of bridge pier foundations. Temporary impacts on the water quality of the Kenai River would occur during construction, including increased turbidity and siltation, which could smother incubating eggs. Impacts to EFH from bridge replacement would be partially offset by removal of the old bridge piers and any abutments that might be in the water.

Mitigation

Adverse effects to resident and anadromous fish species and EFH are unavoidable and largely associated with temporary construction activities; however, with mitigation, no long-term adverse effects on EFH or species that rely on that habitat are anticipated. Impacts would be minimized through installation criteria, BMPs, and the proposed mitigation measures listed below. These measures were developed in consultation with NMFS. These are general measures that may be modified to specifically address details of the preferred alternative through additional consultation with the agencies during final design and permitting. Additional details on the effects to EFH and proposed conservation measures can be found in the *Essential Fish Habitat Assessment* (HDR 2013a).

- Based on available preliminary engineering done to date (HDR 2011b, 2014a), all new bridge crossings would be designed to minimize impacts to EFH by placing as few piers as feasible below the ordinary high water line. All replacement bridges would be designed with fewer piers than currently exist, whenever practical, and DOT&PF has committed to using no more piers than currently exist. As engineering design develops, DOT&PF will continue to evaluate bridge designs to reduce impacts to EFH and retain existing hydrology.
- When specific pile driving techniques are known, appropriate mitigation would be developed with the regulatory agencies to minimize impacts. For example, in the spawning areas identified in ADF&G's *Atlas of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* (ADF&G 2014c), pile driving or bridge removal activities may be limited to late October to the end of December to avoid most spawning impacts (per recommendations in Marsh, personal communication (2006) and Popper and Hastings (2009)). If possible and necessary, there may be deviations to the proposed timing windows, which would be coordinated in consultation with NMFS and ADF&G.

- All anadromous fish stream crossings would be designed to minimize impacts on stream function and hydrology, and to provide passage to both anadromous and resident fish. All road structures crossing anadromous fish habitat would be designed to meet the ADF&G-DOT&PF MOA requirements for fish passage. For example, stream culverts would be bottomless arch culverts or would be fully embedded with streambed material where possible.
- At no time would the construction activities result in a migration barrier for adult or juvenile salmonids. Construction would be timed to avoid critical fish spawning and migration. Specific timing windows for in-water work and pile driving would be established during permitting.
- During construction, the contractor may use other methods to re-route streams such as temporary bridging for larger anadromous streams and rivers, or a bypass culvert or pumping for smaller anadromous streams. Temporary diversions within fish-bearing streams would be subject to permitting stipulations and would be designed so that stream flow would not be impeded and fish passage would not be compromised. Stream diversions may be limited to a specific work window depending on species present in stream and spawning habitat in the vicinity (Litchfield, personal communication 2014). Any kind of in-stream diversion would be limited to late October through December to avoid salmon spawning and rearing life cycles, although this timing window may be adjusted in permit stipulations (Marsh, personal communication 2006). Following completion of construction, all streams would be restored to natural conditions.
- A number of existing undersized or perched culverts were identified during a field investigation to identify small streams and drainages in the project area, as summarized in the *Hydrology and Hydraulics Summary* (HDR 2006f). Replacement of existing culverts that are undersized or perched could improve fish passage to upstream habitat on portions of the highway that are reconstructed.
- To minimize and prevent spills or leakage of hazardous materials during construction, standard spill-prevention measures would be implemented in accordance with the contractor's approved "Spill Prevention, Control, and Countermeasures Plan."
- No vehicles or equipment would be fueled or serviced within 100 feet of wetlands or fish bearing streams with the exception of "low-mobility" equipment used for pile driving, drilled shaft construction, or other bridge construction. A plan would be provided detailing the process for fueling this equipment within 100 feet of wetlands or fish-bearing streams. Fueling and service vehicles would be equipped with adequate materials (such as sorbent pads, booms, etc.) to immediately contain and commence clean-up of spilled fuels and other petroleum products. Fuel would be stored a minimum of 100 feet from any wetland or water body.
- The contractor would use contaminant-free embankment and surface materials in construction.
- Stream banks at all culverts and bridge crossings would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion. Seeding of the disturbed areas would conform to Section 618 of the DOT&PF Standard Specifications for Seeding.

- DOT&PF would work with ADF&G to incorporate vegetation to the extent practicable into any areas along anadromous fish streams that would require riprap, with the aim of minimizing long-term habitat loss.
- Design would include standard engineering considerations to avoid and minimize the potential for erosion near surface drainages.
- Temporary material storage piles would not be placed in the 100-year floodplain during the rainy season unless the following conditions are met: (1) storage does not occur when flooding is imminent; and (2) if storage piles consist of erosive material, they are to be covered with plastic tarps (or similar) and surrounded with compost berms or other erosion control devices.
- Slopes with the potential to impact the Kenai River would be stabilized as soon as practicable.
- BMPs developed in accordance with DOT&PF's *Alaska Storm Water Pollution Prevention Plan Guide* (DOT&PF 2011d) and ADEC's *Alaska Storm Water Guide* (ADEC 2011) would be employed to control erosion and capture sediment that is moved by stormwater before it leaves the site into project area streams. Specific BMPs related to anadromous fish habitat would include installing temporary erosion and sediment control measures (e.g., minimizing the amount of soil exposed during construction by preserving native topsoil or phasing construction, maintaining natural buffer areas, controlling storm water discharges and flow rates, and protecting steep slopes until re-vegetated plants can bind the soil and stabilize it), and sustaining predevelopment flow rates to protect stream habitat (ADEC 2011).
- Grassy swales would be part of the roadway design to accept storm water runoff to help maintain water quality in fish habitat by filtering sediments, road salts, and oil residue before entering streams or the Kenai River.

3.21.2.3 Cooper Creek Alternative

Direct and Indirect Impacts

The Cooper Creek Alternative would affect Cooper Creek, the Kenai River, Fuller Creek, and Unnamed Creeks 1, 2, 3, and 4. Adjacent to impacted EFH are 2.6 acres of seasonally- or permanently-flooded wetlands that could also serve as fish habitat. A bridge would be built more than 100 feet above Cooper Creek. Based on preliminary design conducted for bridge structure options (HDR 2011b), because of the narrow creek width, it is anticipated that the bridge structure could be designed so that piers and abutments would not need to be placed in the stream channel. Based on available preliminary engineering to date, no loss of EFH is anticipated at the Cooper Creek bridge crossing.

New culverts would be used to cross Fuller Creek and Unnamed Creeks 2, 3 and 4, all of which have been field-verified as EFH for rearing coho salmon. Unnamed Creek 4 is also known to have Chinook salmon present. Unnamed Creek 1 would be re-routed into an open channel adjacent to the road. There would be minimal permanent loss of EFH resulting from these culvert crossings because the required culvert design features for all build alternatives, noted in Section 3.21.2.2 above, would preserve fish passage. Within the culverts, the waterways would be completely shaded and without natural vegetation or meanders, causing a reduction in habitat

quality. Additional details on the effects to EFH and proposed conservation measures can be found in the *Essential Fish Habitat Assessment* (HDR 2013a).

The Cooper Creek Alternative also includes replacement of the Cooper Landing and Schooner Bend bridges over the Kenai River and identifies two separate locations along the river where installation of riprap or retaining walls may be required to widen and reconstruct segments of the existing roadway to bring the highway up to current standards. These activities would result in temporary impacts to fish and EFH during construction and are the same as the construction impacts for all build alternatives, as discussed in Section 3.21.2.2. Once project bridges, retaining walls, and riprap were in place, minimal permanent impacts to these fish species would be expected, because new construction would be in almost the same locations, and the new bridges would be only slightly wider than the existing bridges.

Existing indirect impacts such as sediment delivery and potential water quality degradation from storm water runoff, potential contamination from spills due to vehicle crashes, risk of hazardous substance spills from fuel tankers and other vehicles, and concentrated fishing pressure and associated stream bank erosion would be slightly less than the No Build Alternative because approximately 44 percent of the highway alignment would be routed away from the Kenai River floodplain and would carry about 70 percent of traffic away from fish habitat.

Table 3.21-4 depicts the anticipated construction activities and impacts associated with the Cooper Creek Alternative that would affect EFH.

Construction Impacts

Construction impacts associated with the Cooper Creek Alternative are detailed in Section 3.21.2.2.

Mitigation

Construction impacts to salmon are of particular concern. Specific timing windows for in-water work and pile driving would be established during permitting to avoid critical salmon life cycle impacts. Mitigation for fish and EFH that is common to all alternatives can be found in Section 3.21.2.2.

Table 3.21-4. Cooper Creek Alternative EFH impacts

Anadromous Waters	Sockeye	Chinook	Coho	Pink	Chum	Structure (length, in feet)	EFH Impact (acres)	EFH Impact (yards^3)
Upper Kenai River	S	S	S	S	P	Cooper Landing Replacement Bridge (3–4 in-water piers[a])	0.15	4,825
						Schooner Bend Replacement Bridge (2–3 in-water piers[a])	0.075	2,413
						1. Retaining Wall/Riprap	0.76	2,465
						2. Retaining Wall/Riprap	0.057	65
Cooper Creek	S		R			New Bridge: 0 piers in water	0.00	0
Fuller Creek	—	—	R	—	—	Culvert (130 feet long)	0.030	1,150
Unnamed Creek 1	—	—	R	—	—	Creek re-routed into open channel adjacent to roadway	0.101	980
Unnamed Creek 2	—	—	R	—	—	Culvert (112 feet long)	0.026	660
Unnamed Creek 3	—	—	R	—	—	Culvert (95 feet long)	0.022	290
Unnamed Creek 4	—	P[b]	R	—	—	Culvert (95 feet long)	0.022	290
						Total	**1.2**	**13,138**

[a] The number of in-water bridge piers is estimated to be the same or fewer than existing bridge piers. Acreage calculations were based conservatively on the number and size of piers of the existing Cooper Landing Bridge.

[b] Anadromous fish documented by ADF&G during Sterling Highway MP 45–60 Resurfacing Project.

EFH = Essential Fish Habitat; S = Spawning; R = Rearing; P = Present

Sources: Marsh, personal communication (2006), ADF&G (2012a), HDR (2011a), Johnson and Blanche (2011), ADF&G (2014c).

3.21.2.4 G South Alternative

Direct and Indirect Impacts

The G South Alternative would affect known EFH water bodies including the Kenai River, Bean Creek, Juneau Creek, Fuller Creek, and Unnamed Creeks 2, 3, and 4. Adjacent to impacted EFH are 2.6 acres of seasonally- or permanently-flooded wetlands that could also serve as fish habitat. Placement of a new bridge across the Kenai River with up to three in-water piers would permanently change the shading, sound/vibration, and in-water and streambank vegetation in the immediate area. However, this impact is expected to be minimal to resident fish species, which are not expected to use the Kenai River for critical life stages such as spawning and rearing. Impacts to anadromous fish species would be minimized by limiting in-water work to a window that would avoid critical life cycle impacts. The existing Schooner Bend Bridge would be replaced, but minimal permanent impact to fish would be expected, because the new bridge would be in nearly the same location and would be only slightly wider. This alternative identifies two separate locations along the river where installation of riprap or retaining walls may be required to widen and reconstruct segments of the existing roadway to bring the highway up to current standards. The impacts to salmon in the Kenai River would be the same as those under the Cooper Creek Alternative (see Section 3.21.2.3).

Under the G South Alternative, a bridge would be constructed to cross Juneau Creek. Based on preliminary design conducted for bridge structure options (HDR 2011b), it is anticipated that the bridge structure for the Juneau Creek crossing could be designed so that piers would not be placed below ordinary high water and no fill would be placed in the creek. Based on available preliminary engineering to date, no EFH impact is anticipated at the Juneau Creek crossing.

Culverts would be used to cross Bean Creek, Fuller Creek, and Unnamed Streams 2, 3 and 4, which have been field-verified as anadromous and provide rearing habitat for coho salmon. Unnamed Creek 4 is also known to have Chinook salmon present, and Bean Creek provides rearing habitat for Chinook salmon. There would be minimal permanent loss of EFH resulting from these culvert crossings because the required culvert design features for all build alternatives, noted in Section 3.21.2.2 above, would preserve fish passage.

Existing indirect impacts such as sediment delivery and potential water quality degradation from storm water runoff, potential contamination from spills due to vehicle crashes, risk of hazardous substance spills from fuel tankers and other vehicles, and concentrated fishing pressure and associated stream bank erosion would be somewhat less than those same impacts under the No Build Alternative. This is because approximately 53 percent of the highway would be routed away from the Kenai River floodplain and would carry about 70 percent of traffic away from fish habitat.

Table 3.21-5 depicts the anticipated construction activities and impacts associated with the G South Alternative that would affect EFH.

Construction Impacts

Construction impacts associated with the G South Alternative are similar to those for all build alternatives as detailed in Section 3.21.2.2.

Mitigation

A specific in-water work window would be established during permitting, in conjunction with permitting agencies, to avoid critical salmon life cycle impacts. Mitigation for fish and EFH that is common to all build alternatives can be found in Section 3.21.2.2.

Table 3.21-5. G South Alternative EFH impacts

Anadromous Waters	Sockeye	Chinook	Coho	Pink	Chum	Structure (length, in feet)	EFH Impact (acres)	EFH Impact (yards^3)
Kenai River	P	S	P	S	P	New Kenai River Bridge (2–3 in-water piers[a])	0.15	4,825
						Schooner Bend Replacement Bridge (2–3 in-water piers [a])	0.075	2,413
						1. Retaining Wall/Riprap	0.76	2,465
						2. Retaining Wall/Riprap	0.057	65
Juneau Creek	*S*	S/R	S	S	—	New Bridge: 0 piers in water	0.00	0
Bean Creek	—	R	R	—	—	Culvert (125 feet)	0.031	500
Fuller Creek	—	—	R	—	—	Culvert (130 feet)	0.030	1,150
Unnamed Creek 2	—	—	R	—	—	Culvert (112 feet long)	0.026	660
Unnamed Creek 3	—	—	R	—	—	Culvert (95 feet long)	0.022	290
Unnamed Creek 4	—	P	R	—	—	Culvert (95 feet long)	0.022	290
						Total	**1.0**	**12,658**

[a] The number of in-water bridge piers is estimated to be the same or fewer than existing bridge piers. Acreage calculations were based conservatively on the number and size of piers of the existing Cooper Landing Bridge.

EFH = Essential Fish Habitat; S = Spawning; R = Rearing; P = Present

Sources: Marsh, personal communication (2006), ADF&G (2012a), HDR (2011a), Johnson and Blanche (2011), ADF&G (2014c).

3.21.2.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

The Juneau Creek and Juneau Creek Variant alternatives would affect the Kenai River and Fuller Creek. Adjacent to impacted EFH are 1.9 acres of seasonally- or permanently-flooded wetlands that could also serve as fish habitat. Preliminary bridge structure options anticipate that the crossing of Juneau Creek could be clear spanned (HDR 2011b). A bridge over Juneau Creek would be more than 260 feet above the stream itself, and piers and abutments are not anticipated to be placed in the water or riparian area (no work would occur below elevation 1,060 feet on the canyon rim); as a result, no EFH impact is anticipated at that crossing. A crossing of Bean Creek would use a fish passage culvert placed above the documented anadromous fish reach.

The impacts to the Kenai River and Fuller Creek would have the same impacts as the other build alternatives where they are coincident with the existing highway. Fuller Creek provides rearing habitat for coho salmon and would be crossed with a culvert. There would be minimal permanent loss of EFH resulting from these culvert crossings because the required culvert design features for all build alternatives, noted in Section 3.21.2.2 above, would preserve fish passage.

These alternatives identify four locations along the river where installation of riprap or retaining walls may be required to widen and reconstruct a segment of the existing roadway to bring the highway up to current standards. The EFH impacts to the Kenai River and Fuller Creek would be

similar to those under the other build alternatives where they are coincident with, and reconstruct, the existing highway.

Existing indirect impacts such as sediment delivery and potential water quality degradation from storm water runoff, potential contamination from spills due to vehicle crashes, risk of hazardous substance spills from fuel tankers and other vehicles, and concentrated fishing pressure and associated stream bank erosion would be slightly less than those same impacts under the No Build Alternative. This is because approximately 75 percent of the highway under the Juneau Creek Alternative would be routed away from the Kenai River floodplain and approximately 74 percent of the highway under the Juneau Creek Variant Alternative would be routed away from the Kenai River. These changes would carry about 70 percent of traffic away from fish habitat in this area.

Table 3.21-6 depicts the anticipated construction activities and impacts associated with the Cooper Creek Alternative that would affect EFH.

Table 3.21-6. Juneau Creek and Juneau Creek Variant alternatives EFH impacts

Anadromous Waters	Sockeye	Chinook	Coho	Pink	Chum	Structure (length, in feet)	EFH Impact (acres)	EFH Impact (yards^3)
Kenai River	S	S	S	S	P	Retaining Wall/Riprap	0.76	2,465
Juneau Creek	*S*	S/R	S	S	—	New Bridge: 0 piers in water	0.00	0
Fuller Creek	—	—	R	—	—	Culvert (130 ft long)	0.03	1,150
						Total	**0.8**	**3,615**

EFH = Essential Fish Habitat; S = Spawning; R = Rearing; P = Present

Sources: Marsh, personal communication (2006), ADF&G (2012a), HDR (2011a), Johnson and Blanche (2011), ADF&G (2014c).

Construction Impacts

Construction impacts associated with the Juneau Creek and Juneau Creek Variant alternatives are similar to those for all build alternatives as detailed in Section 3.21.2.2.

Mitigation

Construction impacts to salmon are of particular concern. Specific timing windows for in-water work and pile driving would be established during permitting to avoid critical salmon life cycle impacts. Mitigation for fish and EFH that is common to all alternatives can be found in Section 3.21.2.2.

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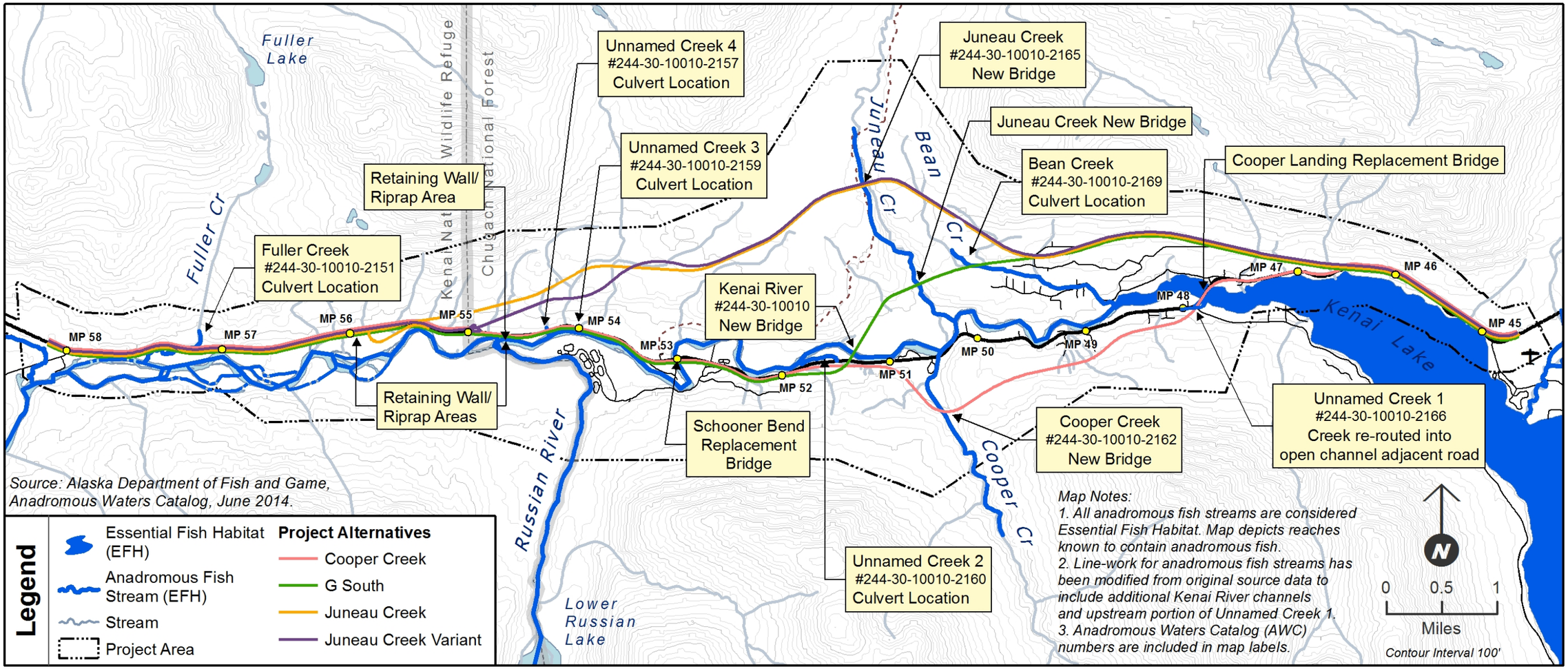

Map 3.21-1. Essential fish habitat in the project area

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3.22 Wildlife

3.22.1 Affected Environment

More than 175 species of mammals, birds, and amphibians live in, seasonally use, or visit the Kenai River basin (USFWS 2014). The sections below summarize the bird, mammal, and amphibian species known or likely to occur in the project area including population information, agency status, habitats, selected life histories, mortality factors, and current conditions related to the project area. Non-native and invasive species are also discussed. Mammals are discussed in Section 3.22.1.1, birds in Section 3.22.1.2, and amphibians in Section 3.22.1.3.

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended, 16 USC § 1531 *et seq.*), FHWA received concurrence from both the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) that no species listed as Federally threatened or endangered under the Endangered Species Act (ESA) occur in the project area (Balogh 2006, Mecum 2006). Review of the USFWS and National Oceanic and Atmospheric Administration (NOAA) websites verified that no ESA-listed or ESA-proposed or candidate species are present in the project area (NOAA 2013, USFWS No date).

There are no U.S. Forest Service (USFS) Sensitive Species in the project area (Goldstein, Martin and Stensvold 2009).

No State-listed endangered species are known to occur in the project area (ADF&G 2011b).

3.22.1.1 Mammals

Species Occurrence and Agency Status

There are 26 species of mammals that are known or likely to occur in the project area, including bears, ungulates (moose, sheep, and goats), canids (wolves, coyotes, and foxes), lynx, weasels, rodents, hares, shrews, and bats (Table 3.22-1). All of these are known to occur on the Kenai National Wildlife Refuge (KNWR (USFWS 2010a)). No wild non-native or invasive mammal species have been documented on the Kenai Peninsula as of 2008 (McClory and Gotthard 2008), or on the KNWR as of 2010 (USFWS 2010a).

Although there are no threatened, endangered, or USFS sensitive mammal species in the project area, 14 mammal species occurring or likely to occur in the area have special agency designations by the Alaska Department of Fish & Game (ADF&G), the KNWR, and/or the Chugach National Forest (CNF; see Table 3.22-1). Only brown bear and wolverine have special designations by all three agencies.

Nineteen of the project area mammal species are classified as game species by the ADF&G and regulated for hunting and trapping (ADF&G 2013a). The ADF&G's Comprehensive Wildlife Conservation Strategy includes a list of "species of greatest conservation need" (ADF&G 2006a). Eight mammal species known or likely to occur in the project area are included on that list, including three game species (Table 3.22-1).

Table 3.22-1. Mammals known or likely to occur in the project area, with agency status*

		Agency Status		
Common Name	**Scientific Name**	**USFS[a]**	**USFWS[b]**	**ADF&G[c]**
Brown bear[d]	*Ursus arctos*	MIS	continued interest	SGCN, G
American black bear[d]	*Ursus americanus*	none	none	G
Moose[d]	*Alces alces*	MIS	none	G
Dall sheep[d]	*Ovis dalli kenaiensis*	none	none	G
Mountain goat[d]	*Oreamnos americanus*	MIS	none	G
Gray wolf[d]	*Canis lupus*	SSI	none	G
Coyote	*Canis latrans*	none	none	G
Red fox	*Vulpes vulpes kenaiensis*	none	special interest	G
Canadian lynx[d]	*Lynx canadensis*	SSI	none	G
Wolverine[d,e]	*Gulo gulo luscus*	SSI	special interest	SGCN, G
River otter[d]	*Lontra canadensis*	SSI	none	G
American marten	*Martes americana kenaiensis*	none	none	SGCN, G
Least weasel	*Mustela nivalis*	none	none	G
Ermine	*Mustela erminea*	none	none	G
American mink	*Neovison vison*	none	none	G
Beaver	*Castor canadensis*	none	none	G
Muskrat	*Ondatra zibethicus*	none	none	G
Porcupine	*Erethizon dorsatum*	none	none	G
Root vole	*Microtus oeconomus*	none	none	SGCN, UG
Northern red-backed vole	*Myodes rutilus*	none	none	SGCN, UG
Northern bog lemming	*Synaptomys borealis*	none	none	SGCN, UG
Cinereus shrew	*Sorex cinereus*	none	none	UG
Pygmy shrew	*Sorex hoyi*	none	none	SGCN, UG
Dusky shrew	*Sorex monticolus*	none	none	SGCN, UG
Snowshoe hare	*Lepus americanus*	none	none	G
Little brown bat	*Myotis lucifugus*	none	none	NG

[*] Based on MacDonald and Cook (2005) unless noted.

[a] MIS = management indicator species; SSI = species of special interest (USFS 2002a, 2009)

[b] Special interest = USFWS KNWR Species of Special or Continued Interest (2010a)

[c] ADF&G = Alaska Department of Fish and Game; SGCN = species of the greatest conservation need (ADF&G 2006a); UG = unclassified game, no closed season or bag limits; NG = nongame, no harvest permitted; G = game species (ADF&G 2013a)

[d] Selected as management/indicator species or as species for evaluation of impacts from this project by interagency group (HDR 2004a).

[e] The wolverine on the Kenai Peninsula was previously considered a unique subspecies (*Gulo gulo katschemakensis or Gulo luscus katschemakensis*) and was designated as a State "species of greatest conservation need" (ADF&G 2006a). A previous study found that genetic information from the Kenai Peninsula population is not consistent with subspecies status (Tomasik and Cook 2005). However, "the Kenai Peninsula population may harbor a disproportionate amount of the North American mitochondrial diversity and, as such, warrants special conservation" (USFWS 2010a).

As of 2010, USFWS recognized some species on the KNWR with "special" or "continued" interest (USFWS 2010a). Three of the mammal species identified are known or likely to occur in the project area (Table 3.22-1).

The USFS selects management indicator species because "their population changes are believed to indicate the effects of management activities" (from CFR 219.19 [a][1]). All three of the CNF's mammal management indicator species and four of the six mammal "species of special interest" in the CNF (USFS 2002a) are likely to occur in or near the project area (Table 3.22-1).

During consultations for this project, a 2004 interagency working group comprised of representatives from DOT&PF, FHWA, ADF&G, USFS, USFWS, and the National Park Service (NPS) identified nine mammal species that could be affected the most by the proposed project and/or that the interagency working group considered to be key indicators of potential effects to terrestrial wildlife in general (HDR 2004a). These species were primarily selected from species identified in the USFS CNF Plan (USFS 2002a). Selected species include moose, brown and black bear, river otter, Dall sheep, mountain goat, Canadian lynx, wolf, and wolverine (HDR 2004a).

The following sections discuss the affected environment for the nine selected mammal species. Brown bear and moose are highlighted because agencies identified these species as ones of particular importance for evaluation of potential impacts from the project (Ruediger 2004).[1]

Brown Bear

There is no estimate for the number of brown bears using the project area, although at least 11 individual brown bears have been known to use lower Juneau Creek (USFWS and USFS 2010), and at least 12 individuals have been known to use the Russian River area (Benoit 2011).

Empirical evidence from ADF&G tagging data and a 2010 population study (i.e., 11,175 black and brown bear hair samples captured from grid-located traps on the KNWR and CNF) indicate that at least 211 brown bears were alive on the Kenai Peninsula in 2010 (USFWS and USFS 2014). These data were used to generate a population estimate for a study area consisting of the KNWR and CNF of 428 bears (353 to 539) with a density of 42 bears per 1,000 square kilometers (386 square miles, mi^2) of habitat (USFWS and USFS 2014). These data were further extrapolated to generate a 2010 brown bear population estimate for the entire Kenai Peninsula (3,938 mi^2) of 582 bears (USFWS and USFS 2014). According to these studies, the Kenai Peninsula population is likely to have equal numbers of males and females, estimated at 188 adult males, 188 adult females, and 206 dependent young (103 male, 103 female) (USFWS and USFS 2014). There are not enough data to assess the stability of the brown bear population.

The 2010 population estimate of 582 brown bears for the Kenai Peninsula is greater than the 1993 population estimate of 277 brown bears. The 1993 estimate was based on an assumed density of 20 bears per 386 mi^2 of an estimated 5,347 mi^2 of brown bear habitat on the Kenai Peninsula (Del Frate 1993). The 2010 estimate is consistent with ADF&G opinion in 2005 that

[1] Caribou were generally considered to occur outside the project area (HDR 2007a) because they inhabit the Chickaloon River, Big Indian Creek, and Resurrection Creek areas (McDonough 2011b), although there are instances of occasional strays in the project area (HDR 2007a). Caribou were ranked as a lower priority for impact analysis and were not selected as a species of special consideration for this analysis (HDR 2007a).

the Kenai Peninsula brown bear population likely increased between 1995 and 2005 (Selinger 2005).

Despite the large runs of salmon in the Kenai River and other streams and the updated population estimate, the Kenai Peninsula brown bear population density is closer to the lower densities of Interior Alaska bears (non-salmon-dependent populations) than higher densities associated with salmon-dependent coastal brown bear populations elsewhere in Alaska (USFWS and USFS 2014). Human disturbance and development, including forest clearing in areas with high-quality habitat on the Kenai Peninsula, may help explain this lower density (Suring, Barber, et al. 1998). In addition, the Kenai Peninsula brown bear population has been considered isolated because the narrow isthmus of the Kenai Peninsula could affect immigration and viability (Graves et al. 2006, Suring et al. 2006). However, scientists have not found strong enough genetic evidence of isolation to cause concern (Jackson et al. 2008).

Habitat-use studies and management objectives generally focus on reproductive-age adult female brown bears because they are most important to the viability of the Kenai Peninsula population (Selinger 2009, Graves et al. 2006). Brown bears on the Kenai Peninsula use a wide variety of habitats, including rivers and streams, forests, and subalpine and alpine areas (Goldstein et al. 2010), generally avoiding areas in proximity to roads during spring and summer (Suring, Farley, et al. 2006). Locations of radio-tracked female Kenai Peninsula brown bears (male bears were not studied) clearly show extensive use of salmon streams for feeding during the summer (Farley et al. 2001). From July to October, female Kenai Peninsula brown bears were an average of 6,560 feet (approximately 2,000 meters) from a salmon stream. Related data show that female bears extensively use riparian areas up to 6,560 feet or more from a stream. The average daily movement of female brown bears slowly decreased in distance from May through October, presumably as bears spent more time near salmon streams. Kenai Peninsula dens used by female brown bears are typically in mountainous, remote sites (average 2,210 feet elevation and 8 miles from roads) on steep slopes (Goldstein, Poe, et al. 2010). Seasonal brown bear habitat use is summarized in Table 3.22-2.

The area surrounding Cooper Landing (approximately between Mileposts [MP] 45 and 55) has been generally identified as a Kenai Peninsula brown bear movement "corridor." Furthermore, the area just west of Cooper Landing near Juneau Creek was identified as a "linkage zone" (i.e., primary brown bear habitat (T. A. Graves, S. Farley, et al. 2007)). The general area between MP 45 and 60 is in a class of habitat with medium to high probability of use by both lone adult females and females with cubs during spring and summer (Farley et al. 2001).

The 2004 interagency working group for this project identified areas considered important habitat for brown bears that intersected the proposed alignments (Map 3.22-1; (HDR 2004a)). The interagency working group also noted other bear/human conflict areas, such as the refuse transfer station near MP 45 (Map 3.22-1, Area 1) and the Sportsman's Landing recreation area at MP 55 (Area 17; see Map 3.22-1; (HDR 2004a)). The agencies identified Areas 4 and 11 (Map 3.22-1) as areas of particular note for brown bears for high-value habitat or high-value feeding and movement areas, including a large area of lower Juneau Creek and bench areas to the west (Ruediger 2004). Areas 8, 9, and 11 (Map 3.22-1) near Juneau Creek were also noted as feeding and movement areas. Areas 11 and 16 (Map 3.22-1), which include the area at and west of Juneau Creek and a large area north of the Russian River confluence and well west of Juneau Creek, were noted as brown bear movement areas.

A 2010 study by USFWS and USFS identifying potential wildlife movement corridors indicated that brown bears likely move back and forth in a northwest-southeast direction over the Kenai Mountains and across the Kenai River within the project area. Based on GPS locations of collared bears, north-south landscape linkages for bears have been identified in the Juneau-Cooper creeks area (2,431 acres) and the Round Mountain (Juneau Creek-Russian River) area (part of 670 acres; (USFWS and USFS 2010, Benoit 2011)). East-west landscape linkages for bears were identified along Bean Creek (884 acres; (USFWS and USFS 2010)).

No brown bear dens were known in the project area as of 2010 (USFWS and USFS 2010).

Table 3.22-2. Seasonal activities and associated habitat use for brown bears

Activity	Season	Seasonal Habitats in Project Area	Selected Project Areas (see Map 3.22-1)
Feeding	July through September	Salmon streams; forest; subalpine	Areas 8, 9 (Juneau Creek) Area 11 (Juneau Creek to highlands)
Movement	Unspecified	Unspecified	Area 1 Area 4 (Slaughter Gulch ridge and valley – "high value bear habitat") Area 9 (Juneau Creek) Area 11 (Juneau Creek to highlands) Area 16 (north-south movement)
Denning	October through April or May	Females den in mountainous, remote sites (average 2,210 feet elevation; 8 miles from roads) on steep slopes [a]	None

[a] Goldstein, Poe et al. (2010)

The persistence of brown bears is affected by three factors: 1) the quality of available habitat, 2) the number of humans within that habitat, and 3) the relationship of those humans to brown bears (Mattson et al. 1996, McLellan 1998, Apps et al. 2004). Natural or human-induced landscape-scale changes influence brown bear populations through habitat loss, changes in habitat suitability, changes in habitat use (e.g., displacement from habitat or disruption of movement patterns), or reduced survival (Goldstein, Suring and Preston 2004). These changes may result in fragmentation of brown bear habitat, modifications of brown bear habitat use, and decreased population sustainability (Goldstein, Suring and Preston 2004). Human actions also result in direct bear mortality through hunting, vehicle collisions, and bear kills in Defense of Life and Property (DLP). The approximate numbers and types of human-caused brown bear deaths are described below to provide a context for evaluating the changes in bear mortality that could result from project alternatives.

In 2000, a sustainable human-caused mortality rate for the Kenai Peninsula brown bear population was thought to be 15 bears per year, including no more than 6 females (Farley et al. 2001). In 2006, the ADF&G management objective changed to allow no more than 10 reproductive-age females (5 to 6 years old) to be killed per year by any human cause. However, from fall 1999 to spring 2009, the number of females killed exceeded ADF&G levels for at least 5 of those years (although the ages were not reported; see Table 3.22-3).

From 1999 to 2009, DLP kills were the highest type of recorded brown bear mortality in Game Management Units[2] (GMU) 7 and 15 (65 percent), followed by "other mortality" (accidental deaths from research, public safety actions, poaching, etc.; 16 percent), hunting (13 percent), and vehicle collisions (6 percent; see Table 3.22-3; McDonough, personal communication (2011a)). ADF&G management objectives continue to focus on reducing the non-hunting mortality and conservation of reproductive-age adult female brown bears because they are most important to the viability of the Kenai Peninsula population (Selinger 2009, Graves et al. 2006).

The number of brown bear DLP kills on the Kenai Peninsula has increased from less than 1 bear annually in the 1960s, to an average of 5 bears annually in the 1990s, and to an average of 17 bears annually between 2001 and 2009 (Table 3.22-3; Figure 3.22-1 (Suring and Del Frate 2002)). An increase in human population is one factor associated with the increase of DLP kills since the 1960s. The human population of the Kenai Peninsula Borough (Borough) increased from approximately 9,000 people in 1960, to 40,802 people in 1990, to 49,691 people in 2000, and to 55,400 people in 2010 (Figure 3.22-1 (ADOLWD 2010); see Section 3.3.1). Other factors include a possibly increasing brown bear population on the Kenai Peninsula and brown bear use of salmon streams in roaded areas of Southcentral Alaska, resulting in more frequent human-bear encounters and bear mortality (Titus and Beier 1991, Schoen et al. 1994). A USFS study prepared for this project also indicated that an increase in road density (the ratio of length of road network to land area) is associated with an increased likelihood of Kenai Peninsula brown bear DLP kills (Suring and Del Frate 2002, Goldstein, Suring and Preston 2004). Of note, most of the DLP kills analyzed from 1961 to 1999 were associated with hunting or took place near residences (Suring and Del Frate 2002).

[2] GMUs are geographic subdivisions created by ADF&G to manage hunting in Alaska. Each GMU has regulations that govern hunting in that specific area. The project area includes portions of GMUs 7, 15A, and 15B. GMU boundaries within the project area are depicted on Map 3.22-1.

Table 3.22-3. Reported Kenai Peninsula (Game Management Units 7 and 15) brown bear mortality and related factors for 1999–2009

Year (FY ending June 30)	Vehicle collisions[a]		DLP kills[b]	Hunting harvest[c]		Other mortality[d]	Minimum total killed	Gender of killed bears			Management objectives (max. # adult female bears to be killed)
	Killed	Hit		M	F			M	F	U	
2008–09	1	1(+2)	33	1	5	6	46	21	21	4	10
2007–08	2	2	23	1	0	2	28	17[e]	11[e]	0	10
2006–07	1	3(+3)	23	0	0	7	31	12	15	4	10
2005–06	1	(4)	12	0	0	6	19	10	7	2	8 (out of 20)
2004–05	1	4	12	3	1	0	17	9	7	1	8 (out of 20)
2003–04	0	0	8	0	0	8	16	5	8	3	8 (out of 20)
2002–03	5	1	18	0	0	0	24	--	--	24	8 (out of 20)
2001–02	2	1	9	1	2	4	18	8	10	0	6 (out of 15)[f]
2000–01	0	0	14	5	1	0	20	8	5	7	6 (out of 15)[f]
1999–2000	0	0	3	5	5	4	17	9	8	0	6 (out of 15)[f]
TOTAL	13 killed +12 hit + (9 hit of unknown bear species)		155	30		37	236	99	92	45	
Portion of total killed	*6%*		*65%*	*13%*		*16%*	*n/a*	*42%*	*39%*	*19%*	

[a] Hit column includes injury and unknown fate. Numbers in parentheses are unknown species of bears. Source: *Road Kill Final Reports* in Morton, personal communication (2011a, 2011b, 2011c). Note: Data are not always consistent with Selinger (2011a).

[b] As reported by McDonough (personal communication 2011b) Note: Data are not always consistent with Selinger (2011a).

[c] For 1999–2007 as reported in ADF&G brown bear management report (Selinger 2011a).

[d] Includes other non-hunting mortality (research or public safety-related, poaching, etc.) as reported in most current ADF&G brown bear management report (Selinger 2011a).

[e] From Selinger (2009) Table 1; however, the source text states 16 females and 11 males.

[f] From Farley et al. (2001).

DLP = defense of life or property kills; M = males; F = females; U= unknown gender

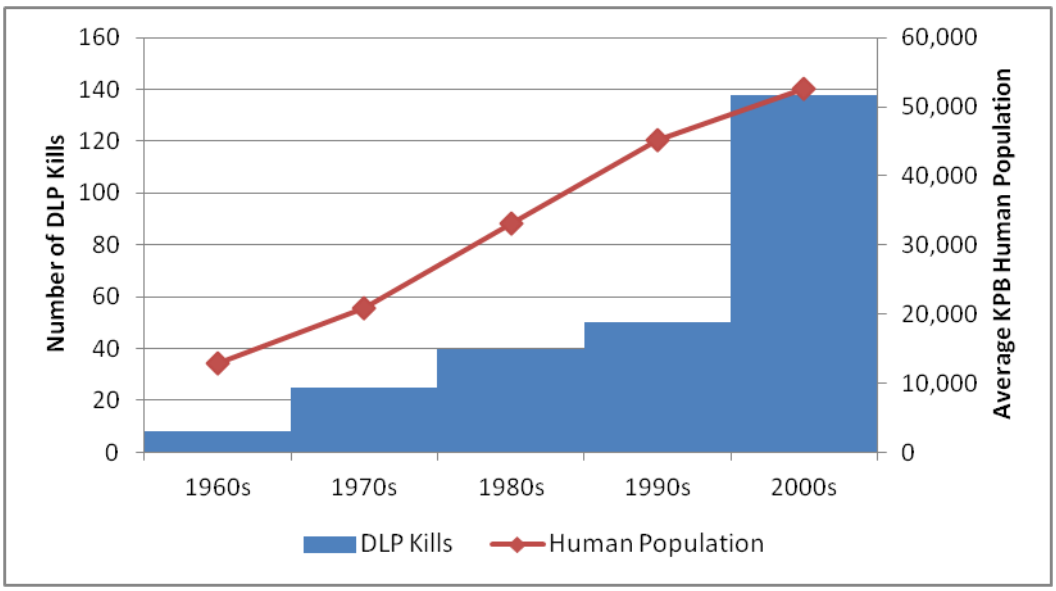

Figure 3.22-1. The human population and number of brown bear DLP kills by decade on the Kenai Peninsula, Alaska

Sources: Suring and Del Frate (2002); ADOLWD (2010).

Between 1999 and 2009, hunting harvest represented 13 percent of known brown bear mortalities on the Kenai Peninsula. For example, during the 2009 to 2010 hunting season, there were 5 bears taken by hunters compared to 25 other non-hunting mortalities on the Kenai Peninsula (Selinger 2011a). Hunting mortality has increased both in numbers and relative to other non-hunting mortalities since 2012, when State hunting regulations changed from using State-drawn permit hunts to one using a State registration hunt (RB300) with increased harvest limits and bag limits (ADF&G 2012c, ADF&G 2013a). According to USFWS in its role as a cooperating agency for this SEIS, a take of 176 brown bears occurred from 2012 through 2014, mostly from hunting. In an emergency notice in October 2013, USFWS closed KNWR to sport hunting of brown bears as a resource protection measure. The action was taken because human-caused mortality of brown bears, including mortality of adult female brown bears, on the KNWR and on the Kenai Peninsula as a whole during 2013 exceeded sustainable levels (USFWS 2013a). This emergency closure remained in effect for 30 days. Brown bears on the KNWR are currently protected from harvest during the 2014-2015 season. Kenai Peninsula brown bear sows with cubs have been protected from hunting since the 1970s (Goldstein, Suring and Preston 2004, Selinger 2009).

Vehicle-bear collisions comprised 6 percent of brown bear mortalities between 1999 and 2009 (Table 3.22-3; McDonough, personal communication (2011b)). There were at least 13 brown bear mortalities from collisions during 1999 to 2009, and at least 12 more hit with unknown consequences (Table 3.22-3; Morton, personal communications (2011a, 2011b, 2011c)). From 2003 to 2010, at least 3 brown bears were killed by vehicle collisions in the project area (Morton, personal communication 2011a). The number of reproductive-age adult female bears killed by collisions is not identified separately in ADF&G management reports.

Moose

Moose population information for the greater project area is summarized in Table 3.22-4. There are no moose population surveys for GMU 7 due to heavy forest cover (McDonough 2010a). Other information indicates that the population is stable with a "chronically low" density that supports less than 10 percent of the entire Kenai Peninsula moose harvest (Table 3.22-4). ADF&G believes that in GMU 15A (north of MP 55–60, and mostly north and west of the project area on the KNWR), the moose population is in a slow but steady decline (Table 3.22-4 (2010a)). The factors most greatly affecting the moose population on the Kenai Peninsula are considered to be declining habitat quality, predation, and mortality caused by vehicle collisions. Weather is also considered a factor in GMU 7, where a high mortality rate for moose has been linked to consistent severe winters with heavy snowfall (McDonough 2010a).

Table 3.22-4. ADF&G moose population estimates and status in the greater project area

GMU[a]	Related MP	Year	Population Estimate	Basis of estimate	Status	Moose per square mile[b]
7	45–55 (north and south)	2006	1,000–2,000	Based on habitat	Stable with a "chronically low" density	0.3–0.6
15A	55–60 (north)	2012	1,600	Aerial census	Continued decline from 3,400 in 1991; 2,097 in 2001; 2,070 in 2006; 1,670 in 2008	1.2
15B	55–60 (south)	2006	960	Aerial census	Stable since 1999	0.9

[a] GMU boundaries within the project area are depicted on Map 3.22-1.
[b] Calculated from total area of GMU or subunit, not just areas considered as moose habitat.
Source: McDonough (2010a), ADN (2013).

The approximate numbers and types of human-caused moose deaths described below provide context for evaluating the changes in moose mortality that could result from the project alternatives. From MP 45 to MP 60, there were at least 60 vehicle-moose collisions from 2001 to 2010 (Burch, personal communication 2011). Areas 15 (just east of MP 53) and 19 (near MP 57.5; see Map 3.22-1 and Map 3.22-2) were highlighted by the interagency working group as high moose collision areas (HDR 2004a). Moose killed by vehicles within GMU 7 as a whole (which includes MP 45–55) have ranged from 16 to 30 per year from 2002 to 2009 (averaging 24 per year; Morton, personal communications (2011a, 2011b, 2011c)).

DOT&PF crash data document that, on two-lane rural highways in low-elevation habitats around the state, there is a correlation between traffic volumes and moose collisions. Specifically, from 2001 to 2005, moose collisions increased at a rate of about 0.8 collision per mile per year as traffic volumes increased (Thomas, personal communication 2011). Primary factors in moose-vehicle collisions on the Sterling Highway have been attributed to increasing traffic volume as well as increasing traffic speeds (Del Frate and Spraker 1991). Vehicle collisions tend to increase

during severe winters (e.g., deep snow) and when road conditions favor higher speeds (Del Frate and Spraker 1991).

Moose are an important subsistence and sport hunting resource in the greater project area [see Section 3.10, Subsistence, and Section 3.8, Park and Recreation Resources]. During 2007 to 2011, the average annual harvest in GMU 7 was 34 moose (range 18 to 38), in GMU 15A it was 93 moose (range 4 to 119), and in GMU 15B it was 37 (range 10 to 55; ADF&G (2012b)). In 2011 and 2012, the hunting regulations became more restrictive, substantially reducing moose harvest levels (Selinger, personal communication 2013). These harvest numbers and collision numbers indicate the importance of vehicle collisions in the project area as a mortality factor for moose.

The 2004 interagency working group identified areas considered important habitat for moose that intersected the proposed alignments (see Table 3.22-5 and Map 3.22-1 and Map 3.22-2; (HDR 2004a)). Of particular note is Area 13 (Map 3.22-1), a large area spanning the north side of the Kenai River from the western edge of the Juneau Creek drainage westward to the Russian River confluence area (MP 55.5 on the existing highway). This area was identified as an important feeding area that has been partially enhanced through USFS vegetation management specifically for moose. Landscape-scale linkages have since been defined by the USFWS and USFS, particularly related to the remaining north-south movement corridors for wildlife on the Kenai Peninsula (Round Mountain and Juneau Creek-Cooper Creek linkages; USFWS and USFS (2010); Benoit (2011)).

Table 3.22-5. Seasonal activities and associated habitat use for moose

Activity	Season	Seasonal Habitats in Project Area	Identified Use Areas[a] (see Map 3.22-1 and Map 3.22-2)
Breeding/ rutting	September through October	Open habitats with shrubs[b]	Area 1 – rutting Area 4 – rutting
Feeding	May through September	Forest, shrub, wetland habitats particularly with willow; ponds with aquatic vegetation[b]	Area 13 (habitat enhanced for moose)
	October through April	Lower elevation vegetation along rivers, forest edges, and forest regrowth[b]	Area 4 – wintering Area 13 (habitat enhanced for moose)
Calving	May to early June	Wetlands adjacent to rivers[c]	None

[a] HDR (2004a).
[b] Franzmann and Schwartz (1998).
[c] Bailey (1984).

Other Mammals

Life history and habitats in the project area for the seven additional mammal species identified as part of the 2004 interagency consultation (HDR 2004a) are summarized below. Seasonal habitats and use areas in the project area identified by agencies in 2004 are summarized in Table 3.22-6 and Map 3.22-1 (HDR 2004a). As discussed above, landscape-scale linkages have since been defined by the USFWS and USFS, particularly related to the remaining north-south movement

corridors for wildlife on the Kenai Peninsula (Round Mountain, and Juneau Creek-Cooper Creek linkages; USFWS and USFS (2010); Benoit (2011)).

Table 3.22-6. Seasonal activities and associated habitat use for other mammals

Common Name	Activity	Season	Seasonal Habitats in Project Area	Selected Project Areas (see Map 3.22-1)
American black bear	Feeding	May through September	Avalanche chutes	Area 1 (east end of Kenai Lake)
	Movement	Unspecified	Unspecified	Area 10 (Cooper Creek) Area 16 (north-south)
	Denning	October through May	Unspecified	None
Dall sheep	Movement	Unspecified	Subalpine slopes	Area 12
Mountain goat	Movement	Unspecified	Alpine/subalpine slopes	Area 12
Canadian lynx	General	Year-round	Mixed deciduous-spruce forest; north side of Kenai River[a]	None
Gray wolf	Movement	Unspecified	All	Area 18
Wolverine	All	Winter	Lower elevations of Kenai Mountains	None
		Winter/Spring	Avalanche chutes	See Map 3.22-1
River otter	All	Year-round	Freshwater habitats; streams (ice-free)	Areas 5, 6, 7

[a] Bailey (1984).

American Black Bear. The Kenai River watershed is considered excellent black bear habitat. Black bears are widely distributed on the Kenai Peninsula in most forest habitats, but typically prefer rugged terrain or dense cover (Bailey 1984). Black bears frequent the open avalanche chutes around Kenai Lake during spring through fall (Area 1, as shown on Map 3.22-1).

There are no specific black bear population estimates in the project area, but in 2010, the population on the entire Kenai Peninsula was estimated at more than 4,000 and was considered stable (Selinger 2011b). The USFS considers black bears very common in the Juneau Creek drainage, which provides moderate- to high-quality black bear habitat. The distribution and movements of black bears have been linked to the distribution and abundance of devil's club shrubbery (Schwartz and Franzmann 1991).

Seasonal habitats and use areas in the project area identified through interagency consultation in 2004 are summarized in Table 3.22-6 and Map 3.22-1 (HDR 2004a). Landscape-scale linkages have been defined by the USFWS and USFS, particularly related to the remaining north-south movement corridors for wildlife on the Kenai Peninsula (Round Mountain and Juneau Creek-Cooper Creek linkages; USFWS and USFS (2010); Benoit (2011)).

Primary human-caused mortality factors for black bears are harvests by hunters and collisions with vehicles on highways. From 2005 through 2011, the average annual hunter harvest in GMUs 7, 15A, and 15B was 296 black bears (Selinger 2011b, ADF&G 2012b). At least 35 black

bears have been killed by vehicle collisions on the Kenai Peninsula between 2001 and 2009, and at least 9 more were hit with unknown consequences (Morton, personal communication (2011a, 2011b, 2011c)).

Dall Sheep. Dall sheep occur both north and south of the existing highway in the project area (see Map 3.22-3 (McDonough 2011a)). The Broadview subherd of Dall sheep winters on the south-facing cliffs and slopes of the Slaughter and Langille mountains (in the project area north of Cooper Landing and Kenai Lake) and scatters to the north in the summer. The Round Mountain subherd of Dall sheep occupies Round Mountain (in the project area east of Fuller Creek and north of Sportsman's Landing) year-round (McDonough, personal communication 2011b). Within the project area, sheep are known to travel between mountains and across the Sterling Highway. However, the Juneau Creek valley is not a regularly used travel corridor by sheep (Spraker, personal communication 2001).

Dall sheep population numbers near the project area and Kenai Peninsula-wide have varied since counts began in 1949, with an overall decline starting in the 1970s (McDonough 2011a). Aerial survey reports of the Round Mountain subherd from July 2002 and July 2004 recorded 69 and 58 sheep, respectively, with 49 sheep recorded in July 2006 (Selinger, personal communication 2006). Sheep populations may have been on the decline in 2006, but more sheep than usual were observed in the Mystery Creek area, which may suggest a change in distribution to the west (Selinger, personal communication 2006). Surveys in the Slaughter and Langille mountains (north of the project area) in the summer of 2007 recorded 57 sheep (McDonough, personal communication 2011b).

The Sterling Highway from MP 45 west to the Kenai River crossing, and then west along the river to the confluence of Juneau Creek, forms the southern boundary of ADF&G's "Cooper Landing Closed Area," which is closed to Dall sheep and mountain goat hunting (ADF&G 2013b) and is managed as a viewing area. The closed area is bounded on the west by Juneau Creek.

No sheep-vehicle collisions were reported in the project area from 1999 to 2009 (Morton, personal communication 2011a, 2011b, 2011c). Draw hunt permits are issued based on sheep population levels. Four sheep were harvested from Round Mountain during 2005 to 2012 (ADF&G 2014a). There is a general hunting season in GMUs 7 and 15, but there is very little sheep hunting opportunity in the rest of the project vicinity (ADF&G 2013a).

Mountain Goat. The Kenai Peninsula population of mountain goats has decreased more than 30 percent from the early 1990s to 2009 (McDonough 2010c). Eight mountain goats were recorded during surveys in the summer of 2007 in the Cooper Landing Closed Area north of the project area (including Slaughter and Langille mountains) (McDonough, personal communication 2011b). Aerial counts from 2004 to 2008 on Cecil Rhodes Mountain (south of the project area) ranged from 32 to 60 goats (McDonough 2008, 2010c).

Natural mortality occurs due to predation and avalanches (ADF&G 2008f). During 2004 to 2007, there were three goats killed by hunters on Cecil Rhodes Mountain in GMU 7 (McDonough 2008). The Cooper Landing Closed Area (see above) is closed to Dall sheep and mountain goat hunting (ADF&G 2013b) and is managed as a viewing area. No goats have been recorded as hit or killed in vehicle collisions during 2002 to 2009 on the Kenai Peninsula (Morton, personal communication 2011a, 2011b, 2011c).

Canadian Lynx. There have not been any population surveys for lynx in the project area. Lynx are cyclically abundant depending on snowshoe hare populations, their primary prey. The last documented population peak on the Kenai Peninsula was around 2009 (McDonough 2010b). The mixed deciduous and spruce forests in GMUs 15A and 15B appear to have a higher abundance of hares and lynx than the spruce forests of GMU 7 (McDonough 2010b). Radio-collared lynx have been monitored in the project area, and appear to travel through the forested area on the north side of the Kenai River between the western lowlands and the eastern mountains (Bailey, personal communication 2000). This travel pattern can be attributed to the north side being more densely forested, wider, and less steep than the south side.

Four radio-collared lynx and at least 2 non-collared lynx were killed while attempting to cross the Sterling Highway as of 2001 (Bailey, personal communication 2001). Between 2002 and 2009, 1 lynx was killed by a vehicle collision in the project area at MP 58.5 in 2007 (Morton, personal communication 2011a, 2011b, 2011c). Lynx harvest seasons (trapping and hunting) are opened or closed based on lynx population levels. Trapping in GMUs 7 and 15 was closed from 2002 to 2007. When trapping resumed in 2008–2009, 8 lynx were taken from GMU 7, and 68 were taken from GMUs 15A and 15B (McDonough 2010b).

Gray Wolf. In 1984, the wolf population on the Kenai Peninsula was estimated as 186 (Peterson, Woolington and Bailey 1984). Wolf surveys have not been conducted recently in the project area or on the entire Kenai Peninsula. A count in GMU 15A (see Map 3.22-1) recorded 40 to 45 wolves in early 2010 (Selinger, personal communication 2011).

In general, wolves avoid areas of human activity on the Kenai Peninsula, including along the Sterling Highway corridor (Jozwiak 1997). However, the project area is an important movement corridor for wolves and other carnivores because it provides relatively easy east-west movement through the mountainous area (Jozwiak 1997). Two packs (the Mountain and the Quartz Creek packs) have used the project area (Jozwiak 1997), with five radio-collared wolves located in the Juneau Creek watershed from 1983 to 1992 (USFWS and USFS 2010).

Vehicle collisions are not an important mortality factor for wolves compared to hunting and trapping. From 1999 to 2009, two wolves were killed by vehicle collisions in GMU 7 with none reported from GMU 15A or 15B (Morton, personal communication 2011a, 2011b, 2011c). The average harvest from hunting and trapping between 2003 and 2008 on the Kenai Peninsula was 45 wolves per year (McDonough 2009).

Wolverine. Wolverines require expansive tracts of undisturbed land. On the Kenai Peninsula, some of the primary wolverine habitat is located in the Kenai Mountains (McDonough 2010b), and wolverines use habitat within the project area (McDonough 2010b). Wolverines prefer higher elevations during the summer (including natal denning in the mountains such as those north and south of the project alternatives), and lower elevations during the winter (ADF&G 2008d). Wolverines travel extensively searching for food. Male territories range from 200 to 260 mi^2, and female territories range up to 115 mi^2 (ADF&G 2008d). They primarily scavenge for food and feed on carcasses left behind by bears, wolves, and avalanches (see Map 3.22-1), but they also prey on smaller animals (ADF&G 2008d, USFWS 2006).

There have not been any population surveys for wolverines on the Kenai Peninsula. Wolverines typically occur in low densities; the estimated wolverine density for all primary Kenai Peninsula habitat was 3.0 per 386 mi^2 (Golden, et al. 2007). Kenai Peninsula wolverines are a KNWR "species of special interest" due to low population estimates and declining harvests (USFWS

2010a). From 2004 to 2009, harvests in GMU 7 have ranged between 17 (2004–2005) and 9 (2008–2009), harvests in GMU 15A have been 0 or 1, and harvests in GMU 15B have ranged between 0 and 3 (McDonough 2010b). Much of their range is essentially protected from trapping due to very difficult access or trapping closures (Golden, et al. 2007). No vehicle collisions with wolverines have been recorded in the project area from 1999 to 2009 (Morton, personal communication 2011a, 2011b, 2011c).

River Otter. River otters use primarily freshwater habitats, including streams. During the winter, they dig tunnels and feeding dens within the snow on frozen lakes. River otters have also been known to travel several miles on land between water bodies (ADF&G 2008h).

No population surveys have been conducted in the project area, but river otters or their signs have been observed in Juneau Creek and along the Fuller Lakes Trail by hunters and trappers (Selinger, personal communication 2006). From 2004 to 2009, the trapping harvest averaged about seven otters per year in GMU 7 and about 27 per year in GMUs 15A and 15B (McDonough 2010b). No vehicle mortalities have been recorded in the project area from 2002 to 2009 (Morton, personal communication 2011a, 2011b, 2011c).

3.22.1.2 Birds

Species Occurrence and Agency Status

A variety of waterbirds, raptors, landbirds, and upland game birds occur at least seasonally within the project area. There are no studies that comprehensively document bird species presence and abundance in the project area. However, the KNWR lists 150 bird species that have been documented within or adjacent to the KNWR, and 113 species are known to breed in the KNWR (USFWS 2010a). These species use a range of habitats within the KNWR, some of which are not found in the project area (e.g., subalpine, alpine, coastal). Most bird species occurring within the project area are migratory, arriving or passing through in the spring, beginning with raptors and waterfowl in March and April, continuing with the arrival of songbirds through May, and ending with these species migrating south in late summer or fall to wintering grounds in North or Central America. Approximately 39 species, including several species of waterfowl, raptor, woodpecker, and songbird, are present in the project area year-round (Table 3.22-7). The project area provides important nesting, brood rearing, wintering, and migratory habitat for many of these birds.

Table 3.22-7. Year-round resident bird species in the project area

Species Name	Scientific Name	Abundance	Species Name	Scientific Name	Abundance
Trumpeter swan	*Cygnus buccinator*	C	Downy woodpecker	*Picoides pubescens*	C
Mallard	*Anas platyrhynchos*	C	Black-backed woodpecker	*Picoides arcticus*	R
Common goldeneye	*Bucephala clangula*	C	Three-toed woodpecker	*Picoides dorsalis*	C
Barrow's goldeneye	*Bucephala islandica*	C	Gray jay	*Perisoreus canadensis*	C
Common merganser	*Mergus merganser*	C	Steller's jay	*Cyanocitta stelleri*	U
Spruce grouse	*Falcipennis canadensis*	C	Black-billed magpie	*Pica hudsonia*	C
Willow ptarmigan	*Lagopus lagopus*	U	Common raven	*Corvus corax*	C
Rock ptarmigan	*Lagopus muta*	U	Black-capped chickadee	*Poecile atricapillus*	C
Northern goshawk	*Accipiter gentilis*	U	Boreal chickadee	*Poecile hudsonicus*	C
Bald eagle	*Haliaeetus leucocephalus*	C	Red-breasted nuthatch	*Sitta canadensis*	U
Gyrfalcon	*Falco rusticolus*	R	Brown creeper	*Certhia americana*	U
Merlin	*Falco columbarius*	U	American dipper	*Cinclus mexicanus*	U
Glaucous-winged gull	*Larus glaucescens*	C	Golden-crowned kinglet	*Regulus satrapa*	U
Great horned owl	*Bubo virginianus*	U	Bohemian waxwing	*Bombycilla garrulus*	U
Northern hawk owl	*Surnia ulula*	R	Northern shrike	*Lanius excubitor*	U
Great gray owl	*Strix nebulosa*	R	Pine grosbeak	*Pinicola enucleator*	U
Boreal owl	*Aegolius funereus*	U	Common redpoll	*Acanthis flammea*	C
Northern saw-whet owl	*Aegolius acadicus*	U	Pine siskin	*Spinus pinus*	C
Belted kingfisher	*Megaceryle alcyon*	C	White-winged crossbill	*Loxia leucoptera*	C
Hairy woodpecker	*Picoides villosus*	C			

Notes: C = Common, U = Uncommon, R = Rare
Sources: USFWS (2010a, No date), Eskelin and O'Connor (2008), National Audubon Society (2002), eBird (2013).

All migratory birds are protected by the Migratory Bird Treaty Act (MBTA); eagles are also protected by the Bald and Golden Eagle Protection Act (see below and Section 3.24, Permits). No Federally listed threatened, endangered, proposed, or candidate species or USFS Sensitive Species occur in the project area; however, numerous species that have been identified by

resource agencies as birds of conservation concern may occur in the project area (USFWS 2013, Goldstein, Martin and Stensvold 2009). Table 3.22-8 identifies birds that are listed as species of conservation concern in the project area. The list includes USFWS Birds of Conservation Concern (BCC), KNWR "species of special interest," and ADF&G "species of the greatest conservation need" (USFWS 2010a, USFWS 2008, ADF&G 2006a).

Table 3.22-8. Birds of conservation concern in the project area

Species Name	Scientific Name	Agency Status	Species Name	Scientific Name	Agency Status
Trumpeter swan	*Cynus buccinators*	KNWR[b] ADF&G[c]	Western wood-pewee	*Contopus sordidulus*	ADF&G[c]
Common loon	*Gavia immer*	ADF&G[c]	Steller's Jay	*Cyanocitta stelleri*	ADF&G[c]
Horned grebe	*Podiceps auritus*	USFWS[a] ADF&G[c]	Violet-green swallow	*Tachycineta thalassina*	ADF&G[c]
Red-necked grebe	*Podiceps grisegena*	ADF&G[c]	Boreal chickadee	*Poecile hudsonicus*	ADF&G[c]
Osprey	*Pandion haliaetus*	ADF&G[c]	Red-breasted nuthatch	*Sitta canadensis*	ADF&G[c]
Bald eagle	*Haliaeetus leucocephalus*	USFWS[a] ADF&G[c]	Brown creeper	*Certhia americana*	ADF&G[c]
Sharp-shinned hawk	*Accipiter striatus*	ADF&G[c]	American dipper	*Cinclus mexicanus*	ADF&G[c]
Northern goshawk	*Accipiter gentilis*	KNWR[b]	Golden-crowned kinglet	*Regulus satrapa*	ADF&G[c]
Merlin	*Falco columbarius*	ADF&G[c]	Swainson's thrush	*Catharus ustulatus*	ADF&G[c]
Solitary sandpiper	*Tringa solitaria*	USFWS[a] ADF&G[c]	Hermit thrush	*Catharus guttatus*	ADF&G[c]
Lesser yellowlegs	*Tringa flavipes*	USFWS[a] ADF&G[c]	Gray-cheeked thrush	*Catharus minimus*	ADF&G[c]
Wilson's snipe	*Gallinago delicate*	ADF&G[c]	American robin	*Turdus migratorius*	ADF&G[c]
Arctic tern	*Sterna paradisaea*	USFWS[a] ADF&G[c]	Varied thrush	*Ixoreus naevius*	ADF&G[c]
Great-horned owl	*Bubo virginianus*	ADF&G[c]	Townsend's warbler	*Dendroica townsendi*	USFWS[a] ADF&G[c]
Western screech-owl	*Megascops kennicottii*	ADF&G[c]	Wilson's warbler	*Wilsonia pusilla*	ADF&G[c]
Northern hawk owl	*Surnia ulula*	ADF&G[c]	Northern waterthrush	*Parkesia noveboracensis*	ADF&G[c]
Great gray owl	*Strix nebulosa*	ADF&G[c]	Fox sparrow	*Passerella iliaca*	ADF&G[c]
Boreal owl	*Aegolius funereus*	ADF&G[c]	Dark-eyed junco	*Junco hyemalis*	ADF&G[c]
Northern saw-whet owl	*Aegolius acadicus*	ADF&G[c]	Rusty blackbird	*Euphagus carolinus*	ADF&G[c]

Species Name	Scientific Name	Agency Status	Species Name	Scientific Name	Agency Status
Northern flicker	*Colaptes auratus*	ADF&G[c]	Pine grosbeak	*Pinicola enucleator*	ADF&G[c]
Blackpoll warbler	*Dendroica striata*	ADF&G[c]	White-winged crossbill	*Loxia leucoptera*	ADF&G[c]
Olive-sided flycatcher	*Contopus cooperi*	USFWS[a] ADF&G[c]	Pine siskin	*Spinus pinus*	ADF&G[c]
Northern shrike	*Lanius excubitor*	ADF&G[c]			

[a] USFWS Birds of Conservation Concern (USFWS 2008).
[b] KNWR Species of Special Interest (USFWS 2010a).
[c] ADF&G "Species of Greatest Conservation Need" (ADF&G 2006a).

USFWS developed the BCC list of migratory and non-migratory bird species that represent the highest conservation priorities (USFWS 2008). The USFWS defines BCC as species, subspecies, and populations that are not already Federally listed as threatened or endangered but that without additional conservation actions are likely to become candidates for Federal listing (USFWS 2008). The KNWR published a list of species of special interest in the *Revised Comprehensive Conservation Plan* and Environmental Impact Statement (EIS) (USFWS 2010a). The State of Alaska no longer maintains a list of Species of Special Concern. It uses its Comprehensive Wildlife Conservation Strategy (sometimes referenced as its Wildlife Action Plan) to assess the conservation needs of particular species and lists species nominated for consideration as potential planning targets. This list is intended to represent the "species of greatest conservation need" that should be considered for planning purposes in Alaska (ADF&G 2006a).

The following paragraphs present an overview of bird species and/or groups that occur in the project area.

Waterbirds and Cranes

Waterbirds include ducks, geese, swans, loons, grebes, gulls, terns, and shorebirds, most of which nest in ponds, marshes, and shallow waters along lake shorelines with emergent vegetation. Shorebirds and cranes generally nest in wetland habitats, although some shorebirds also nest in upland habitats. In winter, several waterfowl species remain in the open waters of the Kenai River.

The outlet of Kenai Lake is frequently ice-free during the winter and attracts a variety of waterbirds. Trumpeter swans overwinter at the outlet of Kenai Lake, downstream along the Kenai River, and in other areas with open water during the winter. Mallards, common mergansers, and common and Barrow's goldeneyes can be found in areas with open water during winter. Mew gulls, glaucous-winged gulls, and glaucous-winged/herring gull hybrids are common along Kenai Lake and the Kenai River during the summer (USFWS 2010a, eBird 2013, West 2008). Sandhill cranes migrate through the Kenai Peninsula, stopping at estuaries, tundra areas, and wetlands where some remain to nest (West 2008).

While abundant nesting habitat for waterbirds is present on the KNWR as a whole, the project area contains very little waterbird nesting habitat. Trumpeter swans are a common nesting species on the KNWR but do not likely nest in the project area. Canada goose, common and red-breasted merganser, American wigeon, green-winged teal, and Barrow's goldeneye are likely to

breed in the project area. Three species of loons (common, red-throated, and Pacific) have been documented as breeding in the KNWR. Common and Pacific loons may nest along the shoreline of Kenai Lake. Red-necked grebes may nest on Kenai Lake or smaller waterbodies adjacent to the project area. Most shorebird species in the project area are migrants; however, a few likely nest in the project area, including lesser yellowlegs, spotted sandpipers, solitary sandpipers, semipalmated plovers, and Wilson's snipe (USFWS 2010a, West 2008).

Raptors

Raptors that occur in the project area include hawks, eagles, owls, and falcons. Raptors typically inhabit forested areas, open country, and riparian habitat. Raptors such as golden eagles and peregrine falcons inhabit cliffs. Several species of raptors are present year-round in the project area including bald eagles, gyrfalcon, northern goshawk, and several species of owls. Golden eagles do not nest in the project area, but may nest in the cliffs above it and occasionally pass through.

Bald eagles are present year-round in the project area. Bald eagles are common at the outlet of Kenai Lake and downstream along the Kenai River for several miles where they feed on spawned-out salmon in the fall and winter (West 2008). Bald eagles in the project area feed and nest along an approximately 500-foot-wide band of forested and riparian habitat along the Kenai and Russian rivers, Cooper and Quartz creeks, Juneau Creek below the falls, and along the shores of Kenai Lake (USFS 1990). Seasonal habitats and agency-identified nesting areas in the project area are summarized on Map 3.22-4 (HDR 2004a).

The USFWS has developed guidelines for avoiding disturbance of bald eagles at nest sites, including the recommendation of 330-foot primary and 660-foot secondary buffer zones between bald eagle nests and disturbance activities such as motorized traffic and standard road construction (USFWS 2007). A buffer of 0.5 mile (2,640 feet) is recommended for blasting and the generation of other loud intermittent noises (USFWS 2007). For all activities, the actual size of the buffer zone needed could vary depending on the individual eagle's tolerance for human disturbance as well as whether the activity will be visible from the nest.

An aerial survey of the project area for bald eagle nests was conducted in April 2014. The survey identified 4 active and 21 inactive eagle nests within the project area (see Map 3.22-4). Of the 25 nests identified, four nests are currently less than 330 feet from the existing Sterling Highway. There are 4 additional nests located between 330 and 660 feet from the existing highway. The location of all 25 nests located within the project area is shown on Map 3.22-4.

Landbirds

Landbirds belong to many diverse groups and include both migrant and resident birds. Most landbird species that nest and rear young in the project area between May and August or September migrate outside of Alaska for the winter. Landbirds found in the project area include sparrows, warblers, finches, thrushes, kinglets, chickadees, woodpeckers, jays, and ravens. Common, year-round residents in the project area include black-billed magpie, common raven, black-capped chickadee, pine grosbeak, common redpoll, and pine siskin (Table 3.22-7 and Table 3.22-8). Resident birds remain active during the winter and rely primarily on berries and seeds. Resident ravens and gray jays scavenge on winter- or predator-killed carrion. Four woodpecker species—downy, hairy, three-toed, and black-backed—occur year-round in the project area (USFWS 2010a, West 2008).

Landbirds utilize a broad range of habitats in the project area that include mature, intermediate, and early stage forests, riparian forests, muskegs, and willow shrub thickets. The project area provides breeding habitat for a variety of these species, including: dark-eyed junco, yellow-rumped and orange-crowned warbler, Swainson's thrush, boreal chickadee, ruby-crowned kinglet, gray jay, alder and olive-sided flycatcher, and American robin (USFWS 2010a, West 2008).

Upland Game Birds

Spruce grouse are important subsistence and game birds in the project area (HDR and USKH 2013). Spruce grouse inhabit forested habitat, whereas the related willow ptarmigan and rock ptarmigan rely on the subalpine shrub and alpine tundra habitats found in upper elevations above the project area.

3.22.1.3 Amphibians

The wood frog (*Rana sylvatica*) occurs on the KNWR (USFWS 2010a) and likely lives in other parts of the project area. It is considered widespread and relatively common in most of Alaska (Gotthardt 2005).

The wood frog has no special regulatory status, but is considered a State "species of greatest conservation need" (ADF&G 2006a). It was selected as a management/indicator species for the project based on interagency consultation (HDR 2004a).

No specific habitat use areas in the project area for amphibians were identified during agency consultation (HDR 2004a), but wood frogs likely occur in the project area wetlands (Map 3.20-1) and hibernate under forest litter and snow (MacDonald 2003). Loss and degradation of its wetland habitat, especially in Southcentral Alaska, is of concern for wood frogs (Gotthardt 2005). Proximity to roads has been positively correlated with risk of skeletal abnormalities in Alaskan wood frogs, possibly due to chemical contamination of their habitat, or by facilitating introduction of predators, parasites, or pathogens (Reeves et al. 2008). Abnormality prevalence (up to 20 percent of frogs sampled) at road-accessible sites in the KNWR is among the highest reported in the published literature (Reeves, et al. 2008).

There are three non-native amphibian species documented in Alaska, but none have been documented on the Kenai Peninsula as of 2008 (McClory and Gotthard 2008) or in the KNWR as of 2010 (USFWS 2010a).

3.22.2 Environmental Consequences (Threatened and Endangered Species)

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended, 16 USC§1531 *et seq.*), FHWA initiated Section 7 Consultation with letters to both USFWS and NMFS requesting concurrence that endangered, threatened, or candidate species or their habitat would not be affected by the project. USFWS and NMFS responded with letters of concurrence stating that no ESA listed species occur in the project area, thus concluding the Section 7 Consultation (Balogh 2006, Mecum 2006). Recent review of the USFWS and NOAA websites verified that no ESA-listed species are present in the project area (USFWS 2013, NOAA 2013). Therefore, neither the No Build Alternative nor any of the build alternatives would affect listed threatened or endangered species.

No State-listed endangered species are known to occur in the project area as of August 2013 (ADF&G 2013a); therefore, no alternatives would adversely affect State-listed endangered species.

3.22.3 Environmental Consequences (Brown Bear)

A variety of direct and indirect impacts to brown bears would occur under all alternatives, including the No Build Alternative. The existing and proposed road infrastructure represent human-induced landscape-scale changes to brown bear habitat. Impacts that negatively affect females (especially those of reproductive age) would likely have the greatest effect on the population.

3.22.3.1 No Build Alternative

Direct and Indirect Impacts

Existing impacts to brown bears would be expected to continue and increase under the No Build Alternative as traffic levels, human population, and recreation levels increased. These would likely result in increased impacts to bears including:

- Avoidance of habitats in the highway corridor;
- Physical and traffic impediments to highway crossings; and
- Injury or mortality from collisions.

3.22.3.2 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

As discussed in Section 3.22.1.1, natural or human-induced landscape-scale changes influence brown bear populations through habitat loss, changes in habitat suitability, changes in habitat use (e.g., displacement from habitat or disruption of movement patterns), or reduced survival (Goldstein, Suring and Preston 2004). Changes in human activity can also result in changes in direct bear mortality (e.g., hunting, vehicle collisions, or DLP kills).

Impacts to brown bears are likely to occur under all build alternatives as a result of:

- Habitat loss (permanent loss of vegetation)
- Habitat alteration including fragmentation, changes in habitat quality, and changes in the availability of food resources
- Modification of brown bear behavior and use of existing habitat
- Increased brown bear mortality through changes in the probability of DLP kills or vehicle collisions

Brown bear habitat loss would include the permanent removal of vegetation (Table 3.22-9). The amount of habitat lost in each alternative is related to the length and footprint of the segments of each alternative built on a new alignment and the degree to which these segments pass through existing brown bear use areas (see also Map 3.22-1). Information on the acreage of vegetated habitat permanently lost[3] under each alternative is presented in Table 3.22-9. Impacts to interagency-identified areas of predicted use by brown bears are discussed by alternative, below.

Impacts related to the alteration of brown bear habitat include habitat fragmentation and the creation of impediments to bear movement between important seasonal habitats, changes in

[3] Estimates of brown bear habitat loss are based on the total acreage of vegetation removed under each build alternative. See Section 3.20, Wetlands and Vegetation, for additional information on mapped vegetation types within the project area.

habitat quality, and changes in the availability and accessibility of fish resources. Similar to habitat loss, the extent of habitat fragmentation and impediments to bear movement expected under each alternative are related to the length and placement of those segments built on a new alignment (see Table 3.22-9 and Map 3.22-1).

Habitat fragmentation also could create impediments to movement between important seasonal habitats (Map 3.22-1). Although studies have documented brown bear avoidance of roads and roaded areas (Kasworm and Manley 1990, Schoen et al. 1994, Farley et al. 2001, Waller and Servheen 2005), at least some Kenai Peninsula brown bears would move to seasonally attractive habitats (e.g., salmon streams) despite roads and traffic (Graves et al. 2006). Because salmon are a critical food source for Kenai Peninsula brown bears, it is likely that bears would continue to access and use the Kenai River and its tributaries under any of the build alternatives. However, changes and/or reductions in bear access and use of the habitats near the project area are expected, with the greatest impact on females with cubs (Graves et al. 2006).

The existing highway represents a landscape-level barrier to north-south brown bear movements. Where alternatives construct new alignment, this adds an additional roadway impediment that would roughly parallel the existing roadway impediment and the natural barrier of the Kenai River. The extent to which multiple east-west barriers cross north-south brown bear passage corridors is an additional consideration in determining impacts to brown bear habitat. Table 3.22-9 summarizes the length of new road in important bear habitat predicted use areas and the segments that add a double roadway impediment to bears transiting the area.

Brown bear habitat alteration also includes changes in habitat quality. Brown bears on the Kenai Peninsula heavily use areas within approximately 6,560 feet (2,000 meters) of salmon spawning areas. All portions of the new highway segments are within approximately 6,560 feet of anadromous fish streams, although habitat quality varies among alternatives (see Table 3.22-9). Roads constructed near salmon streams could reduce brown bear use of these areas (Suring, Farley, et al. 2006). New development and activity, particularly the construction of bridge and culvert crossings of anadromous streams, could affect fish resources (see Section 3.21, Fish and Essential Fish Habitat) and availability of this resource to brown bears. Where the project might affect fish resources and availability, the brown bear population could be affected.

Project-related changes to brown bear behavior and habitat use have the potential to impact brown bear populations through decreased population sustainability (Goldstein, Suring and Preston 2004). Potential impacts to brown bear habitat use were evaluated using models to predict patterns of habitat use by female brown bears (Goldstein, Suring and Preston 2004). Known habitat use areas were used to identify variables important to brown bear habitat selection (e.g., distance to cover; density of salmon spawning streams and lakes; density of human development, roads, and trails; and elevation). These factors were used to determine the probability of female brown bear occurrence within the project area for each of the build alternatives (Goldstein, Suring and Preston 2004).

Table 3.22-9. Summary of Build Alternative impacts to brown bear habitat

	Alternative			
	Cooper Creek	**G South**	**Juneau Creek**	**Juneau Creek Variant**
Total length of alternative (miles)	14.2	14.2	14.7	14.3
Total length of new highway segment (miles)	3.5	5.6	10	9
Length of alternative within Bear Use Area (Map 3.22-1)	2.7	3.5	4.3	4.4
Length of double highway barrier to movement within bear use area	0.15	0.9	3.9	3.6
Vegetated habitat loss in the project area (acres) [a]	188	202	269	256
Vegetated habitat loss in the project area (%)[a]	1.3%	1.4%	1.9%	1.8%
Total bear habitat on Kenai Peninsula affected by habitat loss (%)[b]	0.006%	0.006%	0.007%	0.007%
Habitat avoidance area along existing highway/No Build Alternative (acres)[c]	5,596	5,596	5,596	5,596
Additional habitat avoidance area created by new alignment (acres)[c]	605	1,468	2,834	2,640
Crossings of anadromous fish streams	• 2 bridges replaced • 4 new culverts • 1 creek rerouted • 1 new bridge, no in-water structures	• 1 bridge replaced • 5 new culverts • 2 new bridges, 1 with no in-water structures	• 1 new culvert • 1 new bridge, no in-water structures	• 1 new culvert • 1 new bridge, no in-water structures
Quality of habitat lost	• Impacts Kenai River corridor and bench from Kenai Lake to Cooper Creek. • Impacts areas and streams that have less intense brown bear use compared to other parts of project area.	• Impacts high-quality brown bear movement and feeding corridors along Kenai River and lower Juneau Creek. • Could permanently deter bear movement to and from these areas, and feeding in these areas.	• Impacts high-quality brown bear movement corridor on bench area west of Juneau Creek and feeding/resting areas along Kenai River. • Could permanently deter bear movement to and from these areas, and feeding in these areas.	

[a] Vegetated habitat lost is based on vegetation mapping discussed in Section 3.20, Wetlands and Vegetation. Total vegetated habitat lost is based on those acreages as a percent of the total project area acreage.

[b] Total area of Kenai Peninsula bear habitat (5,347 mi^2) taken from Del Frate (1993) and USFWS and USFS (2014).

[c] Sources: Combes (2008), Larsen (2008), Waller and Servheen (2005). Acreage calculated using a 3,280-foot (1,000-meter)-wide roadway avoidance corridor, placed around the alignment centerline (500 meters to each side). The "additional" avoidance acreage is associated with the highway segments built on new alignment for each alternative. The existing/No Build alignment avoidance acreage, calculated at 5,596 acres, remains for all build alternatives. It includes highway segments built on the existing alignment and segments that will become the "old" highway, but will still create an avoidance area for bears.

Findings of the study show that as road density in brown bear habitats increases, the probability of occurrence of female brown bears with cubs in these areas decreases for all build alternatives (Goldstein, Suring and Preston 2004). Changes in road density and the correlated change in the probability of occurrence of female brown bears with cubs are discussed for each build alternative below.

Bear habitat avoidance areas were also quantified using a 3,280-foot-wide (1,000-meter) buffer zone centered on the new highway alignments (Waller and Servheen 2005). Highway segments built on a new alignment would add additional avoidance areas to the 5,596 acre avoidance area that surrounds the existing highway. These values are presented by alternative in Table 3.22-9. USFWS, in its role as a cooperating agency for this project, has expressed concerns related to noise affects on wildlife, and provided information that sound measurements within KNWR indicated that road traffic noise was discernable more than 0.5 mile (2,640 feet) from the source, and up to 2 miles in the winter within Wilderness areas. USFWS indicated that a multitude of wildlife species (including but not limited to brown bear) would likely be affected by increased noise levels from new highway infrastructure. In addition, displacement as a result of habitat degradation would likely increase as traffic volumes increased.

Behavioral changes due to human activity associated with new highway segments may also impact population sustainability. Brown bears may have higher energetic costs (i.e., expend more energy) due to increased human encounters/disturbance, as well as crossing highways at greater speeds than normal (Graves et al. 2006). Seasonal traffic volumes on the existing highway can intensify the barrier to bear movement. USFWS has expressed concern that intersection illumination may affect bears and their movement and the resulting light reflecting off snow and low clouds may exacerbate this impact. Increased road density on the landscape may result in brown bears avoiding—in part or completely—certain crossings, as bears are less likely to cross in areas with two parallel roads than one road (Graves et al. 2006). Human food-conditioning of bears likely would increase with increased traffic and human use of the area.

All build alternatives are likely to have impacts on brown bear mortality through changes in the probability of DLP kills and vehicle collisions. The consequences of bear mortality resulting from vehicular collisions or DLPs are directly related to bear population status. At lower numbers, each bear death is a more substantial loss to the population. Increased road density, traffic volume, and vehicle speed may increase or decrease collision rates with brown bears, depending on avoidance effects, bear population level, and quality of nearby habitat (Huijser et al. 2008). Under all build alternatives, the segments built on the existing alignment would have wider shoulders and clear zones, resulting in better visibility that could reduce bear-vehicle collisions. However, average travel speeds would be greater throughout the entire project area, which could offset any decreases or possibly increase collision rates. Bear-vehicle collisions likely also would be reduced on any “old” highway segments not incorporated into a build alternative because those segments would become a local road with only about 30 percent of the total traffic volume.

Potential changes in the probability of DLP kills in the project area were also evaluated by the USFS study using models to evaluate spatial patterns of brown bear DLP kills. The USFS study suggested that for those brown bears that continue to use the project area, the probability of encounters with humans, as well as DLP kills, will increase for all build alternatives (Goldstein,

Suring and Preston 2004). Increased road density was the primary factor influencing the change in probability of DLP kills among the build alternatives. Dispersed recreation originating with a new highway alignment and new trailheads along each new alignment would be a change that could lead to increased encounters and DLP kills. Changes in road density and impacts on the probability of DLP kills are discussed below by alternative.[4]

None of the build alternatives is likely to change bear mortality due to hunting. New highway segments could increase access to areas that are now relatively remote through the creation of new official trailheads and unofficial access points (temporary access roads, etc.). These sites may increase hunting pressure on bears. However, ADF&G monitors harvests and alters hunting regulations to maintain bear populations at sustainable levels.

None of the alternatives would indirectly cause changes in human population growth or development patterns in the project area. Therefore, no impacts to bears and bear habitat as a result of such development would be attributable to the project. Impacts associated with human population growth and community development are addressed in Section 3.27, Cumulative Impacts.

Construction Impacts

Construction would require staging areas, disposal sites for cleared vegetation and unusable or excess soils, and access roads. Therefore, construction activities anticipated in the build alternatives would result in:

- Temporary loss/alteration of habitats
- Displacement from adjacent habitats
- Changes to typical use and/or movements through the area

Information on the acreage of vegetated habitat temporarily impacted by construction activities under each of the build alternatives is presented in Map 3.20-2 (in Section 3.20, Wetlands and Vegetation) and Table 3.22-10. The acreage of vegetated habitat lost is based on a 10-foot buffer around all proposed construction limits.

Table 3.22-10. Construction impacts on vegetated habitat under build alternatives

	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Amount of vegetated habitat temporarily affected (acres)	85	112	101	100

[4] Impacts to brown bears reported by Goldstein, Suring, and Preston (2004) were based on an assumption that all build alternatives would induce increased human population growth, development, and road density in the project area. Since 2004, DOT&PF has elected to retain access rights for the segment of each alternative that would be built on a new alignment to limit indirect changes in human population growth or development patterns resulting from this project. Despite invalidating a key assumption, the patterns in Goldstein's findings still are relevant because all of the build alternatives would increase road density through the construction of segments built on new alignments. However, the increase in road density and magnitude of correlated increase in impacts on brown bear habitat use and the probability of DLP kills as a result of the project would be lower than values reported in the 2004 study because of the DOT&PF commitment to limit access to the new highway alignments. Increased recreation on trails and dispersed in the backcountry is expected to originate from the new alignments and proposed trailheads, and this likely would lead to greater human-bear encounters and DLP kills than occur today.

Construction and replacement of bridges over anadromous fish streams could temporarily displace bears that typically fish in these waterways and increase competition between bears at other fishing sites.

During and after construction, disturbed areas may have reduced habitat quantity and quality. Noise from construction activities could displace and/or modify movements and behavior of brown bears until project completion. In addition, food and garbage associated with construction activities have the potential to draw bears and other wildlife to the construction site. As a preventive measure, bear-proof containers would be used to discourage such habituation of wildlife.

Mitigation

Measures to minimize harm to vegetated habitat (considered a proxy for brown bear habitat) are documented in Section 3.20. Timing windows for construction activities within the Kenai River (e.g., pile driving; see Section 3.21) would reduce temporary impacts to a brown bear food source. Additional avoidance and minimization measures to reduce impacts to brown bears and brown bear habitat would be pursued during the design phase, and in collaboration with the resource agencies.

Maintaining, enhancing, and/or providing designated wildlife movement corridors has been identified as a key to mitigating impacts to brown bears, as well as moose and other wildlife in the project area. To address the project's potential for impacting wildlife movement, DOT&PF is sponsoring a wildlife study in collaboration with wildlife management agencies. The scope of the study (the study plan) was developed in consultation with an interagency wildlife team (USFWS, USFS, and ADF&G). The study, which was initiated in 2014, is expected to quantify wildlife use of the habitat in the vicinity of proposed alternative alignments and the existing highway and to aid in the placement of one or more wildlife crossings and other measures to accommodate wildlife movement for brown bears and moose, as well as for other species, including black bear, Dall sheep, wolverine, and Canadian lynx. The study will focus on locations where animals are likely to be at greatest risk (either using the highway corridor to move parallel to the highway or to cross the highway).

The study is designed to identify wildlife movement patterns while considering public and private land, with a goal of identifying locations for potential wildlife crossings that would be incorporated into the highway design and remain effective for wildlife movement over the long term. The wildlife study is progressing through a desktop modeling phase and field verification of movement corridors is anticipated later in 2015 or 2016. The field verification effort uses existing tracking data and camera-capture technology to indicate travel corridors for the target species in the project area and where they are crossing the existing and proposed highway alignments. These data will be coupled with data from multiple other studies both within the project area and from other locations around the world. Data inputs will include, for example, bear and moose tracking studies using collars that transmit location and movement data, existing wildlife collision data for the project area, and data on wildlife movement habits from outside the project area. This information will help biologists predict wildlife concentrations and movement areas, and ultimately locations where wildlife would be anticipated to cross the proposed alternatives.

The range of mitigation options includes, but is not limited to:

- Vegetated wildlife overpasses.
- Large mammal underpasses.
- Small mammal underpasses.
- Fencing/wildlife diversions.
- Vegetation planting or clearing to help direct wildlife movement.
- Terrain steps to prevent wildlife movement or to provide for one-way movement.
- One-way gates for large animals.
- Animal movement corridor protection (e.g., through land purchase, designation, or easement).
- Design of project bridges over rivers and streams to accommodate large mammals passing under the bridge along the riparian edge.
- Standard wildlife warning signs for drivers.
- Movement-activated electronic warning signs for drivers.

In addition, design and construction techniques for major new bridges would leave adequate clearance for wildlife passage beneath the bridge, and would retain vegetation to the extent possible as cover for wildlife.

The wildlife movement study is expected to result in recommendations for potential dedicated wildlife crossing structures to minimize collisions between motor vehicles and wildlife and retain connections between habitat areas. DOT&PF is prepared to establish an appropriate number of crossings based on a range of criteria. The study is expected to suggest locations for wildlife crossing structures, most likely on public lands of the KNWR, CNF, State of Alaska, Borough, or a combination. DOT&PF, FHWA, and the wildlife agencies would agree on locations and design criteria for any wildlife crossing structures. Criteria to be used in determining which mitigation measures to implement include:

- Expected effectiveness (or use by species).
- Concentration of use by multiple species/usefulness of the measure for multiple species.
- Technical feasibility and terrain.
- Current and projected land use and ownership.
- Cost and prudent expenditure of public funds.
- Input from the public.
- Input from wildlife agencies and other agencies.

The process to be used to make final wildlife mitigation decisions is anticipated to be a continuing cooperative effort and negotiation among ADF&G, USFWS, USFS, DOT&PF, and FHWA. The initial study results will be incorporated into the Final EIS along with refined mitigation measures based on these results and pertinent comments from the public and agencies. Because the costs may be substantial and because this kind of mitigation is relatively new for Federally-funded

projects in Alaska, it is expected that senior agency decision makers are likely to be involved. The Final EIS will include as much detail as possible. Confirmation data from the wildlife study (e.g., field verification data) will be incorporated into the Record of Decision to the extent possible so that mitigation is identified as specifically as possible in the ROD. A commitment to further refinement during project design also will be included.

While there is not yet any specific cost associated with wildlife mitigation, project construction cost estimates in Sections 3.5.2.2 and 3.27.7.5 include contingency amounts, in part to cover anticipated costs such as those for wildlife mitigation.

Agency coordination has been ongoing on the topic of wildlife and brown bears in particular; see Section 3.27.24 of Cumulative Impacts and Chapter 5, Comments and Coordination, for more information.

In addition, for each of the Juneau Creek build alternatives, the DOT&PF has committed to building underpasses on West Juneau and Chunkwood roads, little-used USFS roads that could function, in part, as wildlife crossings (see Section 2.6). These are not intended specifically for wildlife crossings, but are meant to preserve the access rights for underlying land management purposes. As the surrounding land could be developed and a public road could be built through the crossings, USFWS and USFS have indicated they do not consider these underpasses to be permanent or dedicated wildlife crossings. Nonetheless, the DOT&PF is committed to building these structures to wildlife crossing standards so that moose, bears, and other wildlife would be able to cross under the new highway at these locations. The access roads and easements would be available for use by wildlife and recreational users, and they would continue to serve as wildlife crossings until the underlying land manager might upgrade or change the use of these crossings.

All areas affected by construction activities under any of the build alternatives would be re-vegetated with native species following construction. Vegetation on temporary access road corridors (e.g., beneath the proposed Cooper Creek Bridge, in Juneau Creek Canyon, and across Bean Creek, depending on the alternative) would be restored through seeding with native seed mix. Temporary access roads would be removed and the corridors blocked with a barrier and signed to minimize the chance that these areas would become off-road vehicle or pedestrian trails, which would effectively increase road density and provide increased access for hikers and hunters that could lead to increased human-bear encounters.

Mitigation measures specific to fish and essential fish habitat would benefit bears by reducing impacts related to food availability. Timing windows for construction activities near and within anadromous fish streams would avoid and minimize displacing bears and other wildlife foraging for these food sources. These measures are discussed in Section 3.21, Fish and Essential Fish Habitat.

Mitigation measures specific to noise are addressed under Section 3.15. Noise abatement measures are not proposed for large dispersed recreation areas, based on established DOT&PF and FHWA noise policy. Barriers, the most effective solution, can have negative impacts such as requiring additional habitat clearing, interrupting scenic views, and decreasing wildlife mobility. Additional information is provided in Appendix D.

3.22.3.3 Cooper Creek Alternative

Direct and Indirect Impacts

The proposed footprint of the Cooper Creek Alternative would eliminate 188 acres of vegetated habitat within the project area (Table 3.22-9). This represents 1.3 percent of total vegetated habitat within the project area and less than 0.01 percent of total bear habitat on the Kenai Peninsula.

The Cooper Creek Alternative would alter existing brown bear habitat. About 2.7 miles of the 14.2-mile alternative traverses important bear use areas (see Map 3.22-1, Table 3.22-9). All 3.5 miles of the segment of roadway built on a new alignment would lie within approximately 6,560 feet (2,000 meters) of anadromous fish streams (this corridor serves as an approximation of heavily used bear habitat). Furthermore, the Cooper Creek Alternative would involve five new crossings of anadromous fish streams (Table 3.22-9 and Map 3.21-1 in Section 3.21, Fish and Essential Fish Habitat). However, this alternative would not bisect habitat identified by the interagency team as important for brown bears (Map 3.22-1). Use of the Cooper Creek area by brown bears is lower than at other streams in the project area as a result of reductions to the anadromous fish runs caused by the Cooper Lake hydroelectric project. The clear span bridge over Cooper Creek also would minimize this alternative's potential to impede brown bear north-south movement.

The Cooper Creek Alternative would also likely result in changes to brown bear behavior and use of existing habitat. The Cooper Creek Alternative would result in an increase in road density and thus a corresponding decrease in the probability of occurrence of females with cubs during spring (see Section 3.22.3.2 and Goldstein, Suring and Preston (2004)). However, the Cooper Creek Alternative was found to have the smallest increase in road density of the build alternatives and likely would have a smaller negative impact on the probability of brown bear occurrence than the other build alternatives (Goldstein, Suring and Preston 2004). The Cooper Creek Alternative follows much of the existing alignment. Where it would be separated from the "old" highway (see Table 3.22-9, above), the new alignment would occur mostly in an area already influenced by community development and road infrastructure in Cooper Landing and not as heavily used by wildlife as lower Juneau Creek and the Russian River confluence area.

Brown bear avoidance areas were quantified using a 3,280-foot-wide (1,000-meter-wide) (Waller and Servheen 2005) buffer zone centered on the new highway alignment segments. The estimated avoidance area adjacent to the segment of the Cooper Creek Alternative built on a new alignment is an additional 605 acres over the 5,596 acre area surrounding the existing highway, for a total of 6,201 acres (Table 3.22-9).

A USFWS study within KNWR indicated that road noise had an effect zone of more than 0.5 mile from the source, with road noise in winter audible up to 2 miles from the Sterling Highway. Noise is a contributing factor to the bear avoidance area (approximately one-third mile from a roadway), and behavior modification may extend farther. The existing highway noise effect zone (using a 0.5-mile zone along either side of the highway) extends across about 9,500 acres. The Cooper Creek Alternative would add traffic noise effects to an additional 640 acres of wildlife habitat.

Seven major intersections would be lighted for the Cooper Creek Alternative. These include Quartz Creek Road, Bean Creek Road, Snug Harbor Road/"old" highway (east), "old" highway

(west), Russian River Campground driveway, Sportsman's Landing driveway, and Skilak Lake Road (see Map 2.5-2 in Chapter 2). Intersection illumination may affect bears and their movement, and the resulting light reflecting off snow and low clouds may exacerbate this impact.

Impacts to bears related to vehicle collisions would be similar to those described in Section 3.22.3.2. The Cooper Creek Alternative would include the upgrade of segments built on the existing alignment (MP 45–48 and MP 51.5–58), resulting in better visibility that could reduce bear-vehicle collisions. However, travel speeds would be greater throughout all segments of the alternative, which could offset any decreases, or possibly increase collision rates. Bear-vehicle collisions would likely be reduced on the "old" highway between MP 48 and 51 because of lower traffic volumes.

The probability of bear mortality from DLP kills likely would increase as a result of the Cooper Creek Alternative, which would bring an increase in road density (Goldstein, Suring and Preston 2004) and associated human activity (e.g., dispersed recreation).

Construction Impacts

Construction activities under the Cooper Creek Alternative (Map 2.5-7 in Chapter 2, Alternatives) would result in the temporary loss or alteration of 85 acres of vegetated habitat (Table 3.22-10). Construction would occur in one area of predicted use for brown bears (see Maps 2.5-7 and Map 3.22-1), which could displace them from that area and adjacent habitats, as well as affect their movements through the area. Other construction activities for the Cooper Creek Alternative would result in impacts similar to those discussed in Section 3.22.3.2.

Mitigation

Wildlife mitigation common to all build alternatives is described above in Section 3.22.3.2.

3.22.3.4 G South Alternative

Direct and Indirect Impacts

The proposed footprint of the G South Alternative would eliminate 202 acres of vegetated habitat within the project area (Table 3.22-9). This represents 1.4 percent of total vegetated habitat within the project area and less than 0.01 percent of total bear habitat on the Kenai Peninsula. Some of this habitat (approximately 10 percent) is in the lower Juneau Creek drainage, cited by wildlife and land management agencies as an area especially important for bears (see Map 3.22-1).

The G South Alternative would also alter existing brown bear habitat. All 5.6 miles of new roadway would lie within approximately 6,560 feet (2,000 meters) of anadromous fish streams. This alternative also would involve five new crossings, as well as the replacement of one existing crossing, of anadromous fish streams (Table 3.22-9 and Map 3.21-1). In addition, the segment built on a new alignment would fragment habitat identified by the interagency working group as important for brown bears (Map 3.22-1). There are currently no infrastructure barriers to bear movement on the north side of the Kenai River between about MP 50 and MP 53. The 5.6-mile segment built on a new alignment is expected to restrict wildlife movement, with particular concern about brown bear movement in northwest-southeast directions through the Kenai Mountains between salmon-rich Chickaloon River tributaries such as Thurman Creek (outside the project area, inside the KNWR) and lower Juneau Creek (inside the project area, outside the

KNWR). This is a new east-west impediment to brown bear movement, with the new highway roughly parallel to the existing barriers of the Sterling Highway and the Kenai River. About 3.5 miles of the 14.2 mile G South Alternative would traverse important bear use and movement areas, 0.9 mile of which creates a parallel, double roadway barrier to brown bear movement with the old highway (see Map 3.22-1, Table 3.22-9). The proposed new bridge at Juneau Creek would span the lower Juneau Creek drainage and allow bear passage up and down the stream corridor, but the highway approaches likely would alter bear movements in and out of the canyon.

The G South Alternative also likely would result in changes to brown bear behavior and use of existing habitat. The G South Alternative would result in an increase in road density and a corresponding decrease in the probability of occurrence of females with cubs during spring (Goldstein, Suring and Preston 2004). The increase in road density under the G South Alternative is predicted to be moderate (greater than the road density predicted for the Cooper Creek Alternative but less than that of the Juneau Creek and Juneau Creek Variant alternatives). Thus, the predicted impact on the probability of brown bear occurrence in the project area would be somewhere between that predicted for Cooper Creek Alternative and the Juneau Creek and Juneau Creek Variant alternatives (Goldstein, Suring and Preston 2004).

Brown bear avoidance areas were calculated using a 3,280-foot-wide (1,000-meter) buffer zone centered on the segment of the alternative built on a new alignment. The estimated avoidance area adjacent to the new G South highway segment would be an additional 1,468 acres (Table 3.22-9). The total avoidance area would become 7,064 acres, including the 5,596 acre avoidance area surrounding the existing highway. Some of this habitat is in the lower Juneau Creek drainage, cited by wildlife and land management agencies as an area especially important for bears (Areas 9 and 11; see Map 3.22-1).

The segment of G South Alternative built on a new alignment generally remains within 3,280 feet of the existing highway alignment. There are small slivers of undisturbed habitat between the highways that are outside each of the defined avoidance areas (see above). These areas, totaling 117 acres, may themselves become less attractive habitat as they are wedged between avoidance areas. Brown bear avoidance would likely extend to include this area for a more conservative total avoidance area estimate of 7,181 acres.

A USFWS study within KNWR indicated that road noise had an effect zone of more than 0.5 mile from the source, with road noise in winter audible up to 2 miles from the Sterling Highway. Noise is a contributing factor to the bear avoidance area (approximately one-third mile from a roadway), and behavior modification may extend farther. The existing highway noise effect zone (using a 0.5 mile zone along either side of the highway) extends across about 9,500 acres. The G South Alternative would add traffic noise effects to an additional 1,600 acres of wildlife habitat.

Six major intersections would be lighted for the Cooper Creek Alternative: Quartz Creek Road, “old” highway (east), “old” highway (west), Russian River Campground driveway, Sportsman’s Landing driveway, and Skilak Lake Road (see Map 2.5-3 in Chapter 2). Intersection illumination may affect bears and their movement, and the resulting light reflecting off snow and low clouds may exacerbate this impact.

Impacts to bears related to vehicle collisions would be similar to those described in Section 3.22.3.2. Segments of the existing road (MP 45–46.5 and MP 52–58) would be upgraded with wider shoulders and clear zones, resulting in better visibility that could reduce bear-vehicle

collisions. Bear-vehicle collisions likely would be reduced on the "old" highway between MP 45 and 52 because of lower traffic volume. However, travel speeds would be greater throughout all segments of the alternative, which could offset any decreases, or possibly increase collision rates.

The probability of bear mortality from DLP kills would likely increase as a result of the G South Alternative, which would bring an increase in road density (Goldstein, Suring and Preston 2004) and associated human activity (e.g. dispersed recreation).

As stated in Section 3.8, Park and Recreation Resources, an access road and staging areas for construction of the large bridge a short distance west of Juneau Creek would create new, easier public access after the work was complete. The construction access areas would be closed, gated, made impassable to vehicles, and revegetated, and the highway shoulders adjacent would be signed "No Parking" in this area. However, it may be difficult to keep people from hiking in and thereby keeping the access open, potentially creating a new sport-fishing access point, which could result in increased human-bear conflicts. This could become a new management issue for ADF&G, DNR, and USFS.

Construction Impacts

Construction activities under the G South Alternative (Map 2.5-7) would result in the temporary loss or alteration of 112 acres of vegetated habitat (Table 3.22-10). Construction would occur in three areas of predicted use for brown bears (see Maps 2.5-7 and Map 3.22-1), which could displace them from those areas and adjacent habitats, as well as affect their movements through the area. Other construction activities for the G South Alternative would result in impacts similar to those discussed in Section 3.22.3.2.

Mitigation

Wildlife mitigation common to all alternatives is described above in Section 3.22.3.2.

3.22.3.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

The proposed footprints of the Juneau Creek and Juneau Creek Variant alternatives would eliminate 269 and 256 acres of vegetated habitats, respectively, within the project area (Table 3.22-9). These values represent 1.9 and 1.8 percent, respectively, of total vegetated habitat within the project area and less than 0.01 percent of total bear habitat on the Kenai Peninsula. Much of the habitat loss (approximately 25 percent) would be in areas identified by wildlife and land management agencies as important bear habitat and movement areas (Map 3.22-1).

The Juneau Creek and Juneau Creek Variant alternatives also would alter existing brown bear habitat. The 10 or 9 miles of new roadway, respectively, would be within approximately 6,562 feet (2,000 meters) of anadromous fish streams (Table 3.22-9). Both alternatives would involve one new crossing of an anadromous fish stream (Table 3.22-9 and Map 3.21-1).

There are currently no infrastructure barriers to bear movement on the north side of the Kenai River between about MP 50 and MP 53. The segment of each alternative built on a new alignment would fragment habitat identified as important for brown bears (Map 3.22-1). This includes the potential disruption of brown bear movement in northwest-southeast directions through the Kenai Mountains between salmon-rich Chickaloon River tributaries such as Thurman Creek (inside the KNWR) and Juneau Creek/Kenai River (outside the KNWR). The 10

or 9 miles of new roadway would present an additional east-west barrier to wildlife movement, roughly parallel to the impediments created by the existing highway and the Kenai River. About 4.3 miles of the 14.7-mile Juneau Creek Alternative would traverse important bear use and movement areas. About 3.9 miles of the new alignment segment would create a parallel, double roadway barrier to brown bear movement with the old highway (see Map 3.22-1, Table 3.22-9). About 4.4 miles of the 14.3 mile Juneau Creek Variant Alternative would traverse important bear use and movement areas. About 3.6 miles of the new alignment segment would create a parallel, double roadway barrier to bear movement with the old highway.

The Juneau Creek Alternative (but not Juneau Creek Variant Alternative) would impact land within KNWR specifically designated for wildlife conservation.

The Juneau Creek and Juneau Creek Variant alternatives likely would result in changes to brown bear behavior and use of existing habitat. These alternatives would result in an increase in road density and a corresponding decrease in the probability of occurrence of females with cubs during spring (Goldstein, Suring and Preston 2004). The increase in road density under the Juneau Creek Alternative is predicted to be the highest of the build alternatives evaluated. As a result, this alternative is predicted to result in the greatest decrease in probability of occurrence for females with cubs during spring (Goldstein, Suring and Preston 2004). The Juneau Creek Variant Alternative was developed later and was not analyzed, but is assumed to be similar to the Juneau Creek Alternative.

Brown bear avoidance areas were calculated using a 3,280-foot-wide (1,000-meter) buffer zone centered on the segments of these alternatives built on a new alignment. The estimated avoidance area adjacent to these segments is an additional 2,834 and 2,640 acres, respectively (Table 3.22-9). The total avoidance areas would become 8,430 acres and 8,236 acres, respectively, including the 5,596-acre avoidance area surrounding the existing highway. Much of this habitat is in the Juneau Creek drainage and other areas cited by wildlife and land management agencies as especially important for bears (Areas 8, 11 and 16; see Map 3.22-1).

A USFWS study within KNWR indicated that road noise had an effect zone of more than 0.5 mile from the source, with road noise in winter audible up to 2 miles from the Sterling Highway. Noise is a contributing factor to the bear avoidance area (approximately one-third mile from a roadway), and behavior modification may extend further. The existing highway noise effect zone (using a 0.5-mile zone along either side of the highway) extends across about 9,500 acres. The Juneau Creek Alternative would add traffic noise effects to an additional 3,700 acres of wildlife habitat, and the Juneau Creek Variant would add traffic noise effects to an additional 3,500 acres.

For the Juneau Creek Alternative, lighting would be incorporated at four intersections: Skilak Lake Road, Quartz Creek Road, and both intersections where the old highway and new segment connect (see Map 2.5-4 in Chapter 2). For the Juneau Creek Variant Alternative, illumination would be incorporated at the following four intersections: Skilak Lake Road, Sportsman's Landing driveway/intersection of the new highway segment and "old" highway, Quartz Creek Road, and the eastern intersection where the old highway and new highway segment would connect (see Map 2.5-5 in Chapter 2). Intersection illumination may affect bears and their movement, and the resulting light reflecting off snow and low clouds may exacerbate the impact.

Impacts to bears related to vehicle collisions would be similar to those described in Section 3.22.3.2. Portions of the existing road (approximately from MP 45 to 46 and MP 56 to 58) would

be upgraded with wider shoulders and clear zones, resulting in better visibility that could reduce bear-vehicle collisions. Also, bear-vehicle collisions likely would be reduced on the "old" highway between MP 46 and MP 55 or 56 (depending on the alternative) because of lower traffic volume. However, average travel speeds would be greater throughout all segments of these alternatives, which could offset any decreases in, and possibly could increase, collision rates.

The probability of bear mortality from DLP kills is likely to increase under the Juneau Creek Alternative as a result of an increase in road density (Goldstein, Suring and Preston 2004) and associated human activity (e.g., dispersed recreation). The predicted increase in the probability of DLP occurrence for the Juneau Creek Alternative was more than the predicted increase for the Cooper Creek or G South alternative (Goldstein, Suring and Preston 2004). The Juneau Creek Variant Alternative was not analyzed but is assumed to be similar to the Juneau Creek Alternative.

Construction Impacts

Construction activities under the Juneau Creek or Juneau Creek Variant alternative (Map 2.5-7) would result in the loss or alteration of 101 or 100 acres of vegetated habitat, respectively (Table 3.22-13). Construction would occur in four areas of predicted use by brown bears (see Maps 2.5-7 and Map 3.22-1), which could displace them from those areas and adjacent habitats, as well as affect their movements through the area. Other construction activities for the Juneau Creek and Juneau Creek Variant alternatives would result in impacts similar to those discussed in Section 3.22.3.2.

Mitigation

Wildlife mitigation common to all alternatives is described above in Section 3.22.3.2.

3.22.4 Environmental Consequences (Moose)

3.22.4.1 No Build Alternative

Direct and Indirect Impacts

Existing impacts to moose would be expected to continue and increase under the No Build Alternative as traffic levels, human population, and recreation levels increased. These would likely result in one or more increased impacts to moose, including:

- Avoidance or reduced use of habitats along the highway corridor
- Reduced habitat quality depending on the right-of-way clearing procedures, timing, and colonizing plant species
- Physical and traffic impediments to highway crossings
- Injury or mortality from collisions, especially along MP 48 to 50 and MP 55 to 59

3.22.4.2 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

All build alternatives would likely result in one or more impacts to moose, including:

- Habitat loss (permanent loss of vegetation)
- Habitat fragmentation
- Reduced use of habitats due to avoidance of the highway corridor
- Reduced habitat quality depending on the right-of-way clearing procedures, timing, and colonizing plant species
- Traffic impediments to highway crossings
- Injury or mortality from collisions

Moose habitat loss would include the permanent removal of general moose habitat, rutting habitat, and both rutting and winter habitat (Table 3.22-11; see also Map 3.22-2, which illustrates the habitat areas). As shown on Map 3.22-2, the entire project area is designated moose habitat. The acreage of habitat permanently lost under each alternative, presented in Table 3.22-11, includes both the new highway alignment footprints and the widening of the reconstructed segments of the existing highway for each build alternative.

Table 3.22-11. Moose habitat lost under build alternatives (acres and percent of habitat type in project area) [a]

Habitat type lost	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Miles of the alternative built on new alignment	3.5	5.6	10	9
General habitat[b]	37 (1%)	37 (1%)	59 (2%)	40 (1%)
Rutting habitat	100 (2%)	105 (2%)	114 (2%)	116 (2%)
Rutting and winter habitat	67 (1%)	74 (1%)	104 (2%)	110 (2%)
Total habitat	**204 (1%)**	**216 (1%)**	**277 (2%)**	**266 (2%)**

[a] Moose habitat mapping used in the above analysis was obtained from ADF&G Alaska Habitat Management Guide (1985), which is a separate dataset from vegetation mapping used for other species. The above analysis should be used only as a general overview of potential impacts on moose from project alternatives. Acreage calculations subtract a 35-foot-wide corridor to approximate area already removed from moose habitat by the existing Sterling Highway. Percentages are rounded.

[b] Suitable habitat within the known range of moose, including but not limited to known seasonal and life function use areas (e.g., winter use areas, calving or rutting areas).

In addition to the loss of habitat, new highway segments would fragment moose habitat and reduce habitat quality. Habitat alteration would occur primarily in the right-of-way areas along the highway where natural vegetation would be cleared. In addition, increases in traffic volume and speed, as is associated with all of the build alternatives, would have the potential to increase wildlife-vehicle collisions and hinder wildlife movement. Disturbance and displacement from the new highway segments and associated human activity (e.g. dispersed recreation) is expected, resulting in less habitat availability and possibly reduced population size. Hikers, skiers, and snowmobilers, sometimes with dogs, are likely to traverse new backcountry areas and to walk some trails in higher volumes, which is likely to disturb and displace moose. Also, highway noise has the potential to disturb, displace or modify wildlife behavior. USFWS, in its role as a cooperating agency for this project, has expressed concerns related to noise affects on wildlife, and provided information that their sound studies within KNWR indicated that road noise had an effect zone of more than 0.5 mile (2,460 feet) from the source, and up to 2 miles in

the winter within Wilderness areas. USFWS indicated that a multitude of wildlife species (including but not limited to moose) would likely be affected by increased noise levels from new highway infrastructure. The discussion of habitat potentially impacted can be found under Direct and Indirect Impacts discussions for Brown Bears.

Physical features of the highway, especially steep embankments or retaining walls, may function as barriers to movement for moose, resulting in less use of their current range. Table 3.22-12 summarizes the length of new road in moose habitat predicted use areas (from Map 3.22-1) and the segments that add a parallel roadway impediment to moose transiting the area. Intersection illumination may affect moose and their movement, and the resulting light reflecting off snow and low clouds may exacerbate this impact.

Table 3.22-12. Moose habitat fragmentation by alternative

	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Length of alternative built on new alignment (miles)	3.5	5.6	10	9
Length of alternative within Moose Habitat Predicted Use Area (miles)	3.1	3.2	5.1	5.1
Length of new alignment in Moose Habitat Area that parallels existing highway	NA	0.2	4.4	4.1

Direct mortality from moose-vehicle collisions could increase due to increased road density (where both the “old” highway and a segment built on a new alignment would occur), especially where road segments built on new alignments would bisect high-quality moose habitat and in areas known for high rates of moose-vehicle collisions (MP 48–50 and 55–59). Note that only the Juneau Creek Alternative would create a second road in the MP 55–59 area.

Increased traffic speeds, coupled with increased traffic volume (as anticipated under all alternatives, including the No Build Alternative), would increase the probability of vehicle-moose collisions (Seiler 2005) or, alternatively, could increase displacement of moose in this area. However, lower traffic volume on the “old” highway segments likely would decrease collisions in that area. All new and reconstructed highway segments would be wider, with substantially better sight distance throughout their lengths, allowing for increased visibility and maneuvering room for both drivers and wildlife. Areas along each alignment with a higher potential for vehicle-moose collisions are discussed for each build alternative in the following sections.

While new residential and commercial development is likely to occur within the project area by 2043, and while that new development would impact wildlife and wildlife habitat, it would not be the result of the build alternatives.

New highway segments would increase access to areas that are now relatively remote and could increase hunting pressure on moose and otherwise likely would create new or greater disturbances from dispersed recreational activity. ADF&G would likely monitor hunting and alter hunting regulations to maintain moose at sustainable levels.

Construction Impacts

Construction would require staging areas, disposal sites for cleared vegetation and unusable soils, and access roads. Therefore, construction activities for all build alternatives would likely result in:

- Temporary loss/alteration of habitats
- Displacement from adjacent habitats
- Changes to typical use and/or movements through the area

During and after construction, disturbed areas may have reduced habitat quantity and quality in some areas. Disturbance could also improve habitat in areas that change from dense forest to shrubs and forbs used by moose for foraging. These changes adjacent to the new and rebuilt highway segments could attract moose to the highway edge and could lead to greater risk of vehicle-moose collision. Noise from construction activities could displace and/or modify moose movement and behavior until project completion.

Information on the acreage of general, rutting, and rutting and wintering moose habitats impacted by construction activities under each of the build alternatives is presented in Map 3.22-2 and Table 3.22-13.

Table 3.22-13. Construction impacts on moose habitat under build alternatives

Habitat type	Habitat Temporarily Affected (in acres)[a]			
	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
General	9	9	9	9
Rutting	64	14	14	14
Rutting and wintering	19	91	96	95
Total	**92**	**114**	**119**	**118**

[a] Includes construction staging areas, disposal areas, and a 10-foot buffer beyond the construction footprint.

Mitigation

To address wildlife mitigation for moose, as well as bears and other mammals, DOT&PF is sponsoring a wildlife movement study steered by the wildlife management agencies. This study seeks to identify appropriate mitigation measures to reduce fragmentation, displacement, impediments to movements, and collisions. Section 3.22.3.2 provides a more detailed description of the study and other identified mitigation measures that are applicable to all build alternatives.

3.22.4.3 Cooper Creek Alternative

Direct and Indirect Impacts

The Cooper Creek Alternative would result in the loss of approximately 204 acres of moose habitat (Table 3.22-11). This area represents approximately 1 percent of the total moose habitat in the project area.

Vegetation types within the footprint of the 3.5-mile segment built on a new alignment for the Cooper Creek Alternative are primarily mature stands of Lutz spruce and mountain hemlock, typically considered low-quality moose habitat. However, 2 acres of deciduous shrub thickets, considered high-quality moose browse, would be affected. The new alignment would create 3.5 miles of new right-of-way habitat that could benefit moose, depending on the colonizing plant species and right-of-way clearing procedures.

The new highway segment would cross one riparian area in addition to the Cooper Creek crossing. No areas of predicted use for moose were identified by the resource agencies along the 3.5-mile Cooper Creek Alternative segment built on a new alignment; however, along those segments of the alternative built on the existing alignment, this alternative would cross four areas of predicted use for moose (Areas 1, 13, 15, and 19; see Map 3.22-1). Two of these areas have been identified by resource agencies as areas of higher potential for moose-vehicle collisions. About 3.1 miles of the 14.2 mile Cooper Creek Alternative traverses areas of predicted use for moose.

The Cooper Creek Alternative follows much of the existing highway alignment. Where it would be separated from the "old" highway (see Table 3.22-12, above), the new alignment would occur mostly in an area already influenced by community and road infrastructure development in Cooper Landing and not as heavily used by wildlife as lower Juneau Creek and the Russian River confluence area. No portion of the new alignment would create a double parallel movement barrier within an area of predicted use for moose.

The existing highway noise effect zone (using a 0.5-mile zone along either side of the highway) extends across about 9,500 acres. The Cooper Creek Alternative would add traffic noise effects to an additional 640 acres of wildlife habitat.

Moose-vehicle collisions and the displacement impacts related to increased road density, traffic volume, and speeds that could increase collisions are similar to those discussed for all build alternatives (see Section 3.22.4.2).

Construction Impacts

Construction activities for the Cooper Creek Alternative would result in impacts similar to those discussed for all build alternatives. These include temporary loss/alteration of habitats, displacement from adjacent habitats, and changes to typical use and/or movements through the area. In total, approximately 92 acres of general, rutting, and rutting and winter moose habitat would be temporarily impacted by construction activities (see Table 3.22-13).

Mitigation

Wildlife mitigation common to all build alternatives is described above in Section 3.22.3.2.

3.22.4.4 G South Alternative

Direct and Indirect Impacts

The G South Alternative would result in the loss of approximately 216 acres of moose habitat (Table 3.22-11). This area represents approximately 1 percent of the total moose habitat in the project area.

Vegetation types along the 5.6 miles of new roadway are varied and include mature needle-leafed forests, early successional forests, and mature broad-leafed forests. The G South

Alternative would cross a large logged area east of Juneau Creek that likely provides higher-quality moose browse. The G South Alternative also would cross an area of high-quality moose habitat near Bean Creek where the USFS conducted a hazardous fuels reduction project on approximately 74 acres in 2005 (USFS 2005a).[5]

In addition to crossings of Juneau Creek and the Kenai River, the G South Alternative would cross several riparian areas and would affect approximately 3 acres of deciduous shrub thickets, which are high-quality moose browse. The 5.6-mile segment of this alternative built on a new alignment would cross one area of predicted use for moose and four additional areas of predicted use identified as general wildlife movement areas, including movement by moose (Areas 4, 6, 7, and 9; Map 3.22-1). This segment built on new alignment would be a new impediment to moose movement, with 5.6 miles of new highway roughly parallel to the existing barriers of the Sterling Highway and the Kenai River. There are currently no infrastructure barriers to moose movement on the north side of the Kenai River between about MP 50 and MP 53. The G South Alternative also would cross four areas of predicted use for moose along those segments built on the existing alignment (Areas 1, 13, 15, and 19; Map 3.22-1; same as the Cooper Creek Alternative). About 3.2 miles of the 14.2 mile G South Alternative would traverse areas of predicted use for moose, 0.2 miles of which creates a parallel, double roadway barrier to north-south moose movement with the old highway (see Map 3.22-1, Table 3.22-12).

The 5.6-mile segment built on a new alignment would create an additional 5.6 miles of new modified habitat within the right-of-way, which could benefit moose, depending on the colonizing plant species and right-of-way clearing procedures.

The existing highway noise effect zone (using a 0.5-mile zone along either side of the highway) extends across about 9,500 acres. The G South Alternative would add traffic noise effects to an additional 1,600 acres of wildlife habitat.

Moose-vehicle collisions and the displacement impacts related to increased road density, traffic volume, and speeds that could increase collisions are similar to those discussed for all build alternatives (see Section 3.22.4.2).

Construction Impacts

Construction activities for the G South Alternative would result in impacts similar to those discussed for all build alternatives. These include the temporary loss/alteration of habitats, displacement from adjacent habitats, and changes to typical use and/or movements through the area. In total, approximately 114 acres of general, rutting, and rutting and winter moose habitat would be temporarily impacted by construction activities (Table 3.22-13).

Mitigation

Wildlife mitigation common to all build alternatives is described above in Section 3.22.3.2.

[5] The work included removal of dead and dying trees, removing the upper portion of trees greater than 8 inches in diameter, chipping of surface debris, and scarifying the soil surface to promote hardwood regeneration. This type of work not only reduces the fire hazard, but also creates high-quality moose habitat due to the early successional vegetation that grows in after the work is completed.

3.22.4.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

The Juneau Creek and Juneau Creek Variant alternatives would affect approximately 277 and 266 acres of moose habitat, respectively (Table 3.22-11). These areas each represent approximately 2 percent of the total moose habitat in the project area. Vegetation types along the respective 10 or 9 miles of roadway built on a new alignment are varied and include mature needle-leafed forests, early successional forests, mature mixed forests, mature broad-leafed forests, and wet meadows. The Juneau Creek and Juneau Creek Variant alternatives would cross several logged areas east and west of Juneau Creek, as well as the USFS Bean Creek fuel reduction project area, that likely provide higher quality moose browse. As a result, an increase in moose-vehicle collisions is likely. Because there could be expected to be higher numbers of moose using these areas, mitigation is proposed; see Section 3.22.3.2 for a description of the wildlife movement study to identify specific mitigation options. The USFS also conducted a 106-acre wildlife habitat improvement project north of Juneau Falls in 2005 (USFS 2005b). The wildlife habitat improvement area is north of the proposed Juneau Creek and Juneau Creek Variant alternatives' alignments and would not be affected by these alternatives.

In addition to a crossing of Juneau Creek, the Juneau Creek and Juneau Creek Variant alternatives would cross several riparian areas and approximately 5 acres and 3 acres, respectively, of deciduous shrub thickets, which are sources of high-quality moose browse. Juneau Creek, at the proposed bridge crossing, is a steep rock walled canyon, and no construction activity is anticipated below the canyon rim, so impacts to moose habitat in the bottom of the canyon is not expected. Impacts to moose from crossing of the remaining riparian areas are expected to be minimal due to the small amount of habitat affected by construction of the highway.

The 9-mile or 10-mile segments of roadway built on a new alignment would add an infrastructure barrier to wildlife movement that does not exist between about MP 50 and MP 53 on the north side of the Kenai River. The new road segments would cross the following areas of predicted use: one small area specifically for moose (Area 4); two areas near Bean Creek identified as general wildlife movement areas, including movement by moose (Areas 6 and 7); a general wildlife movement area along Juneau Creek (Area 8); and one large area west of Juneau Creek identified as an important feeding area for moose (Area 13; Map 3.22-1). The Juneau Creek and Juneau Creek Variant alternatives also would cross two areas of predicted use for moose along segments built on the existing alignment (Areas 1 and 19; Map 3.22-1). In total, both Juneau Creek alternatives would traverse about 5.1 miles of moose predicted use areas, About 5.1 miles of the Juneau Creek alternatives traverse areas of predicted use for moose. Of that, 4.4 miles of the Juneau Creek Alternative and 4.1 miles of the Juneau Creek Variant would create a parallel, double roadway barrier to north-south moose movement with the old highway (see Map 3.22-1, Table 3.22-12).

The Juneau Creek and Juneau Creek Variant alternatives would likely cause moose habitat to become fragmented along the length of new alignments. These alternatives cross several areas that provide high-quality moose browse, including two areas where habitat improvements have been made specifically for moose. Habitat fragmentation and avoidance of habitat improvement areas and other areas predicted for use by moose could add to the nutritional stress on moose during winter.

The existing highway noise effect zone (using a 0.5-mile zone along either side of the highway) extends across about 9,500 acres. The Juneau Creek Alternative would add traffic noise effects to an additional 3,700 acres of wildlife habitat, and the Juneau Creek Variant would add traffic noise effects to an additional 3,500 acres of wildlife habitat.

Moose-vehicle collisions and displacement impacts related to increased road density, traffic volume, and speeds that could increase collisions are similar to those discussed for all build alternatives (see Section 3.22.4.2). Note that only the Juneau Creek alternatives would create a second parallel road in the MP 55–59 area known for higher rates of moose-vehicle collisions.

Construction Impacts

Construction activities for the Juneau Creek and Juneau Creek Variant alternatives would result in impacts similar to those discussed for all build alternatives. These include the temporary loss/alteration of habitats, displacement from adjacent habitats, and changes to typical use and/or movements through the area. In total, approximately 119 and 118 acres, respectively, of general, rutting, and rutting and winter moose habitat would be impacted by construction activities for the Juneau Creek and Juneau Creek Variant alternatives (Table 3.22-13).

Mitigation

Wildlife mitigation common to all build alternatives is described above in Section 3.22.3.2.

3.22.5 Environmental Consequences (Other Mammals)

During consultations for this project, wolves, lynx, wolverines, river otters, black bears, Dall sheep, and mountain goats were identified by a 2004 interagency working group as management/indicator mammal species in the project area (HDR 2004a). This section discusses impacts on these mammals.

Section 3.22.1.1 discusses known population and general habitat information for wolves, lynx, river otters, black bears, Dall sheep, and mountain goats in the project area. Detailed information on how these mammals use the project area is not available. However, the types of impacts are assumed to be similar to those described above for moose and brown bears. See Sections 3.22.3 (brown bears) and 3.22.4 (moose) for discussion applicable to general impacts on other mammals.

3.22.5.1 No Build Alternative

Direct and Indirect Impacts

Few new impacts on wolves, lynx, wolverines, river otters, black bears, Dall sheep, and mountain goats would be anticipated for the No Build Alternative. Impediments to movements, continued highway traffic noise effects, and some animal-vehicle collisions would be expected to increase as future traffic volumes rise. Increased traffic and human use could reduce prey species (for wolves, lynx, and wolverines), and increase DLP kills of black bears. Increased displacement from habitats adjacent to the highway could occur for some species.

3.22.5.2 Issues Applicable to the Build Alternatives

All build alternatives would result in direct impacts to wolves, lynx, wolverines, river otters, and black bears, including permanent loss of habitat from the proposed footprint, habitat fragmentation, and displacement of animals from habitat adjacent to the new highway segments

(especially for wolves, lynx, and wolverines). These impacts could result in lower population sizes, impediments to movements across the new highway, and direct mortality resulting from vehicle collisions (especially of wolves, lynx, and black bears). For the larger species, the Kenai River and the existing highway represent a semi-permeable barrier to wildlife movement. Larger mammals move across the barrier, but their movement is changed by the feature. For smaller mammals, road infrastructure represents a reflective boundary. The segments of each alternative built on a new alignment would add another semi-permeable parallel barrier. This may cause different and greater impacts to wildlife movement and mortality.

River otters could be affected by project-related changes to rivers and streams, especially near Bean Creek (Map 3.22-1). A minor but permanent loss of habitat would occur with the placement of fill, piers, and culverts for water body crossings (the construction or replacement of bridges or culverts). In addition, vegetation clearing and the placement of fill for the roadway could affect river otter movements as they travel on land between water bodies (ADF&G 2008h). Installation of culverts may help connect fragmented river otter habitat.

Direct impacts on black bears would be similar to impacts reported for brown bears (3.22.3.2). This includes habitat loss, habitat fragmentation, behavioral changes due to human activity, and injury or mortality from traffic collisions. However, areas of predicted use for the two bear species differ. Three black bear areas were identified within the project area: the avalanche chutes near Kenai Lake (Area 2), which are frequented by black bears during the spring and fall; an area near Cooper Creek (Area 10); and the area west of Juneau Creek (Map 3.22-1). All build alternatives would involve either a widened roadway (Cooper Creek Alternative) or a new alignment (G South, Juneau Creek, and Juneau Creek Variant alternatives) along the avalanche chutes above Kenai Lake. As a result, all build alternatives have the potential to displace black bears.

Increased road density and associated dispersed recreational use of lands near the new roads, traffic volumes expected under all alternatives (including the No Build Alternative), and vehicle speeds could increase wildlife-vehicle collisions (especially for black bears), or alternatively, increase displacement and create movement barriers, decreasing collisions. Increased traffic and associated human use near the new alignments could also increase DLP kills of black bears.

Increased traffic and human use could reduce prey species (for wolves, lynx, and wolverines), and increase poaching of black bears. Black bears tend to avoid brown bears, so any changes in habitat use and population size of brown bears may affect habitat use by, and population size of, black bears.

Because Dall sheep and mountain goats generally inhabit the higher elevation areas away from the proposed build alternatives, direct and indirect impacts on them would likely be minimal. There are no records of vehicle collisions with sheep or goats in the project area from 1999 to 2009 (Morton, personal communication 2011a, 2011b, 2011c); however, sheep and goats are found in the mountains north and south of the project area (Map 3.22-3). Therefore, vehicle collisions with sheep or mountain goats that might occasionally travel between northern and southern habitats are possible but anticipated to be infrequent.

None of the build alternatives are likely to change mortality due to hunting and trapping. New highway segments could increase access to areas that are now relatively remote through the creation of new official trailheads and unofficial access points (temporary access roads, etc.). These sites may increase hunting and trapping pressure on these “other” mammals. ADF&G

monitors hunting and trapping and alters regulations to maintain mammal populations at sustainable levels.

Construction Impacts

Construction would require staging areas, disposal sites for cleared vegetation and unusable soils, and access roads. Construction and use of these temporary facilities for each of the build alternatives would result in impacts to wolves, lynx, wolverines, river otters, black bears, and Dall sheep such as:

- Temporary loss/alteration of habitats
- Displacement from adjacent habitats
- Changes to typical mammal use and/or movements through the area

During and after construction, disturbed areas would likely have reduced habitat quantity and quality by reducing habitat for prey species, foraging, and cover. Snowshoe hares, a major prey species for lynx, could benefit in areas where dense forest is replaced by shrubs. Construction of bridges and installation of culverts could displace river otters during construction. Noise from construction activities could displace and/or modify movements and behavior of wildlife until project completion. Construction activities in mountainous areas (such as for the Juneau Creek and Juneau Creek Variant alternatives) could temporarily alter Dall sheep movements between mountainous areas (Map 3.22-3).

Mitigation

Wildlife mitigation, including measures to reduce fragmentation, displacement, impediments to movements, and collisions, is common to all build alternatives and described above in Section 3.22.3.2. Mitigation measures would be selected primarily to benefit brown bears and moose, but would also benefit other mammal species.

3.22.5.3 Cooper Creek Alternative

Direct and Indirect Impacts

Impacts to wolves, lynx, Dall sheep, mountain goats, and river otters would likely be minimal. Wolves and lynx generally favor use of areas north of the existing highway and likely avoid homes and roads found along the alignment for the Cooper Creek Alternative, which is located mainly south of the existing highway. The Cooper Creek Alternative is not expected to adversely affect river otters because the alternative would cross a limited amount of riparian areas potentially used by river otters.

Two areas of predicted use for black bears within the project area would be crossed under this alternative (Map 3.22-1, Areas 2 and 10). Therefore, the Cooper Creek Alternative could fragment black bear habitat, alter their movements, displace them from current habitats, and/or increase the number of collisions, possibly reducing their population size. Other impacts on black bears resulting from increased traffic, human use, and changes in brown bear habitat use and population size would be similar to those described for all build alternatives in Section 3.22.5.2.

The Cooper Creek Alternative mostly follows the existing highway alignment. Where it would be separated from the “old” highway (see Table 3.22-9, above), the new alignment would occur

mostly in an area already influenced by development in Cooper Landing and not as heavily used by wildlife as lower Juneau Creek and the Russian River confluence area.

The Cooper Creek Alternative would be located outside mapped ranges for Dall sheep (Map 3.22-3). The potential for vehicle collision impacts on Dall sheep and mountain goats would be expected to be minimal, as described for all build alternatives (see Section 3.22.5.2).

Construction Impacts

Construction impacts to wolves, lynx, wolverines, black bears, Dall sheep, and mountain goats would be expected to be similar to those described for all build alternatives. Construction impacts to river otters would be less for the Cooper Creek Alternative than other build alternatives because it would cross a small and limited amount of riparian areas potentially used by river otters.

Mitigation

Wildlife mitigation common to all build alternatives is described above in Section 3.22.3.2.

3.22.5.4 G South Alternative

Direct and Indirect Impacts

The G South Alternative would be situated north of the existing highway and would cross primarily undisturbed areas. The loss of undisturbed habitat could affect more secretive species such as wolves, lynx, and wolverines, which prefer undisturbed habitats north of the existing highway (Bailey, personal communication 2001), by displacing them from foraging, denning, and resting areas. The G South Alternative would be located near or within the three river otter areas of predicted use (Map 3.22-1, Areas 5, 6, and 7) and would likely result in loss of habitat, habitat fragmentation, and displacement of river otters. Lower Juneau Creek is recognized as an "animal movement corridor" (Map 3.22-1, Area 9), so the new highway segment, even with a bridge over Juneau Creek, could change or disrupt wildlife movements, especially during daylight and/or high-traffic situations.

One area of predicted use for black bears within the project area would be crossed under this alternative (Map 3.22-1, Area 2). Other impacts on black bears resulting from increased traffic, human use, and changes in brown bear habitat use and population size would be similar to those described for all build alternatives in Section 3.22.5.2.

For the G South alternative, the segment built on a new alignment would lie north of the Kenai River. A portion of this area, particularly between about MP 50 and MP 51.5, is a region that currently has no linear infrastructure barrier to wildlife movement.

The G South Alternative would be located outside mapped ranges for Dall sheep (Map 3.22-3). The potential for vehicle collision impacts on Dall sheep and mountain goats would be expected to be minimal, as described for all build alternatives (Section 3.22.5.2).

Construction Impacts

Construction impacts on wolves, lynx, wolverines, river otter, black bears, Dall sheep, and mountain goats would be expected to be similar to those described for all build alternatives.

Mitigation

Wildlife mitigation common to all build alternatives is described above in Section 3.22.3.2.

3.22.5.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

The Juneau Creek and Juneau Creek Variant alternatives would involve the construction of 10 and 9 miles, respectively, of new roadway north of the existing highway. Wolves, lynx, and wolverines prefer habitat north of the existing highway; therefore, habitat lost and fragmented under these alternatives could impact these mammals. A reduction in foraging, denning, and resting areas would be expected for wolves, lynx, and wolverines.

The Juneau Creek and Juneau Creek Variant alternatives would cross several riparian areas, resulting in habitat loss, fragmentation, and displacement of river otters (Map 3.22-1, Areas 5, 6, and 7).

Two areas of predicted use for black bear would be crossed with these alternatives (Map 3.22-1, Areas 2 and 16) and could impede black bear movements, increase displacement and habitat fragmentation, and increase collisions. Other impacts on black bears resulting from increased traffic, human use, and changes in brown bear habitat use and population size would be similar to those described for all build alternatives in Section 3.22.5.2.

For the two Juneau Creek alternatives, the segment built on a new alignment would lie north of the Kenai River over a long distance. A portion of this area, particularly between about MP 50 and MP 53, is a region that currently has no linear infrastructure barrier to wildlife movement. In areas between MP 53 and about MP 55/56, the segment built on a new alignment would add a new second barrier north of the Kenai River.

The Juneau Creek and Juneau Creek Variant alternatives would be located outside mapped ranges for Dall sheep (Map 3.22-3). However, Dall sheep have been observed moving across the Juneau Creek Valley from Slaughter Mountain to Round Mountain (Spraker, personal communication 2001) and are documented as using the lower portions of the cliff bands close to the proposed routes. It is thought that sheep could be attracted to grasses within the right-of-way during early summer. In addition, noise and human activity associated with these northernmost alternatives have the potential to impact important sheep winter range and/ or lambing areas. However, the potential for vehicle collision impacts on Dall sheep and mountain goats would be expected to remain low, as described for all build alternatives (Section 3.22.5.2).

Construction Impacts

Construction impacts on wolves, lynx, wolverines, river otters, black bears, and mountain goats would be expected to be similar to those described for all build alternatives. Construction activities for the Juneau Creek and Juneau Creek Variant alternatives could temporarily alter Dall sheep movements between mountainous areas (Map 3.22-3). However, should the Juneau Creek or Juneau Creek Variant alternatives be constructed, concentrated human activities (such as construction camps) are not anticipated to be located in areas that would affect important wintering and lambing habitat for the Dall sheep.

Mitigation

Wildlife mitigation common to all build alternatives is described above in Section 3.22.3.2.

3.22.6 Environmental Consequences (Birds)

3.22.6.1 No Build Alternative

Direct and Indirect Impacts

Few new impacts on birds would be anticipated for the No Build Alternative. Disturbance and displacement from habitats adjacent to the highway and some bird-vehicle collisions could increase as future traffic volumes rise.

A 2014 survey of bald eagle nests in the project area identified four inactive nests located less than 330 feet from the existing highway and an additional four inactive nests located between 330 feet and 660 feet from the existing highway (see Table 3.22-15 and Map 3.22-4). As discussed in Section 3.22.1.2, USFWS recommends 330-foot primary and 660-foot secondary buffer zones between bald eagle nests and disturbance activities such as motorized traffic and standard road construction (USFWS 2007). While the eight nests identified are already located within the recommended buffer zones, bald eagles nesting in the project area are likely tolerant of the ongoing existing noise and disturbance from highway traffic because they consistently nest in this area. Future increases in traffic volume on the existing highway could increase bald eagle disturbance, but are unlikely to have substantial impact on bald eagle nesting in the project area.

3.22.6.2 Issues Applicable to the Build Alternatives

The following discussion of environmental consequences focuses on species identified as species of concern by USFWS and ADF&G. Within that discussion, special attention is given to potential impacts to bald eagles due to protections under the Bald and Golden Eagle Protection Act and the potential for impacts to nesting eagles. Impacts to general bird habitat and other bird species are also discussed.

Direct and Indirect Impacts

Direct impacts on birds would include a permanent loss of habitat, disturbance from human activity along the roadway, disturbance from recreational use originating at the highway but dispersed in the backcountry, and direct mortality from collisions with vehicles. All build alternatives would result in a permanent loss of bird habitat. Vegetation clearing and fill placement would result in a loss of bird habitat used for some or all of the following activities: foraging, resting, breeding, perching, and nesting. Vegetation clearing and fill placement could result in decreased reproduction rates, behavior modification, increased mortality, and displacement to other habitat. Habitat quality adjacent to the roadway may be reduced because of increased disturbance from human activity. Disturbance from traffic volume and noise can create avoidance zones that extend as far as 3,280 feet (1,000 meters) or more from the road itself for certain bird species (Reijnen and Foppen 2006). Table 3.22-14 presents direct impacts on bird habitat for all project alternatives.

Table 3.22-14. Area of bird habitat eliminated (in acres)

Habitat type	Dominant bird group(s)	Build alternative			
		Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Needle-leafed forests	Raptors, landbirds	88	64	127	122
Broad-leafed forests	Raptors, landbirds	11	26	25	17
Mixed needle-leafed and broad-leafed forests	Raptors, landbirds, upland game birds	79	104	102	105
Shrub thickets	Landbirds, upland game birds	4	3	4	4
Dry meadows	Landbirds, waterbirds	5	4	4	4
Wet meadows	Landbirds, waterbirds	1	1	7	7
Total		**188**	**202**	**269**	**256**

Species of Concern. Habitat loss and disturbance could affect a number of USFWS BCC, KNWR "species of special interest," and ADF&G "species of greatest conservation need," as listed in Table 3.22-1.

Waterbird species of concern that may potentially be affected by the build alternatives include the red-necked and horned grebe, arctic tern, common loon, and trumpeter swan. Shorebird species of concern that may potentially be affected include the lesser yellowlegs, solitary sandpiper, and Wilson's snipe. Direct impacts on waterbirds would include loss of habitat from the placement of piers for bridges, disturbance/displacement of birds from construction activities, disturbance from vehicular traffic, and direct mortality from collisions with vehicles or structures. Highway construction would affect some portion of the banks of the Kenai River and its tributaries, resulting in a small loss of breeding and nesting areas for waterbirds. Raptor and owl species of conservation concern (USFWS BCC, KNWR "species of special interest," and ADF&G "species of the greatest conservation need") that may be affected by project alternatives include the osprey, bald eagle, golden eagle, sharp-shinned hawk, northern goshawk, merlin, and six species of owls (Table 3.22-8). The golden eagle may occasionally pass through the project area; however, they are not expected to be impacted by any of the project build alternatives because they nest in cliffs.

Direct and indirect impacts specific to bald eagles are similar to those discussed for other bird species, including the permanent loss of habitat, direct mortality from collisions with vehicles, and disturbance and displacement as a result of human activity and highway noise. For all build alternatives, direct impacts from the loss of habitat would include the potential reduction in food sources (including decrease in available hunting areas and reduced availability of prey base), cover, breeding habitat, and perching sites. The removal of riparian habitat used by bald eagles for breeding and foraging could reduce roosting and foraging habitat in the area. Bald eagle mortality could increase if birds are struck by vehicles while foraging for vehicle-killed carrion on or along the roadway. Although there are anticipated to be impacts to bald eagles within the

project area as a result of all build alternatives, the impacts should not be substantial given the abundance of available habitat for bald eagles in the Kenai Peninsula.

Bald eagles that are subjected to disturbance during the breeding season may seek new, more remote nest sites (Fraser and Anthony 2008). As discussed in Section 3.22.1.2, USFWS recommends 330-foot primary and 660-foot secondary buffer zones between bald eagle nests and disturbance activities such as motorized traffic and standard road construction (USFWS 2007). A 2014 aerial survey identified 8 nests already within the 660-foot buffer zone of the existing highway (4 nests within the 330-foot primary zone and 4 nests within the 330- to 660-foot secondary zone). The locations of the 8 nests within the USFWS-defined buffer zones of the area of high traffic and activity along the existing highway and the Kenai River are shown in Table 3.22-15. All 25 nests identified in the larger project area are shown on Map 3.22-4.

The build alternatives generally increase the distance of the new highway and the majority of area traffic from the Kenai River and where most of the bald eagle nests are located. The existing highway segments would exist in the same location relative to eagle nests (Table 3.22-15) but, where not rebuilt, would be expected to carry only 30 percent of traffic in the project area, reducing the intensity of traffic-related disturbance to nests in those areas. There are three nests identified in the project area that are within the USFWS buffer zones of a build alternative but not the existing highway. One nest is within the 330-foot primary buffer zone and two nests are within the 660-foot secondary buffer zone. These are discussed below as impacts of specific alternatives. See also the Construction Impacts section below for discussion of construction noise and activity on eagle nests.

Table 3.22-15. Distances (in feet) from documented bald eagle nests in USFWS-defined buffer zones

Nest	Nest Status[a]	Existing Conditions/ No Build[b]	Build Alternative			
			Cooper Creek[c]	G South[c]	Juneau Creek[c]	Juneau Creek Variant[c]
9	Active	>660	>660	>660	>660	649
10	Inactive	402	387	387	>660	>660
11	Inactive	>660	>660	>660	>660	0
12	Inactive	306	232	232	>660	>660
14	Inactive	50	119	119	>660	>660
15	Inactive	433	495	495	>660	>660
16	Inactive	59	106	106	>660	>660
17	Active	309	433	>660	>660	>660
18	Active	651	>660	>660	>660	>660
23	Inactive	525	>660	>660	>660	>660
25	Inactive	>660	451	>660	>660	>660

[a] Nests status can change from year to year; therefore, this information should only be considered accurate for the survey year (2014). However, the number of active and inactive nests is unlikely to change significantly.
[b] The distance was calculated from the bald eagle nest to the nearest edge of the pavement of the existing highway.
[c] The distances were calculated from the bald eagle nest to the cut and fill line of each build alternative. Nests present within the alternative footprint would be identified as "0."
Source: Nest location data based on HDR (2014c).

Other Species and Habitat Issues. Passerines potentially affected by the build alternatives include a variety of woodpeckers, thrushes, warblers, sparrows and other passerine species of concern that may occur in the project area (see Table 3.22-7). The majority of these species nest in mixed deciduous/coniferous forests, willow thickets, and forest edges that are typical of the project area and could be affected by vegetation clearing for construction of road alignments. See Table 3.22-14 for a comparison of bird habitat types that would be lost under each alternative. Acreages were calculated by overlapping construction cut and fill areas with the project vegetation layer.

Linear developments fragment landbird habitat, which increases the amount of edge habitat. Edge habitat can increase landbird nest predation by concentrating predator forage activity, such as gray jays and ravens, along the newly created edge habitats. Habitat fragmentation and increased edge habitat would lead to a reduction in core habitat size, which could ultimately result in decreased reproductive potential in the project area.

Construction Impacts

Construction activities would disturb or displace birds in and immediately adjacent to the construction footprint. During construction, noise, dust and equipment exhaust in the air, and water quality impacts would temporarily displace birds from foraging, resting, and nesting habitat for several summer seasons in a row. Disturbance-related displacement from favored breeding habitats could result in birds consuming extra energy searching for, and competing with other birds to find, suitable replacement habitats. This could result in nesting in less-favored areas where nests may be damaged or accessed more easily by predators, which could limit survival of offspring or adults. To ensure no impacts to birds already nesting, removal of trees will be conducted during the late summer and winter months to avoid nesting times.

Once construction is complete, the disturbance area (10 feet) immediately adjacent to the cut and fill limits, would be revegetated with native species and would be expected to gradually resume natural vegetation character.

Waterbirds are sensitive to noise disturbance from construction activities during the summer months when they are nesting, brood rearing, molting, and/or congregating in staging areas prior to migration. Some individuals could experience lowered productivity resulting from nest and/or brood abandonment, and erratic sleeping and/or feeding patterns resulting from disturbance.

Bald eagles are sensitive to visual and auditory disturbances, especially during the early part of the nesting cycle (e.g., during nest building, incubation, and the first 5 weeks of nestling life). The presence of humans or construction noise near bald eagle nests has been found to cause changes in almost all aspects of eagle breeding behavior. Responses to disturbances include frequent flushing from the nest, not leaving the nest to feed, expending energy on defending the nest rather than maintaining the nest, and abandoning the nest (Steidl and Anthony 2000). Changes in eagle behavior are influenced by several factors, such as timing of disturbance in the breeding cycle, type of disturbance, disturbance proximity and intensity, degree of previous exposure, and environmental conditions. Studies have shown that the distance at which a disturbance first becomes visible to an eagle greatly influences its response (Steidl and Anthony 1996).

The noise and motion of construction activities could result in reproductive failure (Wright and Schempf 2008), displace bald eagles nesting within the project area to less suitable habitat, or result in birds leaving nests unattended, risking eggs during incubation. The National Bald Eagle Management Guidelines (USFWS 2007) recommend maintaining a buffer of at least 660 feet between construction activities and an active nest if the activity will be visible from the nest site. The buffer is intended to restrict all vegetation clearing, external construction, and landscaping activities within 660 feet of the nest to outside the bald eagle nesting season. If the nest is not visible from the construction activity, a buffer of 330 feet should be maintained.

The USFWS also recommends an increased buffer zone of 0.5 mile (2,640 feet) between eagle nests and blasting or other loud intermittent noises such as pile driving (USFWS 2007). All build alternatives are found within the 0.5-mile blasting buffer zone for multiple bald eagle nests, with the Cooper Creek and G South alternatives overlapping with the greatest number of nest buffer zone areas (21 and 19 nests, respectively) and the Juneau Creek and Juneau Creek Variant alternatives overlapping the fewest (10 nests). Whether or not impacts from blasting or other loud intermittent noises occur depends on the specific locations and timing of blasting activities. Proposed avoidance, minimization, and mitigation efforts for potential impacts within the recommended primary, secondary, and blasting buffer zones are discussed below.

Mitigation

To meet requirements of the MBTA, clearing of vegetation on lands for project-related development would occur before or after the nesting season (from May 1 to July 15 in Southcentral Alaska).

During the final design and permitting phase of the project, DOT&PF would consult with USFWS to develop measures to avoid, minimize, and mitigate impacts to bald eagle nests to ensure compliance with the Bald and Golden Eagle Protection Act. As part of consultation, the USFWS will determine the need for DOT&PF to obtain an eagle disturbance permit. The permit application, if required, would be submitted prior to the start of construction for disturbance to nests within 660 feet of the cut and fill limits of the selected build alternative that cannot otherwise be avoided, minimized, or mitigated.

The following conservation measures, some of which are based on the National Bald Eagle Management Guidelines (USFWS 2007), are currently proposed to avoid, minimize, and mitigate impacts to bald eagles. These are general measures that will be modified to specifically address details of the chosen build alternative through further coordination with USFWS during design and permitting:

- Prior to construction, a survey would be conducted to reassess the activity of the nests in the project area and to determine whether new nests have been constructed.
- Construction activities adjacent to any known nests would occur, to the greatest extent practicable, only during Mid-September through February, when eagles would not be nesting.
- If determined necessary, DOT&PF and USFWS would assess the risk for tree blow-down with known nest trees and adjacent trees.
- DOT&PF would work with USFWS to develop a detailed nest monitoring plan to mitigate disturbance from construction activities in the primary and secondary buffer

zones. Depending on the magnitude of the anticipated disturbance, this may include providing post-construction monitoring to determine whether the nest sites, communal roosts, or important foraging areas continue to be used by eagles for up to 3 years following completion of the permitted activity (USFWS 2009).

3.22.6.3 Cooper Creek Alternative

Direct and Indirect Impacts

The Cooper Creek Alternative would result in the permanent loss of 188 acres of bird habitat, the lowest amount of acreage affected of the build alternatives (see Table 3.22-14). Other impacts would include disturbance from human activity along the roadway and on nearby public lands and direct mortality from collisions with vehicles. Impacts to birds are similar to those described for all build alternatives (see Section 3.22.6.2).

The Cooper Creek Alternative alignment is within 660 feet of seven documented bald eagle nests. The new highway segment of the Cooper Creek Alternative passes within 660 feet of one nest, and improvements to the existing Sterling Highway would occur within the primary buffer zone (330 feet) of three nests and within the secondary buffer zone (660 feet) of another three nests (Table 3.22-15). It is anticipated that bald eagles nesting in this area are likely habituated to the routine noise and movement from traffic on the existing highway because they consistently nest in this area. However, the improvements to the existing highway would also remove some riparian habitat, which could degrade bald eagle nesting and roosting habitat in this area.

Construction Impacts

Impacts related to construction of the Cooper Creek Alternative would be anticipated to be similar to those described for all build alternatives (see Section 3.22.6.2).

Construction activities would occur within 660 feet of seven documented bald eagle nests. There are 21 nests within 0.5 mile of the alignment that may be impacted by blasting or pile-driving activities from road and bridge construction activities. DOT&PF would work with USFWS to determine a mitigation/monitoring plan to avoid and minimize impacts on these bald eagle nests.

Mitigation

Mitigation measures to address potential impacts to birds under the Cooper Creek Alternative would be the same as those described for all build alternatives (see Section 3.22.6.2). This would include consultation with USFWS to develop measures to avoid, minimize, and mitigate impacts to all bald eagle nests within 660 feet of the cut and fill limits of the Cooper Creek Alternative.

3.22.6.4 G South Alternative

Direct and Indirect Impacts

The G South Alternative would result in the permanent loss of 202 acres of bird habitat (see Table 3.22-14). Other impacts would include disturbance from human activity along the roadway and on nearby public lands and direct mortality from collisions with vehicles. Impacts to birds are similar to those described for all build alternatives (see Section 3.22.6.2).

The G South Alternative alignment is within 660 feet of five documented bald eagle nests. Along the 5.6 miles of new roadway segments for the G South Alternative, there are no known bald eagle nests (HDR 2014c). Improvements to sections of the existing highway would also occur

within the primary buffer zone (330 feet) of two documented bald eagle nests and within the secondary buffer zone (660 feet) of three nests within the project area (Table 3.22-15). Bald eagles nesting in this area are likely habituated to the noise and movement from traffic on the existing highway because they consistently nest in this area. The improvements to the existing highway would also remove some riparian habitat that could affect bald eagle nesting, roosting, and foraging areas in the project area.

Construction Impacts

Bird impacts related to construction of the G South Alternative would be anticipated to be similar to those described for all build alternatives (see Section 3.22.6.2).

Construction activities along the road alignment would occur within 660 feet of five documented bald eagle nests, and a large disposal site near MP 50 (see Map 2.5-7) would be located approximately 440 feet north of an additional documented bald eagle nest (Nest 21 on Map 3.22-4).

There are 19 nests within 0.5 mile of the alignment that may be impacted by blasting or pile-driving activities from road and bridge construction activities. DOT&PF would work with USFWS to determine a mitigation/monitoring plan to avoid and minimize impacts on these bald eagle nests.

Mitigation

Mitigation measures to address potential impacts to birds under the G South Alternative would be the same as those described for all build alternatives (see Section 3.22.6.2). This would include consultation with USFWS to develop measures to avoid, minimize, and mitigate impacts to all bald eagle nests within 660 feet of the cut and fill limits and construction areas of the G South Alternative.

3.22.6.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

The Juneau Creek and Juneau Creek Variant alternatives would result in the permanent loss of 269 and 256 acres, respectively, of bird habitat (see Table 3.22-14). Other impacts would include disturbance from human activity along the roadway and on nearby public lands and direct mortality from collisions with vehicles. Impacts to birds are similar to those described for all build alternatives (see Section 3.22.6.2).

There are no documented bald eagle nests located within 660 feet of the entire length of the Juneau Creek Alternative. There is one bald eagle nest located within the footprint of the Juneau Creek Variant after it splits from the Juneau Creek Alternative (see Map 3.22-4). Should the Juneau Creek Variant be selected as the preferred alternative, further evaluation would be conducted. A permit would be required to remove this nest if needed.

The improvements to the existing highway would also remove some riparian habitat that could affect bald eagle nesting, roosting, and foraging areas in the general project area.

Construction Impacts

Bird impacts related to construction of the Juneau Creek and Juneau Creek Variant alternatives would be anticipated to be similar to those described for all build alternatives (see Section 3.22.6.2).

A large soils disposal site near MP 50 (see Map 2.5-7) would be located approximately 440 feet north of an additional documented bald eagle nest (Nest 21 on Map 3.22-4) for both the Juneau Creek and Juneau Creek Variant alternatives.

There are ten nests within 0.5 mile of the alignment that may be impacted by blasting or pile-driving activities from road and bridge construction activities. DOT&PF would work with USFWS to determine a mitigation/monitoring plan to avoid and minimize impacts on these bald eagle nests.

Mitigation

Mitigation measures to address potential impacts to birds under the Juneau Creek and Juneau Creek Variant alternatives would be the same as those described for all build alternatives (see Section 3.22.6.2). This would include consultation with USFWS regarding avoidance and minimization measures to avoid impacts to the bald eagle nest identified along the Juneau Creek Variant Alternative.

3.22.7 Environmental Consequences (Wood Frog)

3.22.7.1 No Build Alternative

Direct and Indirect Impacts

Increased traffic may increase vehicle-caused mortality to wood frogs, but no other direct impacts on aquatic species within the project area are expected for the No Build Alternative. However, due to the proximity of the existing Sterling Highway to wetlands, waterways, and water bodies, and due to its narrow alignment with many sharp curves, there may be an increased likelihood of pollutants entering aquatic habitats due to vehicle crashes. These pollutants could cause detrimental effects on the health, longevity, and reproduction of aquatic species (Reeves, et al. 2008).

3.22.7.2 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

Widening segments of the existing Sterling Highway and building the new segment of each alternative would eliminate some wetlands and wood frog habitat, as well as fragment remaining habitat, as small species such as wood frogs are not likely to cross the highway. Increased road density and increased traffic would likely increase direct mortality to wood frogs as they moved among aquatic habitats and forests (HDR 2011a). On the segment of highway built on a new alignment under each alternative, new culverts would reduce the quality of habitat for wood frogs, although requirements for fish passage would be met wherever necessary and would minimize impact. Table 3.22-9 presents the number of water body crossings per alternative, including replacement and new culverts.

Impacts to water bodies and water quality (as discussed in Section 3.13), and impacts to wetlands (as discussed in Section 3.20) would have indirect impacts on wood frogs. In particular, wood frogs may develop skeletal abnormalities in areas associated with new highway segments (Reeves et al. 2008).

Construction Impacts

The operation of construction equipment in areas outside the permanent project footprint, such as along the edges of the construction area and on temporary access roads and staging areas, would likely result in mortality of some wood frogs and disturbance to habitat. In general, frogs would be expected to re-inhabit temporarily impacted habitat following construction.

Mitigation

Culverts would meet ADF&G-DOT&PF Memorandum of Agreement (ADF&G and DOT&PF 2002) requirements for fish passage. This would lessen potential impacts of new culverts, which would improve habitat over existing conditions at culverts that are not up to current standards and may improve habitat and passage for wood frogs.

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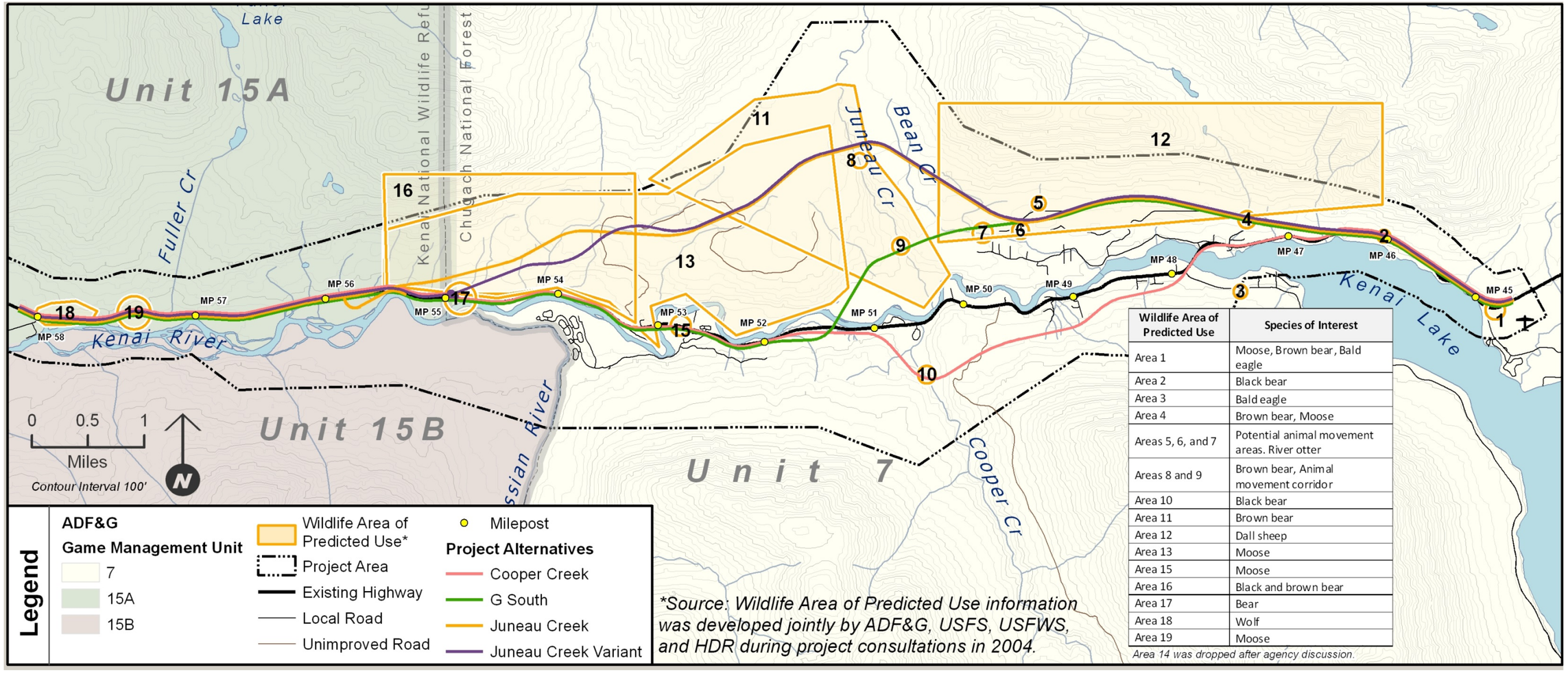

Wildlife Area of Predicted Use	Species of Interest
Area 1	Moose, Brown bear, Bald eagle
Area 2	Black bear
Area 3	Bald eagle
Area 4	Brown bear, Moose
Areas 5, 6, and 7	Potential animal movement areas. River otter
Areas 8 and 9	Brown bear, Animal movement corridor
Area 10	Black bear
Area 11	Brown bear
Area 12	Dall sheep
Area 13	Moose
Area 15	Moose
Area 16	Black and brown bear
Area 17	Bear
Area 18	Wolf
Area 19	Moose

Area 14 was dropped after agency discussion.

Map 3.22-1. Wildlife areas of predicted use

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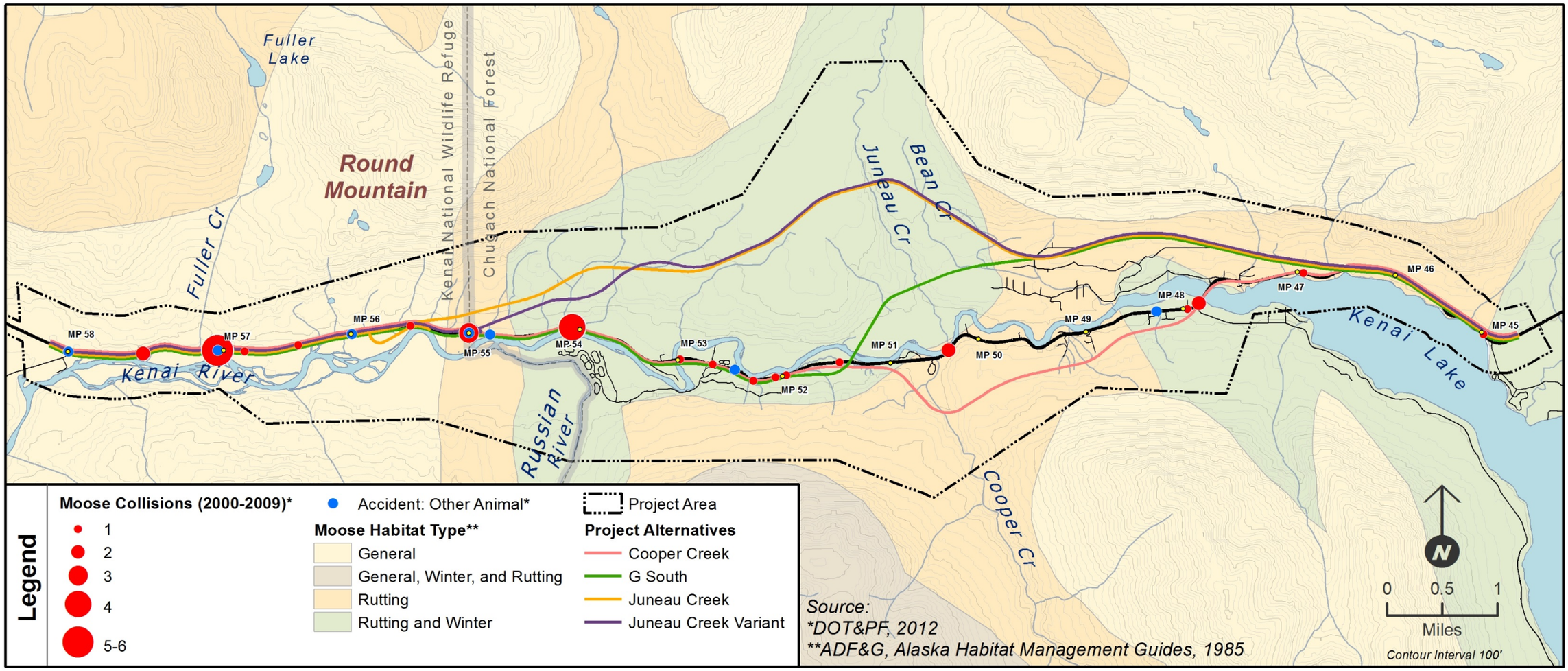

Map 3.22-2. Moose habitat in the project area

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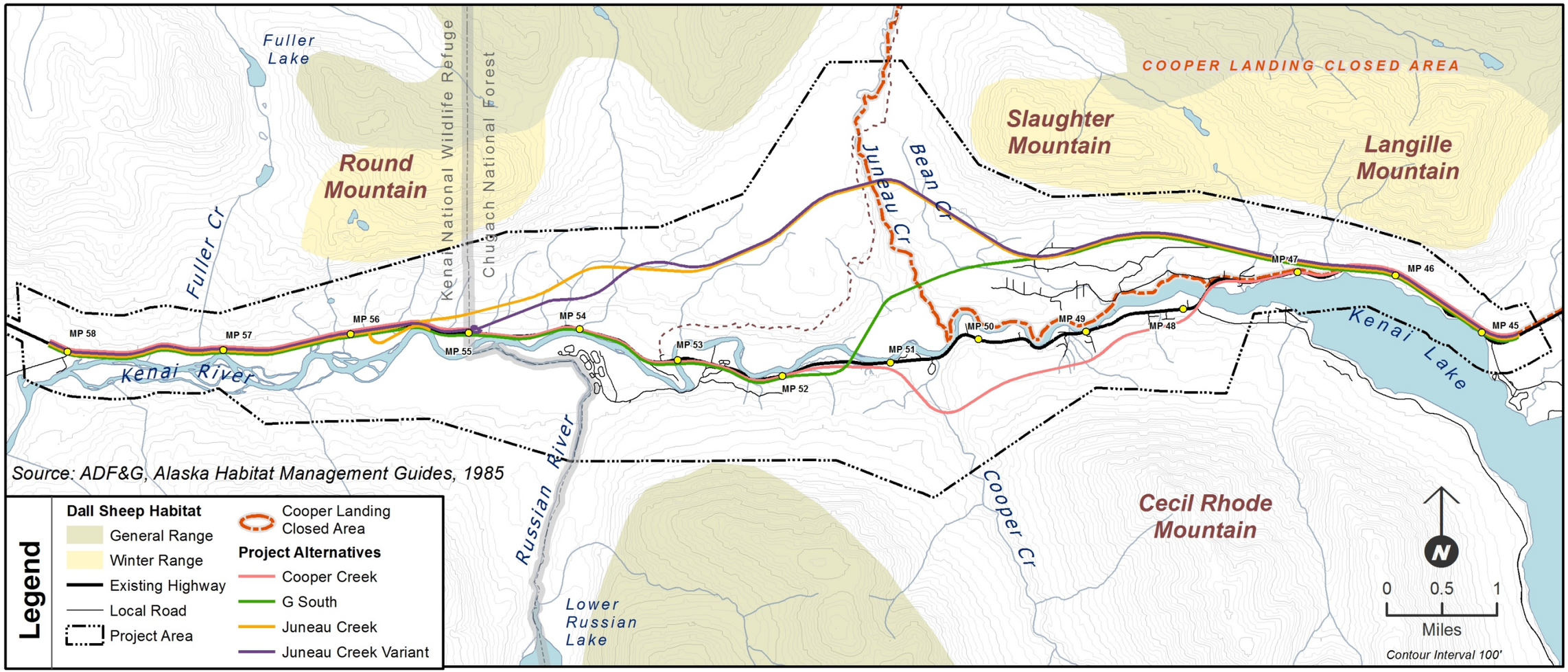

Map 3.22-3. Dall sheep habitat in the project area

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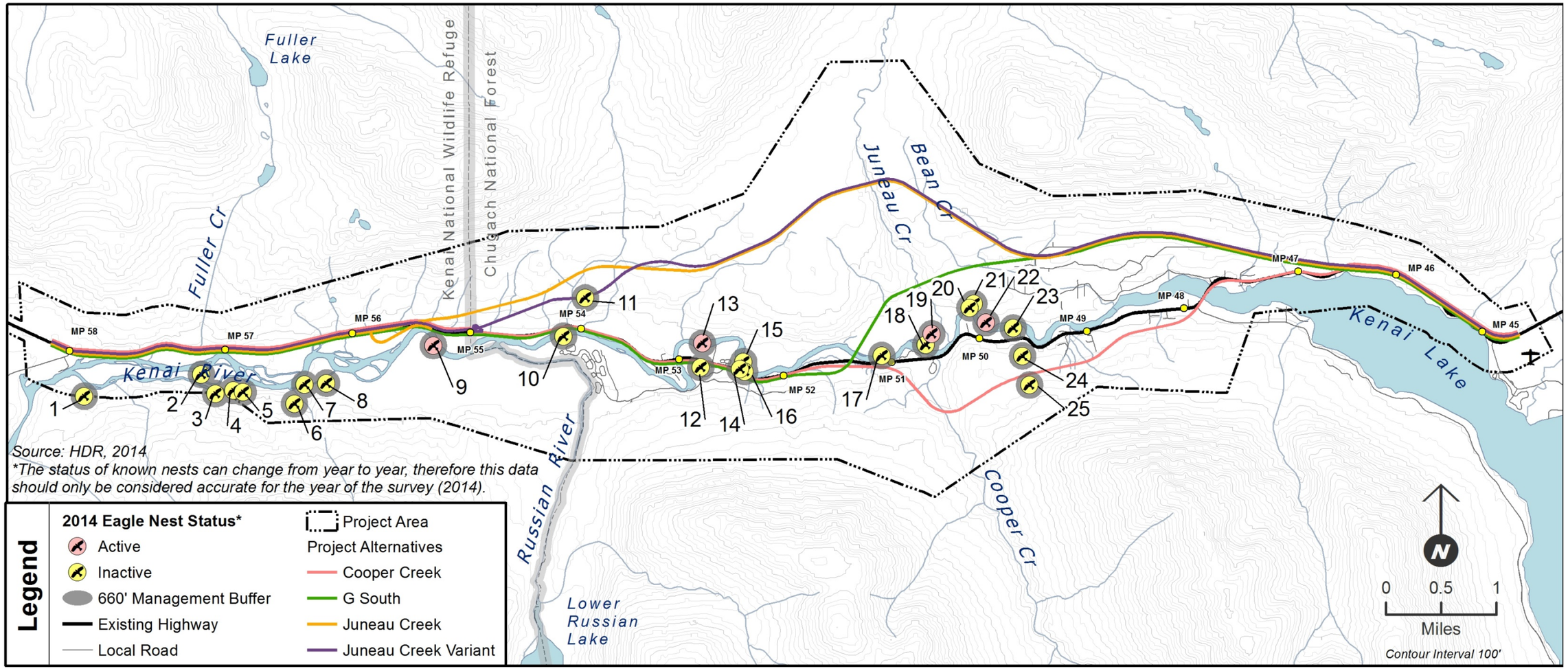

Map 3.22-4. Eagle nest locations in the project area

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3.23 Coastal Zone Management

3.23.1 Affected Environment

The Alaska Coastal Management Program (ACMP) expired by enactment of Alaska Statutes 44.66.020 and 44.66.030 on June 30, 2011. As a result, the ACMP was withdrawn from the National Coastal Management Program on July 1, 2011, and Alaska no longer has a Coastal Zone Management Act program. As of that date, the regulations at 11 Alaska Administrative Code (AAC) 110, 11 AAC 112, and 11 AAC 114, as well as local coastal management plans, were without statutory authority and therefore unenforceable. The Alaska Department of Natural Resources, Division of Coastal and Ocean Management no longer conducts project consistency reviews.

The *Kenai Peninsula Borough Coastal Management Plan* (*Coastal Management Plan*) was developed in accordance with the provisions of the ACMP Section 46.40.030, Development of District Coastal Management Plans. The plan was adopted and went into effect on June 22, 2008 (adopted by the Kenai Peninsula Borough [Borough] Assembly on August 21, 2007). It was developed to provide local information and policies that carry out the objectives of the ACMP.

Since the expiration of the ACMP, the policies described in the Borough's *Coastal Management Plan* lack State statutory authority and are limited in their scope of enforcement. However, according to Borough officials, the Kenai River Center reviews projects for compliance with the *Coastal Management Plan* through established Borough codes and existing local, State, and Federal permitting processes (Mohorcich, personal communication, 2011) for projects located within the Borough coastal zone district.[1] Borough codes such as the Habitat Protection Ordinance (Code 21.18) and Floodplain Management Ordinance (Code 21.06), as well as the Multi-Agency Permit Application, provide regulatory authority consistent with many of the enforceable policies within the *Coastal Management Plan*. See Section 3.24, Permits, for more information on permitting requirements. Enforceable policies applicable to the proposed project are briefly described below. Section 3.23.2 evaluates the enforceable policies against the proposed project alternatives.

3.23.1.1 Enforceable Policies

Coastal Development. These are enforceable policies relating to development in or adjacent to coastal waters throughout the entire coastal resource district. Borough policies set forth requirements for floating facilities and ports and harbors.

Natural Hazards. These are enforceable policies pertaining to erosion in designated natural hazard areas. Borough policy requires that developers retain existing vegetative cover in designated erosion-prone areas to the greatest extent practicable.

Recreation and Coastal Access. These are enforceable policies relating to access to, from, and along coastal waters and throughout the designated recreation use area. All lands and waters of the Borough coastal zone are included within the recreation designation to allow for management

[1] The Borough coastal zone district includes a landward limit up to the 1,000-foot elevation contour and all islands in their entirety, and a seaward limit that extends 3 miles from the coastline.

of uses and activities that may have direct and significant impact on the physical, biological, and cultural features upon which recreational and tourism uses depend.

Transportation and Utilities. These are enforceable policies relating to minimizing adverse social and environmental impacts from transportation facilities in coastal areas. These policies seek to protect drainage patterns, water quality, safety, use by non-motorized travelers, important scenic values, and important fish and wildlife habitats by incorporating these concerns into designs and permits for transportation and utility projects.

Sand and Gravel Extraction. These are enforceable policies relating to sources of sand and gravel through the entire coastal resource district. The policies state that to the extent practicable, sources of sand and gravel from coastal waters should first come from reuse of abandoned development areas and, if that is not practicable, from rivers, streams, and lakes that do not support fish.

Subsistence. These are enforceable polices relating to traditional hunting and gathering subsistence activity on public lands. These policies seek to maintain opportunities for subsistence and harvest of fish and game through continued public access and habitat protection on public lands traditionally used for subsistence.

Fish and Wildlife Habitat. This is an enforceable policy relating to habitat within the Borough. The general goal of this policy is to protect and maintain the habitat values and biological productivity of important fish and wildlife habitat areas within the Borough.

Air, Land, and Water Quality. This is an enforceable policy relating to the protection of air, land, and water quality in coordination and compliance with State and Federal government regulations. This policy is applicable to the handling and storage of hazardous materials, petroleum, and petroleum products as well as the location of contaminated sites.

Archaeological and Historic Resources. These are enforceable policies relating to protection of important historic, prehistoric, and archaeological sites and artifacts within the Borough coastal district. Protection of these resources is to be considered during planning and construction of development projects.

3.23.2 Environmental Consequences

Although there is no State coastal consistency review process in place, the Borough reviews projects using the *Coastal Management Plan* (Mohorcich, personal communication, 2011). The following sections evaluate the consistency of project alternatives with the applicable enforceable policies described in the Borough's plan. The policies and the resources they are intended to protect directly relate to resource categories analyzed within this Supplemental Environmental Impact Statement and, where applicable, the appropriate section where additional information can be found is referenced.

3.23.2.1 No Build Alternative

Direct and Indirect Impacts

The No Build Alternative is located within the coastal zone for its entire length. Improvements made to the existing highway under the No Build Alternative would be subject to the Borough's *Coastal Management Plan* consistency review by the Kenai River Center and would be

developed consistent with all applicable local, State, and Federal regulations under a project separate from this Sterling Highway Milepost 45–60 Project.

3.23.2.2 Issues Applicable to the Build Alternatives

All build alternatives would be located within the coastal zone (see Map 3.23-1) either for the entire alignment (Cooper Creek and G South alternatives) or for the majority of the alignment (Juneau Creek and Juneau Creek Variant alternatives). The consistency of the build alternatives with the Borough's *Coastal Management Plan* enforceable policies is discussed below.

Coastal Development. The Alaska Department of Transportation and Public Facilities (DOT&PF) would comply with this policy through use of best management practices (BMPs) during design and construction to avoid or minimize potential adverse impacts to coastal resources. Dredging and filling necessary for the construction of the highway has been avoided or minimized through routing around most highly productive wetlands and habitat important to resident or anadromous fish. The segment of each alternative built on a new alignment would be located substantially farther from the Kenai River than the existing highway. Section 3.20 describes impacts pertaining to wetlands, and Section 3.21 describes impacts pertaining to fish habitat. Mitigation measures are described in each respective section.

Natural Hazards. The build alternatives would comply with this policy by reducing erosion through mitigation and BMPs during design and construction. Hazards such as avalanche and rockslide chutes, as well as floodplains, have been identified and avoided to the greatest extent practicable, or the effects have been minimized by routing the alignment elsewhere during preliminary design. Avalanche control measures would be implemented to reduce risk to the public and property. Multiple-span bridges would be supported on pilings that would be of size and distribution to create no significant flood risks. Smaller floodplains would be crossed with culverts large enough to pass the 100-year flood without a rise in floodwater. Where construction within the floodplain would be necessary, facilities would be constructed to meet 100-year flood flow passage requirements. The risk of road washout would be minimized through armoring road embankments with rock along the Kenai River. Section 3.19, Floodplains, describes floodplain impacts and proposed mitigation. Section 3.12, Geology and Topography, describes natural hazards such as rockslides and avalanches in relation to the build alternatives.

Recreation and Coastal Access. All build alternatives provide for recreational access to rivers, campgrounds, and trailheads in the project area, and ultimately to coastal areas downstream. All build alternatives would cross recreational lands and trails and could alter public access, but none would eliminate any access. DOT&PF has minimized conflicts with recreational use of designated recreation areas and minimized conflicts with access to recreational lands, or has provided mitigation for recreation, or both. Section 3.8, Park and Recreation Resources, and the Section 4(f) analysis in Chapter 4 describe recreational impacts.

Transportation and Utilities. This standard seeks to protect coastal zone waterways during crossings by transportation and utility corridors. DOT&PF has committed to replacing existing undersized or poorly placed culverts, providing fish passage culverts on anadromous fish streams, and providing replacement bridges on the Kenai River with no more piers in the water than currently exist. Section 3.11, Utilities, describes impacts to utilities located in the project area.

Sand and Gravel Extraction. No sand or gravel for use in project construction would be extracted from coastal zone waterways. Material disposal areas would be located within upland areas of the coastal zone. Reclamation and restoration of sites would occur as described in Section 3.20, Wetlands and Vegetation.

Subsistence. The build alternatives would affect Federal public lands that allow for subsistence uses by qualified rural residents. Section 3.10, Subsistence, describes subsistence impacts.

Fish and Wildlife Habitat. The build alternatives would adversely affect habitat for fish, terrestrial mammals, and birds. DOT&PF has minimized adverse impacts to habitat through proposed mitigation measures. Impacts to fish habitat would be minimized through replacement of existing culverts and bridges that would provide for upgraded fish passage, compared to current conditions. Impacts to fish habitat and wildlife habitat, as well as proposed mitigation, are described in Sections 3.21 and 3.22, respectively.

Air, Land, and Water Quality. During construction, operation, and maintenance of any alternative, DOT&PF would ensure all Alaska Department of Environmental Conservation regulations would be met. To avoid downstream water degradation, BMPs would be used for fueling vehicles and for fuel storage during construction. Sections 3.13 and 3.14 describe water and air quality impacts, respectively.

Archaeological and Historic Resources. To the extent feasible, DOT&PF has minimized adverse impacts to the historic properties associated with each build alternative and plans to mitigate impacts that would occur. The project has been analyzed under the Section 106 process of the National Historic Preservation Act. Section 3.9 describes historic property and district impacts. Chapter 5, Comments and Coordination, includes detail regarding ongoing consultation with the State Historic Preservation Officer and Tribes relevant to the project.

Direct and Indirect Impacts

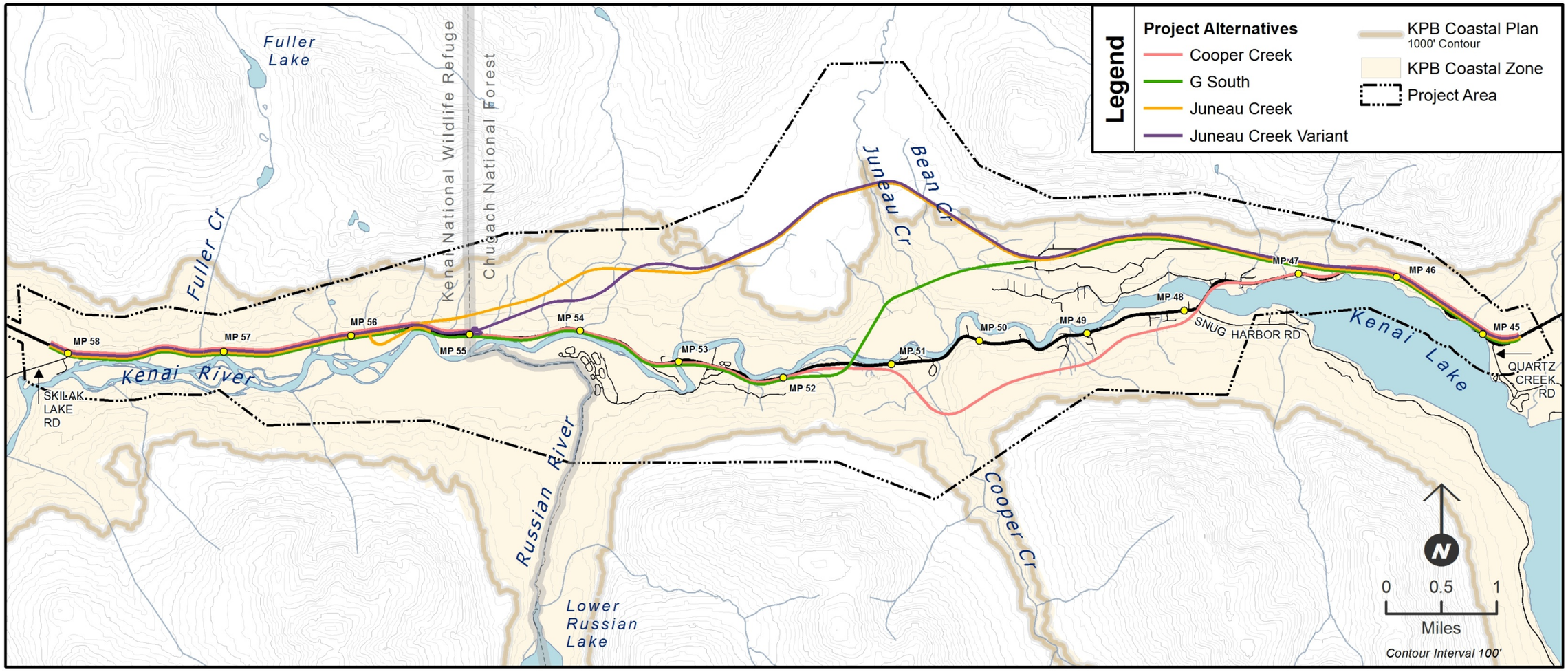
The Cooper Creek and G South Alternatives are located entirely within the coastal zone. The Juneau Creek and Juneau Creek Variant alternatives are located within the coastal zone for 85 and 84 percent of their lengths, respectively. The remainders of these alternatives lie at elevations slightly above the 1,000-foot elevation that marks the coastal zone boundary. The implementation of these alternatives would result in impacts to coastal zone resources as referenced above. Impacts to resources listed in the enforceable policies are described in detail in each respective applicable section of this document.

Construction Impacts

Construction impacts to resources listed in the enforceable policies are described in detail in each respective applicable section of this document.

Mitigation

Proposed mitigation for impacts to coastal zone resources are described in each respective section, as referenced above.



Map 3.23-1. Coastal zone in the project area

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3.24 Permits

3.24.1 Laws, Regulations, and Permits Related to the Project

Federal and State laws authorize agencies to issue permits, review plans, and actively consult about potential project impacts. Table 3.24-1 identifies the most pertinent State and Federal laws and executive orders that govern permits, consultation, and review requirements for the Sterling Highway Milepost (MP) 45–60 Project.

Table 3.24-1. Applicable laws and related permits for the project

Applicable Law, Order or Regulation	Primary Agency(ies) and citation	Description and Requirements
Clean Water Act, Section 404	**USACE and EPA** 33 USC 1344 et seq.	• The USACE requires a permit for discharge of dredged and fill material into waters of the U.S., including wetlands, at specified sites. • Requires that the project demonstrate avoidance and minimization to waters of the U.S. to the maximum extent possible.
Clean Water Act, Section 401	**EPA and ADEC** 33 USC 1344, 18 AAC 15	• Section 401 requires State review and authorization for issuance of Certificate of Reasonable Assurance regarding protection of water quality when discharging dredged or fill material into waters of the U.S. Must accompany the Rivers and Harbors Act Sections 9 and 10, and CWA Section 404 permits.
Clean Water Act, Section 402	**ADEC** 33 USC 1251	• Requires that projects disturbing 1 or more acre of land during construction will require an Alaska Pollutant Discharge Elimination System permit, which will require that BMPs be in place during construction to avoid and minimize pollutant discharges that may affect water quality.
Rivers and Harbors Act, Section 9	**USCG** 33 USC 403	• Authorizes the Secretary of Transportation, through the USCG, to issue permits for bridges or structures that cross or could otherwise affect navigation on waters of the U.S. (e.g., Kenai River).
Rivers and Harbors Act, Section 10	**USACE** 33 USC 1344	• Prevents unauthorized obstruction or alteration of navigable waters of the U.S. (Section 10) by requiring authorization for construction of a structure that would cross navigable waters or result in the modifying of navigable waters.

Applicable Law, Order or Regulation	Primary Agency(ies) and citation	Description and Requirements
Department of Transportation Act of 1966 (as amended), Section 4(f)	**FHWA** 49 USC 303	• Forbids FHWA from using public parks, recreation areas, wildlife/waterfowl refuges, and historic sites, unless there is no feasible and prudent alternative and the agency employs all possible planning to minimize harm. See Chapter 4 for more details.
National Historic Preservation Act, Section 106, Executive Order 11593	**FHWA, USFS, USFWS, and SHPO** 16 USC 470 et seq.	• Provides for the identification and protection of historic properties. • Requires Federal agencies to avoid and minimize impacts to properties in or eligible for the National Register of Historic Places.
Archeological Resources Protection Act (ARPA)	**USFS, USFWS**	• Applies to any additional cultural resources investigations on Federal lands.
Curation of Federally Owned and Administered Collections	**USFS, USFWS** 36 CFR Part 79	• Applies to any materials collected during investigations or for mitigation purposes.
Native American Graves Protection and Repatriation Act	**USFS, USFWS**	• Applies to human remains and funerary objects recovered.
Bald and Golden Eagle Protection Act	**USFWS** 16 USC 668-68d, as amended	• Provides protection of bald and golden eagles by prohibiting, except under specified conditions, the taking, possession, and commerce of such birds. • Provides for issuance of permits to take bald and golden eagles where the activity cannot practically be avoided.
Migratory Bird Treaty Act	**USFWS** 16 USC 703-12	• Prohibits taking of migratory birds unless specifically exempted or authorized. Taking can include loss of habitat. • No permit is required, but all Federal agencies must comply with the Act. Typically includes identifying and avoiding active nests if work is proposed during the breeding season and minimizing habitat loss through BMPs.
National Wildlife Refuge System Administration Act	**USFWS** 16 USC 668	• Requires USFWS to conduct a compatibility determination for any proposed facilities located on a National Wildlife Refuge. • Requires a Special Use Permit to engage in activities deemed appropriate/compatible with the purpose for which the refuge was established.

Applicable Law, Order or Regulation	Primary Agency(ies) and citation	Description and Requirements
Fish and Wildlife Coordination Act	**NMFS, USFWS, and FHWA** 16 USC 662	• Requires Federal agencies to consult with wildlife agencies on proposed project effects to fish and wildlife.
Endangered Species Act	**USFWS and NMFS** 16 USC 1531-44	• Provides for the conservation of species that could become extinct through all or a substantial portion of their range. Prohibits any action that results in "taking" a listed species or adversely affecting its habitat. Section 7 requires Federal agencies to consult (formally or informally) with USFWS and/or NMFS to determine if any effects to listed species will result from the project.
Magnuson-Stevens Fishery Conservation and Management Act / Sustainable Fisheries Act	**NMFS** 16 USC 1801 et seq.	• Establishes national standards for fisheries conservation and management, and provides for enforcement. • Requires that Federal agencies assess the effects of their actions on essential fish habitat and consult with NMFS.
Alaska Fishway Act and Protection of Waterways for Anadromous Fish	**ADF&G, Division of Habitat** AS 16.05.841 and AS 16.05.871	• Project must notify and obtain authorization and approval for all activities within or across streams used by resident fish and/or anadromous fish • Any dam or other obstruction built by an entity across a stream frequented by salmon or other fish shall be provided with an effective fishway and device for efficient passage downstream; any activity or project conducted below the ordinary high water mark of an anadromous stream requires a Title 16 Fish Habitat Permit
USFS Special Use Permit	**USFS** 36 CFR 251	• Outlines requirements and procedures for Special Use Permits on USFS lands.
Uniform Relocation and Real Property Acquisition Act	**FHWA** 42 USC 4601 et seq.	• Requires agencies that must use private property to acquire it at fair market value and assist in any necessary relocation of residences or businesses.
Federal Aviation Regulations	**FAA** CFR 77.13-77.17	• Requires submittal of FAA Form 7460-1, Notice of Proposed Construction or Alteration, for construction activity near Quartz Creek airport.
Alaska National Interest Lands Conservation Act, Title XI	**Congress and all Federal Agencies** 16 USC 3201	• Provides process to allow transportation and utility systems access into Conservation System Units, including National Wildlife Refuges and designated Wilderness areas.

Applicable Law, Order or Regulation	Primary Agency(ies) and citation	Description and Requirements
Special Park Use Permits	**DNR, Division of Parks and Outdoor Recreation** 11 AAC 18	• State regulations require permits for a variety of activities and uses occurring within a State recreation area or State park, including the Kenai River Special Management Area.
ADF&G-DOT&PF Memorandum of Agreement (2002)	**ADF&G and DOT&PF**	• Identifies requirements for constructed fish stream conveyances. • Requires that design of culvert crossings maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency.
Noxious Weeds Management	**DNR, Division of Agriculture** 11 AAC 34	• Required to prevent the importation and spread of pests, diseases, or toxic substances that are injurious to the public interest, and for protection of the agriculture industry.
Borough Floodplain Management	**Kenai Peninsula Borough** Code 21.06	• Establishes Borough Floodplain Management Program to ensure the natural and beneficial functions of floodplains and require building standards to reduce losses to life and property. • Establishes Borough Floodplain Development Permit (Kenai River Center Multi-Agency Permit) required for development in floodplains and anadromous fish streams or lakes and wetlands.
Borough Habitat Ordinance	**Kenai Peninsula Borough** Code 21.18	• Establishes measures for the protection of salmon spawning and rearing habitat in the Kenai River
Executive Order 11990 Protection of Wetlands	**FHWA**	• Prohibits Federal agencies from participating in construction located in wetlands unless they find there is no practicable alternative and the action includes all practicable measures to minimize harm to wetlands. Compliance is demonstrated as part of the Final SEIS and CWA Section 404 permit process.
Executive Order 11988 Floodplain Management	**FEMA**	• Requires Federal agencies to evaluate the potential effects of their actions on floodplains with the aim of reducing the risk of floodplain loss, and restoring and preserving the “natural and beneficial values” of floodplains. • Requires a specific finding of effects in the Final SEIS for significant encroachments.

Applicable Law, Order or Regulation	Primary Agency(ies) and citation	Description and Requirements
Executive Order 13112 Invasive Species	**FHWA**	• Directs Federal agencies to address actions that are likely to influence the presence of invasive species. Further directs agencies to develop programs and authorities to prevent the introduction of invasive species, monitor populations, and provide for restoration of native species and habitats that have been invaded.
Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds	**FHWA and USFWS**	• Directs executive departments and agencies to take certain actions that promote the conservation of migratory bird populations.
Executive Order 12898 Environmental Justice	**FHWA**	• Promotes nondiscrimination in Federal programs affecting environment or human health conditions in minority and low-income communities. • Provides access to public information and opportunity for public participation.

Note: AAC = Alaska Administrative Code; ADEC = Alaska Department of Environmental Conservation; ADF&G = Alaska Department of Fish and Game; AS = Alaska Statute; BMPs = best management practices; CFR = Code of Federal Regulations; CWA = Clean Water Act; DNR = Alaska Department of Natural Resources; EPA = U.S. Environmental Protection Agency; FAA = Federal Aviation Administration; FEMA = Federal Emergency Management Agency; FHWA = Federal Highway Administration; NMFS = National Marine Fisheries Service; SEIS = Supplemental Environmental Impact Statement; SHPO = Alaska State Historic Preservation Office; USACE = U.S. Army Corps of Engineers; USC = United States Code; USCG = U.S. Coast Guard; USFS = U.S. Forest Service; USFWS = U.S. Fish and Wildlife Service

Interagency coordination is an important component of the permitting process. To facilitate the coordination effort, the Federal Highway Administration (FHWA) and the Alaska Department of Transportation and Public Facilities (DOT&PF) have followed the guidance presented in the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* and *Applying the Section 404 Permit Process to Federal-Aid Highway Projects* (FHWA 1988) for the project. In addition, the U.S. Army Corps of Engineers (USACE), FHWA, and DOT&PF operate under a 1992 permit process accord to streamline the National Environmental Policy Act and permit review process (FHWA, USACE, and DOT&PF 1992). Based on the accord, DOT&PF will include a preliminary jurisdictional determination, draft 404(b)(1) analysis, and Section 10/404 permit application in the Final Supplemental Environmental Impact Statement (SEIS).

Additional Kenai Peninsula Borough (Borough) and State permits may be required to address conditional land use, material extraction, temporary water use, and air quality permits associated with construction activities.

3.24.2 Implications for Permitting

3.24.2.1 No Build Alternative

The No Build Alternative would not require any permits, certification, reviews, or consultation. Eventual replacement of bridges along the existing highway would require most of the same permits common to all build alternatives, described below.

3.24.2.2 All Build Alternatives

The USACE, U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), National Marine Fisheries Service, Alaska Department of Environmental Conservation (ADEC), Alaska Department of Natural Resources (DNR), Alaska Department of Fish and Game (ADF&G), and Borough would require permits or approvals to implement any of the build alternatives. Permits and approvals for temporary construction activities would also be required.

Major Federal, State, and local permits, coordination efforts, and approvals common to all build alternatives include:

- USACE, Section 404 for fill in wetlands
- USACE, Section 10 for work in, on, and over the ordinary high water mark of the Kenai River
- USFWS, Special Use Permit for construction within existing Sterling Highway rights-of-way traversing the Kenai National Wildlife Refuge (KNWR)
- USFWS, Eagle Take Permit for work in proximity to bald eagle nests, pending agency consultation
- USFS, Special Use Permit for staging areas, disposal sites for cleared vegetation and soils that cannot be used in the road construction, or borrow sites located within Chugach National Forest (CNF) lands
- FHWA, Section 4(f) Evaluation (see Chapter 4 of this SEIS)
- State Historic Preservation Office, Section 106 coordination and Finding of Effect
- Federal Aviation Administration, submission of notice of proposed construction near Quartz Creek airport
- ADEC, 401 Certification of Reasonable Assurance for water quality
- ADEC, Alaska Pollutant Discharge Elimination System Construction Permit with a corresponding Storm Water Pollution Prevention Plan
- ADEC, letter of non-objection for storm water drainage design plans
- ADEC, Air Quality Permit for construction (potential)
- ADF&G, Title 16 Fish Habitat Permits for work within anadromous and resident fish streams
- DNR, Land Use Permit and/or right of entry for any staging areas located on State land
- DNR, Parks Permit for construction within the Kenai River Special Management Area

- Borough, Kenai River Center, Multi-Agency Permit for construction, major vegetation clearing, and other development in the 50-foot Habitat Protection Area and any in-water use of anadromous fish streams or lakes, or activities that occur in wetlands and floodplains

Additional contractor-specific permits may be required for temporary construction activities. Likely permits include:

- USFS, Special Use Permit for temporary construction activities that would occur on its lands and for material extraction or disposal sites
- ADEC, Dewatering Permit
- DNR, Material Sale Permit and Material Site Reclamation Plan if materials were to be acquired from State lands
- DNR, Temporary Water Use Permit for diversion of streams and water usage during construction
- Borough, Conditional Land Use Permit for proposed material extraction or disposal sites that enter the water table and/or disturb more than 2.5 cumulative acres

In addition to the permits above, additional interagency coordination would be required since any of the build alternatives would cross CNF lands. FHWA is authorized under 23 USC § 317 to appropriate USFS lands unless USFS certifies that the action "is contrary to the public interest or inconsistent with the purposes for which such land or materials have been reserved." A 1998 Memorandum of Understanding between the USFS and FHWA "Regarding the Appropriation and Transfer of National Forest System Lands for Highway Purposes" provides details about the land appropriation process. Typically, the USFS would issue a letter of consent that would include stipulations for road design and construction. This SEIS, prepared with USFS as a cooperating agency, is meant to present the environmental consequences and identify mitigation measures that would be listed as stipulations in the letter of consent. See Chapter 5 for additional information on interagency coordination.

3.24.2.3 Cooper Creek Alternative

The Cooper Creek Alternative would require permits common to all build alternatives described above.

Additional permits required for the Cooper Creek Alternative include the following:

- U.S. Coast Guard (USCG), Bridge Permit (Section 9) for bridge replacements over the Kenai River at Cooper Landing and Schooner Bend
- DNR, Land Use Permit for Submerged Lands for the crossings of the Kenai River at Cooper Landing and Schooner Bend

3.24.2.4 G South Alternative

The G South Alternative would require permits common to all build alternatives described above.

Additional permits required for the G South Alternative include the following:

- USCG, Bridge Permit (Section 9) for bridge construction and replacement over the Kenai River at Schooner Bend and at the new proposed crossing near MP 51

3.24.2.5 Juneau Creek Alternative

The Juneau Creek Alternative would require permits common to all build alternatives described above.

Additional permits or approvals required for the Juneau Creek Alternative include the following:

- USFWS Compatibility Determination for any proposed facilities on lands within the KNWR (see Section 3.8, Park and Recreation Resources, and Section 4(f), and Chapter 4 for more detail)
- Congressional approval, as required by the Alaska National Interest Lands Conservation Act (ANILCA) Title XI, for road construction across KNWR lands (see discussion in Section 2.6.5 of the Alternatives chapter for more detail)
- USFS approval, as required by ANILCA Title XI, for crossing the Resurrection Pass Trail
- DNR, right-of-way permit for proposed access road to a proposed cleared vegetation and soils disposal area on State lands, west of Cooper Landing (see Map 2.6-7 in the Alternatives chapter)

3.24.2.6 Juneau Creek Variant Alternative

The Juneau Creek Variant Alternative would require permits common to all build alternatives described above.

Additional permits or approvals required for the Juneau Creek Variant Alternative include the following:

- USFS approval, as required by ANILCA Title XI, for crossing the Resurrection Pass Trail
- DNR, right-of-way permit for proposed access road to a proposed cleared vegetation and soils disposal area on State lands, west of Cooper Landing (see Map 2.6-7 in the Alternatives chapter)
- USFWS, Eagle Nest Take Permit to remove the inactive nest along the alignment, pending agency consultation

3.25 Short-Term Uses versus Long-Term Productivity

This section discusses, in general terms, the relationship of local, short-term uses of land and resources, and the maintenance and enhancement of long-term productivity for the local area (FHWA 1987). Transportation improvements in Alaska are generally based on State and local comprehensive planning, which considers the need for present and future traffic requirements within the context of present and future land uses. In context with this project, the impacts associated with transportation improvements are considered relative to the present and future uses and subsequent long-term productivity of the land as a natural and recreational resource.

3.25.1 Environmental Consequences

3.25.1.1 No Build Alternative

Direct and Indirect Impacts

Under the No Build Alternative, a minor amount of new right-of-way would likely be required for the planned reconstruction of the Cooper Landing, Cooper Creek, and Schooner Bend bridges and the programmed curve realignment near MP 45. This use of land for the transportation improvement is negligible in comparison to the productive land within the project area. These anticipated improvements are discussed further under Cumulative Impacts (Section 3.27). The No Build Alternative is consistent with the various land use plans developed for the project area (see Section 3.2, Land Use Plans and Policies). The No Build Alternative would have no adverse effect on the long-term productivity of the renewable resources in the area.

3.25.1.2 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

Each of the build alternatives would involve varying degrees of the short-term uses of resources through the conversion of natural areas to roadway right-of-way, but would not be appreciably different from each other. Long-term productivity of the land as a natural and recreational resource would be lost in the constructed roadway footprint and right-of-way of the proposed build alternatives as part of a transportation facility for the life of the proposed project and for the foreseeable future beyond 2043. However, forestry and agricultural production are not occurring on these lands; therefore, long-term production for this type of land use is minimal or nonexistent. Further, the short-term use of the land as a recreation resource is minor in comparison to the land available for this use.

The wetland and vegetation resources used would not recover in the short-term. However, the project area contains substantial amounts of wetland and vegetative resources, and the short-term uses would have minimal effects on long-term productivity of these resources. There would be some short-term reduction in property tax revenues as a result of right-of-way acquisitions of private property.

Short-term uses of the environment by implementation of the proposed project alternatives would be consistent with local land use plans. The long-term benefits of the improvements are recognized in State and local comprehensive planning for the region. Improving surface transportation in the region is consistent with these plans. The project would result in a more

efficient and safer transportation network and would enhance the area's long-term economic productivity.

Considering the overall abundance of naturally productive land in the project area and the project's consistency with local land use plans, the project build alternatives would be consistent with maintaining and enhancing the long-term productivity of the area.

3.26 Irreversible and Irretrievable Commitments of Resources

All of the build alternatives and, to a lesser degree, the planned improvements associated with the No Build Alternative, would require a commitment of natural, physical, human, and fiscal resources for implementation. This section discusses, in general terms, the irreversible and irretrievable commitment of resources of the build alternatives.

3.26.1 Environmental Consequences

3.26.1.1 No Build Alternative

Direct and Indirect Impacts

The land devoted to the existing highway would remain dedicated to use for transportation. A limited amount of undeveloped land would be committed to new highway development for the purpose of the curve realignment at Milepost 45 and potentially for the construction of the three new bridges. The impacts associated with the construction of these activities are addressed in Section 3.27, Cumulative Impacts.

3.26.1.2 Issues Applicable to the Build Alternatives

Direct and Indirect Impacts

The land for the construction of the highway build alternatives would be a conversion from existing land uses to a dedicated transportation facility. Undeveloped lands used for the highway would no longer be available for other uses. Each of the build alternatives require the use of undeveloped, pristine land that would be irreversibly modified. However, should a greater need arise for use of the land and should the highway system no longer be needed, the land could be converted back to other uses; however, that is not anticipated to be likely. Land use impacts are discussed in greater detail in Section 3.2, Land Use Plans and Policies. The irretrievable uses of other resources (e.g., the conversion of wetlands or use of energy) are discussed in their respective sections.

Building the alternatives would commit construction materials that could have been used for other projects to the building of the Sterling Highway alternatives. Construction of the alternatives would cause financial resources that could have been used elsewhere to be irreversibly committed to this project. Table 3.26-1 identifies the major construction materials and financial resources that it would take to construct the various project alternatives based on the preliminary engineering completed for the project. In general, the alternatives are anticipated to use similar quantities of materials. These types of construction materials are usually readily available and not likely to become scarce.

Table 3.26-1. Irreversible and irretrievable commitments of resources, major construction elements

	Build Alternative			
	Cooper Creek	**G South**	**Juneau Creek**	**Juneau Creek Variant**
Borrow/Aggregate (yds^3)	682,000	780,800	671,000	1,053,000
Riprap (yds^3)	14,000	14,000	11,000	11,000
Asphalt/Concrete (tons)	57,000	57,800	55,900	54,270
Guardrail – steel (linear feet)	22,500	30,000	34,000	34,000
Financial resources[a] (million)	$291	$304	$250	$257

[a] This cost represents the total construction cost. See Section 3.5, Economic Environment, for other costs associated with the build alternatives.

The commitment of these resources is based on the concept that residents in the project area, Borough, and State would benefit by the improved quality of the transportation system. These benefits would consist of a more efficient and safe transportation system with improved accessibility for local traffic and other traffic bound for recreation destinations in the area.

3.27 Cumulative Impacts

3.27.1 Introduction to Cumulative Impacts

Council on Environmental Quality (CEQ) regulations require an assessment of cumulative impacts. As defined in CEQ's regulations for implementing the National Environmental Policy Act (NEPA; 40 CFR § 1508.7):

> "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place during a period of time.

The following analysis uses the multi-step process outlined in the CEQ handbook, *Considering Cumulative Effects under the National Environmental Policy Act* (1997).

3.27.2 Resources Assessed for Cumulative Impacts

Determining cumulative environmental consequences requires delineating the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. One of the first steps is to identify the major cumulative effects issues for the project and which resources are important from a cumulative effects perspective. The resources evaluated in this Supplemental Environmental Impact Statement (SEIS) are based on public and agency scoping and coordination, and the importance of the direct and indirect effects evaluated in the document. Based on these factors, the resources analyzed for cumulative impacts are:

- Land Ownership
- Land Use Plans and Policies
- Social Environment (Community Character)
- Housing and Relocation
- Economics
- River Navigation
- Parks and Recreation
- Historic and Archaeological Preservation
- Waterbodies and Water Quality
- Air Quality
- Noise
- Visual
- Floodplains

- Wetlands and Vegetation
- Wildlife

The consideration of other actions occurring within the geographic scope of each resource ultimately determines the resources for which a cause-and-effect relationship and resultant cumulative effect are determined.

The following resources were analyzed in previous sections and determined to have inconsequential adverse impacts and little to no issues raised during scoping or consultation. Therefore, the following were not identified as national, regional, or local issues of importance and are not assessed for cumulative impacts:

- **Transportation**. The alternatives are consistent with State and local plans for transportation. While there would be an important beneficial impact to transportation, such as resolving traffic conflicts with public roads and private driveways, no important adverse impacts are anticipated. The actions associated with the Sterling Highway Maintenance and Bridge Program (see Section 3.27.4.3, below) would include short-term construction-related impacts. During construction, disruption to local traffic and access would occur. There are no other roads in the area suitable for a detour for construction on the existing alignment; therefore, a minimum of one lane of traffic would remain open. Timed stoplights or flaggers and pilot cars would be used to facilitate one-way traffic as needed, and construction would be staged to minimize the length of one-way traffic required.
- **Subsistence**. The alternatives would not alter the availability or competition for subsistence foods. While the No Build Alternative would not result in any new construction in the project area, ongoing operations and maintenance activities would occur. The actions associated with the Sterling Highway Maintenance and Bridge Program (see Section 3.27.4.3, below) would include short-term construction-related impacts, but are not anticipated to contribute to adverse subsistence impacts.
- **Utilities**. The alternatives would not affect the long-term use of existing utility infrastructure or affect the construction of planned utility infrastructure. The scheduled construction activities associated with the Sterling Highway Maintenance and Bridge Program (see Section 3.27.4.3, below) would not impact existing utility locations and would result in only short-term disruptions in service, if any.
- **Geography and Topography**. The alternatives would not alter the local geology or topography to an extent that they would create long-term risks or effects related to unstable lands. The actions associated with the Sterling Highway Maintenance and Bridge Program (see Section 3.27.4.3, below) includes a project identified in the 2013–2015 Statewide Transportation Improvement Plan to realign the curve at Milepost (MP) 45. This would involve blasting and excavation of materials to remove areas of rock and realign the highway, permanently altering the topography of the terrain in the vicinity of the project. Replacement of the three project area bridges also would require excavations and/or blasting, which would change the topographic contours and remove rock and soils near the bridge abutments. However, these impacts are insignificant in terms of magnitude and intensity. Areas within 10 feet of the project construction limits would be

temporarily impacted by construction equipment. Construction staging areas adjacent to the bridge locations would be used for material stockpiling and equipment operation.

- **Hazardous Waste and Spills**. The alternatives would not impact known hazardous materials sites that would expose contaminants to the air or water. In addition, the alternatives would not increase the risk of spills related to transportation of hazardous materials.
- **Energy**. Changes in long-term energy use as a result of implementation of any of the build alternatives would not be substantially different than under the No Build Alternative. The actions associated with the Sterling Highway Maintenance and Bridge Program (see Section 3.27.4.3, below) would require a short-term use of energy for construction, but energy (e.g., fuel) availability for construction is adequate.
- **Fish and Essential Fish Habitat**. While all build alternatives have the potential to adversely impact fish and essential fish habitat (EFH), mitigation measures during the construction process and design to minimize permanent in-water changes would result in minimal impact. Regarding alternatives or projects that may result in culvert replacement, minimal permanent impact to fish or EFH would be expected compared to current conditions.
- **Coastal Zone Management**. The Alaska Coastal Management Program (ACMP) expired on June 30, 2011 (see Section 3.23.1). The enforceable policies of the Borough's Coastal Management Plan include resource protection and management prescriptions. Those that relate to resources considered in this cumulative impacts analysis are described by resource in the appropriate sections below.

3.27.3 Geographic Scope and Timeframe of Cumulative Impacts Analysis

3.27.3.1 Geographic Scope of Analysis

The geographic area of analysis used to assess cumulative impacts for most resources is the project area described in detail in Section 1.1.1 of the Purpose and Need chapter (see Map 1.1-1, Map 3.27-1, and most maps in this SEIS). The project area includes the western end of Kenai Lake and follows the Kenai River Valley downstream for approximately 11 miles, nearly to the western edge of the Kenai Mountains. North and south, the project area extends up Juneau Creek approximately 2.5 miles from its mouth, to a point beyond Juneau Creek Canyon, and it extends up Cooper Creek about 1 mile from its mouth. In elevation, the project area extends from the Kenai River, at elevations between approximately 250 feet (downstream) and 440 feet (at Kenai Lake), to mountain slopes on either side of the valley at elevations of about 1,000–1,500 feet.

In some cases, the geographic areas of analysis are expanded to include a broader area to effectively assess the cumulative effects on a particular resource (e.g. a watershed, ecosystem, or the Kenai Peninsula). The geographic areas of analysis are used to assess the effects of other past, present, and reasonably foreseeable future actions to determine if those actions, combined with project impacts, have a cumulative effect to that resource. Table 3.27-1 identifies the geographic areas of analysis for each resource.

Table 3.27-1. Geographic areas of analysis for cumulative effects analysis

Resource	Geographic Area of Analysis
Land Ownership	Project Area
Land Use Plans and Policy	Project Area
Social Environment	Project Area
Housing and Relocation	Project Area
Economic Environment	Cooper Landing (Project Area and immediate vicinity)
River Navigation	Project Area
Parks and Recreation	Project Area and immediate vicinity
Historic and Archaeological	Project Area
Water Bodies and Water Quality	Upper Kenai River, Middle Kenai River, and Devil's Creek-Quartz Creek Watersheds (HUC10)
Air Quality (Climate Change)	Kenai Peninsula Borough; global
Noise	Project Area
Visual Environment	Project Area
Floodplains	Project Area
Wetlands and Vegetation	Upper Kenai River, middle Kenai River, and Devil's Creek-Quartz Creek watersheds (HUC10)
Wildlife	Game Management Units 7, 15A, and 15B

3.27.3.2 Timeframe Scope of Analysis

For the Sterling Highway MP 45–60 Project, the environmental reference point, or temporal boundary for past development, is 1938, the year that the road connecting Cooper Landing and Seward was completed. In accordance with Environmental Protection Agency (EPA) guidance (EPA 1999), this environmental reference point represents a time when the project area was in an ecologically sustainable condition. The introduction of a connection to a tidewater port in Seward brought more efficient movement of materials and greater numbers of people to the previously isolated community of Cooper Landing. At that time, the project area resources were predominantly in a naturally occurring state.

The temporal boundary for future development is based on the project design year, which is 2043. Reasonably foreseeable future actions (RFFAs) and cumulative effects are considered through that time, approximately 20 years from the anticipated opening of the new highway.

3.27.4 Past, Present, and Reasonably Foreseeable Future Actions

3.27.4.1 Past Actions

Major past actions have had a lasting influence on the present-day environment of the Cooper Landing community and the project area as a whole. The major past actions have shaped the baseline condition (or the affected environment) for a variety of resource categories, and, in most cases, continue to influence the baseline condition. These past actions include the following:

- Road connecting Cooper Landing and Seward, built 1938
- National Moose Range (now the Kenai National Wildlife Refuge [KNWR]), established 1941
- Road connecting Cooper Landing and Kenai, opened about 1950
- Dirt road connecting Kenai Peninsula to Anchorage, opened 1951 and paved 1956
- Alaska Statehood enacted in 1959, which enabled the State of Alaska to select Federal lands in the Cooper Landing area from within the Chugach National Forest (CNF) for community settlement
- Cooper Lake Hydroelectric Facility, constructed 1959–1960
- Kenai Peninsula Borough (Borough), incorporated 1964
- Kenai River Special Management Area, established 1984
- Portions of the Sterling and Seward highways upgraded, including MP 37–45 (not including the MP 45 to 60 corridor), 2000
- Russian Gap (2001) and Birch and Grouse Ridge (2005) subdivisions developed
- Cooper Lake hydroelectric facility, relicensed 2007

The CNF was established prior to 1938 and, along with KNWR, set a general tone for Federal management of lands in the project area primarily for conservation and recreation. The CNF, in particular, developed campgrounds and recreation areas and upgraded pioneer trails as recreational trails. The State of Alaska and KNWR added boat launch ramps, parking, and the Russian River Ferry. Private entities built lodges, guiding businesses, and a large hotel, the Kenai Princess Lodge, in Cooper Landing.

3.27.4.2 Present Actions

The existing land use conditions described earlier in this document represent the present actions that could contribute to a cumulative impact on resources in the project area, as well as the following two projects (see Map 3.27-2 for general locations).

CNF Bean North Vegetation Management

The U.S. Forest Service (USFS) approved actions in 2012 for a 705-acre area along Juneau and Bean creeks for fire prevention and protection, hazardous fuels reduction, improvement of forest health, and wildlife habitat enhancement (USFS 2012b). Known as the Bean North Vegetation Project, the management actions were considered under the Healthy Forest Restoration Act. The Resurrection Pass Trail and the Bean Creek Trail pass through the Bean North Vegetation Project area. It is expected to be complete at the end of summer 2014.

Sterling Highway MP 57 Erosion Protection

The Alaska Department of Transportation and Public Facilities (DOT&PF) proposes to realign about 2,500 feet of the Sterling Highway (near MP 57) away from the Kenai River. The river channel has moved closer to the highway, and an eroding river bank is within 16 feet of the edge of pavement. Construction of the realignment project was started in 2014 and is expected to be completed prior to the start of the Sterling Highway MP 45–60 Project.

3.27.4.3 Reasonably Foreseeable Future Actions

For the purposes of this analysis, RFFAs are other actions by Federal, State, or local agencies, or actions undertaken by private individuals or organizations, that are likely to occur by 2043, regardless of whether the Sterling Highway MP 45-60 Project is built. To identify RFFAs for this cumulative impact analysis, the project team queried local, State, and Federal agencies; landowners; user groups; and the public on future actions they anticipated in the project area. The project team reviewed local and State plans that describe needs and intended patterns of growth and change. This section presents a discussion of the RFFAs that might have an effect on the resources, ecosystems, and human environment within the project area.

RFFAs occurring by 2043 include the following (see Map 3.27-2 for general locations).

Sterling Highway Maintenance and Bridge Replacement

Normal maintenance and bridge replacement would occur along the Sterling Highway. Within the project area, the following maintenance and program work is anticipated to occur:

- Replace pavement (twice before 2043)
- Replace three project area bridges because of age
- Improve the road curve at MP 45

Types of pavement preservation treatments range from crack sealing to thin, hot mix asphalt overlays. The Sterling Highway in the MP 45–60 area received a thin, hot mix asphalt overlay during the summers of 2013 and 2014; such an overlay has an expected life of 5 to 12 years. Based on the current pavement management process at DOT&PF, it is anticipated that two additional pavement replacements or overlays would be required by 2043.

Bridges on the Sterling Highway in the project area are approaching the end of their design life and are likely to be replaced under DOT&PF's Bridge Program prior to 2043. The Cooper Creek Bridge was built in 1955, the Schooner Bend Bridge over the Kenai River was built in 1964, and the Cooper Landing Bridge over the Kenai River was built in 1965 (DOT&PF 2009a). By 2043, all three of these bridges would be well past the typical 50- to 75-year bridge design life. Although there currently is no schedule for replacement, for purposes of this SEIS, it is anticipated that all would be replaced before 2043.

As discussed in Section 2.6.1 (Transportation, No Build Alternative), each of these actions is anticipated to occur regardless of a preferred alternative selection and implementation; however, the timing of these actions may vary depending on the selection of a build alternative because of the changes in traffic volumes for the roadway and bridges (cumulative loads).

Specific to the bridge replacements, the following provides the timing differences for each of the alternatives:

- Under the No Build Alternative, all three existing bridges are anticipated to be replaced before 2043.
- Under the Cooper Creek Alternative, the Cooper Landing Bridge and Schooner Bend Bridge would be replaced as part of the project (by 2023), and it is anticipated that the existing Cooper Creek Bridge would be replaced by 2043.

- Under the G South Alternative, the Schooner Bend Bridge would be replaced as part of the project (by 2023). It is anticipated that the other two bridges—Cooper Landing Bridge and Cooper Creek Bridge—would be replaced by 2043.
- Under the Juneau Creek and Juneau Creek Variant alternatives, none of the existing bridges would be replaced as part of the project. Similar to the No Build Alternative, it is anticipated that all would be replaced by 2043 because of the ages of the bridges.

The 2013–2015 Statewide Transportation Improvement Plan includes a project to realign the Sterling Highway at one curve in the project area, at MP 45–46, to improve sight distance and safety. Should a build alternative be selected, this realignment would be incorporated into the Sterling Highway MP 45–60 Project design. If the final decision resulting from this SEIS was to select the No Build Alternative, this curve realignment would proceed as its own project.

Russian River Campground Entrance Improvements

The USFS has entered into an agreement with FHWA for the redesign of the entrance and access road to the Russian River Campground. This redesign will consider several alternatives for traffic entering and exiting the campground from the Sterling Highway and will be completed in 2015. Preliminary plans of the alternatives are not yet developed (Berg, personal communicaton 2014). FHWA anticipates that the Russian River Campground Entrance Improvements will be examined in a separate NEPA process and its cumulative effects will be assessed in that process. Assuming that the redesigned entrance would occur generally within the same footprint as the existing entrance, its contribution to a cumulative effect with the Sterling Highway MP 45–60 Project would be minor.

Sterling Highway Rehabilitation and Passing Lanes, MP 58–79

The 2013–2015 Statewide Transportation Improvement Program includes a project to reconstruct the Sterling Highway between MP 58 and 79, which would involve resurfacing, minor widening in some areas, and widening for the addition of passing lanes in some areas. This project proposes passing lanes close to where it adjoins the western end of the Sterling Highway MP 45–60 project, and about 2 miles from passing lanes proposed as part of the MP 45–60 project. DOT&PF expects the project will include measures to reduce risk of vehicle-wildlife collisions. The MP 58–79 project is anticipated to be complete prior to construction of the MP 45–60 project.

Senior Citizen Housing Development

The Cooper Landing Senior Citizens Corporation, Inc., formed in 1999, is developing a senior citizen housing complex approximately 1.8 miles east on Snug Harbor Road from its intersection with the Sterling Highway. While the first two phases of development (comprising 12 residential units) are complete, the project would eventually encompass as many as 30 or more individual living units, a 30,000-square-foot senior center, 2,400-square-foot maintenance shop, and a long-term care facility.

Chugach Electric Association Cooper Lake Hydroelectric Facility

On August 24, 2007, the Federal Energy Regulatory Commission (FERC) issued a license amendment that reauthorizes the existing 19.4-megawatt Cooper Lake hydroelectric facility, located at the end of Snug Harbor Road on Cooper Lake near the community of Cooper Landing. The amendment provides for development of an access road and diversion of Stetson Creek into

Cooper Lake to provide for additional flow into Cooper Creek, meant to reinvigorate salmon runs in Cooper Creek. Under an agreement between the Chugach Electric Association and the USFS, this project also would include a winter recreation enhancement consisting of a new 50-space parking lot for snowmobilers at the end of the Snug Harbor Road and a $6,000 annual contribution to the Kenaitze Indian Tribe cultural and educational program for the term of the license.

Cook Inlet Region, Incorporated Land Development

Cook Inlet Region, Incorporated (CIRI), a regional Alaska Native corporation established under the Alaska Native Claims Settlement Act (ANCSA), has received a 42-acre parcel of former CNF lands on a bluff above Sportsman's Landing on the north side of the Kenai River, overlooking the confluence of the Kenai and Russian rivers (see Map 3.27-2). The Russian River Land Act (RRLA) recognized the "abundant archaeological resources of significance to the Native people of the Cook Inlet Region, the Kenaitze Indian Tribe, and the citizens of the United States" of the lands near the confluence of the Russian and Kenai rivers and provided authorization and funding to develop the parcel. CIRI intends to develop the site, referred to as Tract A, jointly with the USFS and U.S. Fish and Wildlife Service (USFWS) to create a visitor's interpretive center and base of archaeological research for the Sqilantnu Archaeological District. CIRI has indicated in meetings for this SEIS that it has developed an access plan and is developing a site plan. Other development described in the RRLA includes a restaurant and lodging that would accommodate overnight guests, offices for the research center, dormitory-style housing for staff, trails, and other ancillary facilities (USFWS, CIRI, USFS 2001).

Cooper Landing Residential Land Development

In 2004, the Borough Assembly approved residential zoning of the Birch and Grouse Ridge Subdivision (Ordinance 2004-27). Approximately 23 lots comprise the subdivision, ranging in size from 2 to 5 acres. Owners have built on several of these lots, and others are likely to be built upon over time. The Borough has not released all lots for sale and has not improved Slaughter Ridge Road far enough to access all the platted lots. Such further development is foreseeable by 2043.

State Land Management Unit 395 Rural Residential Development

Based on the *Kenai Area Plan for State Lands* (DNR 2001) and land transfer decisions made in 2014 by DNR, Unit 395 will be transferred to the Borough for rural residential development. Although the 2001 *Kenai Area Plan* states that this decision will be based in part on the final alignment of the Sterling Highway (the decision to be determined by this SEIS), DNR has moved forward with the land transfer process (DNR 2014).

Because DOT&PF plans to retain access rights for the segment of each alternative that would be built on a new alignment, no driveways or side roads would be connected to the new highway (in accordance with the *Cooper Landing Land Use Plan*). Provision of access for Unit 395 residential development would occur from the existing highway under any of the alternatives, as it could today. Because there would be no change in accessibility to Unit 395 resulting from the selection of a preferred alternative, this project would not affect the likelihood or timing of development. As indicated in Section 3.2, however, depending on the alternative selected, this project would affect the number of lots that could be developed. This is because the combination of the highway right-of-way (generally 300 feet wide) and a planned road buffer (100 feet each

side) would result in removal of up to 120 acres from Unit 395 under either of the Juneau Creek alternatives. Some of this land would be considered developable for residences if the highway was not built across Unit 395.

For purposes of this cumulative analysis, it is assumed that Unit 395 likely would begin to be developed prior to 2043.

A geographic information systems (GIS) analysis of Unit 395 was conducted to estimate the amount of developable land contained within the unit. The results were used to predict the maximum number of houses the unit could contain if fully developed. It is assumed that Unit 395 would be developed as a rural residential area, as indicated in adopted plans. Borough Code of Ordinances, Title 21.44.170, requires a minimum lot size of 100,000 square feet (approximately 2.3 acres) for rural residential districts. However, the Borough's action to create the existing Birch and Grouse Ridge Subdivision on the north side of Cooper Landing was on terrain similar to Unit 395 and included substantial steep ground, and average lot sizes there are in excess of 5 acres. The GIS analysis determined that the percentage of the area that was developable, marginally developable, or not developable based on slope angle was similar to the existing subdivision. For this reason, the GIS analysis was based on the lot density in Birch and Grouse Ridge, a method that accounts for terrain limitations, the land needed for access roads, and for some lands retained by the borough for open space. Table 3.27-2 presents the results of the analysis.

Table 3.27-2. Likely maximum development in Unit 395, by alternative

	Alternatives		
	No Build, Cooper Creek, G South	**Juneau Creek**	**Juneau Creek Variant**
Developable acres (slopes <10%)	69	61	62
Marginally developable acres (slopes 10%–20%)	165	146	148
Not developable acres (slopes >20%)	853	756	750
Not developable acres (land for highway right-of-way and State mandated buffer)	NA	124	127
Total	1,087	1,087	1,087
Approximate maximum number of developed lots	**143**	**126**	**128**

Based on these assumptions, a maximum of 126–143 homes could be added in Unit 395. Because these numbers are equal to more than a third of all existing developed residential parcels in the Cooper Landing area, and because the Birch and Grouse Ridge Subdivision itself is not yet fully developed after more than a decade, it seems unlikely that full development of Unit 395 would occur by 2043.

It is assumed that the Borough would request access to Unit 395 from the USFS using West Juneau Road (see Map 3.27–2), a gravel logging road that is currently closed to public access by motorized vehicles except for snowmobile users. It is anticipated that the Borough would upgrade the road to subdivision standards. Widening the road and lowering grades to meet Borough standards could require modifications to the road alignment and result in impacts to

USFS lands. These USFS impacts are reasonably foreseeable future impacts but would be the result of Borough and USFS actions, not the result of the Sterling Highway MP 45–60 Project.

Cooper Landing Walkable Community Project Improvements

The community of Cooper Landing completed the *Cooper Landing, Alaska, Walkable Community Project* plan in 2010 (LDN 2010a), subtitled "Alternative transportation planning to address congestion and road impacts near the Russian and Kenai Rivers." In April 2010, the *Walkable Community Project* plan was incorporated into the *Kenai Peninsula Borough Comprehensive Plan* by the Borough Assembly (Ordinance 2010-13). Projects that appear most relevant to the Sterling Highway MP 45–60 Project include:

- Clearly delineating entry and exit to businesses
- Creating a "gateway" feel to the area
- Improving portions of the existing highway to add shoulders and straighten curves
- Providing pedestrian undercrossing of the highway bridge at the outlet of Kenai Lake and improving safety of the pedestrian walkway across the length of the bridge
- Adding acceleration-deceleration/turning lanes throughout the community
- Adding a separated pedestrian and bicycle route throughout much of the project area (MP 45–53, Quartz Creek to Schooner Bend)

DOT&PF is undertaking a pathway and bridge walkway project in Cooper Landing in 2014.

3.27.5 Characterization of the Resources to be Evaluated

This section characterizes the resources being evaluated for cumulative effects with the geographic and timescale scope of analysis. The resource characterization is based on historical data and existing conditions to establish the baseline used for the cumulative effects analysis.

3.27.5.1 Land Ownership and Land Use

The geographic area of analysis for land ownership and land use cumulative impact analyses encompasses the project area (Map 3.27-1).

Residential development is limited almost exclusively to the unincorporated community of Cooper Landing. Commercial establishments cater primarily to tourism and recreational fishing. Minor logging and mining also occur on private property and USFS-owned land. The majority of the project area is undeveloped open space and is managed for preservation, recreation, watershed, wildlife, fishery, or habitat purposes. Section 3.1 describes the present land use trends and status in full detail. Since 1992, local land use planning updates have shown an increase in recreational and preservation land use classifications, and a desire to provide for lands for public and private ownership, but without sudden community change (CLAPC (1996); adopted by the Borough in 2010).

Land designation (Federal, State, and Borough) and gradual development have affected the current land use in the project area. Overall, the project area is owned primarily by Federal, State, and Borough governments, and only about 5 percent of land (614 acres) is owned privately.

3.27.5.2 Land Use and Land Management Plans and Policy

The geographic study area of analysis for the land use plans and policy cumulative impact analysis encompasses the project area (see Map 3.27-1).

The majority of the project area is undeveloped open space, and is managed for preservation, recreation, watershed, wildlife, fishery, or habitat purposes. Section 3.1 describes the present land use trends and status in full detail. Since 1992, local land use planning updates have shown a drastic increase in recreational and preservation land use classifications, and a desire to provide for lands for public and private ownership, but without sudden community change (CLAPC (1996); adopted by the Borough in 2010). Within the project area, due to the various types of land ownership, multiple land use plans and policies exist (see Section 3.2 for detail). These plans have been developed over time and are continually being implemented and updated.

3.27.5.3 Social Environment

The geographic area of analysis for the social environment cumulative impact analysis covers the project area (see Map 3.27-1).

Population and Social Groups. In 1950, Cooper Landing had a year-round population of 60 (KPB 2000). Cooper Landing's population peaked in 2001 at 391, and by 2010 declined to 289. Summer populations are larger. While seasonal population counts are not available from U.S. Census data, seasonal housing accounts for more than half (52.4 percent) of the available housing in Cooper Landing (USCB 2010c).

According to 2010 U.S. Census data, 4.5 percent of the residents of Cooper Landing are considered part of a minority group. The median household income for Cooper Landing increased between 1999 and 2009 from $34,844 to $72,837 (USCB 2010b). In both years, results were above the poverty threshold for the State of Alaska. The median age of population in Cooper Landing rose between 2000 and 2010, from 45.7 to 55.6 years old (higher than the State average), indicating either the population is aging or new residents are older. Section 3.3.1.1 in the Social Environment section describes the present population and social groups' trends and status in more detail.

Community Character. Section 3.3.1.2 describes the present community character trends and status in full detail. The 86-room Kenai Princess Lodge is a good example of recent trends of increasing recreational and tourism development. Constructed in 1990, the lodge was expanded in 1991, 1994, 1996, and 1999 (Princess 2010).

Results from meetings and interviews conducted by the project team in 2005 indicated that in recent subdivision development, many buyers were high-income professionals from Anchorage building retirement or vacation homes, indicating a trend in community composition toward older residents and seasonal occupancy. In 2000, 76 children under 19 were residents in Cooper Landing; by 2010, the number of children dropped to 25.

The Sterling Highway is a defining feature of Cooper Landing. The highway bisects the community, with residential housing, commercial development, and community and public services located on the north and south of the highway. The *Cooper Landing, Alaska, Walkable Community Project* notes that "as most travel is by vehicle, the ability for casual contact among residents is limited" (LDN 2010a).

Community and Public Facilities. There is a local public library, school, and volunteer fire and ambulance facility. These facilities have remained relatively static, except for an enrollment decrease at the local school. There are no identified plans for additional facilities or facility closures. Most residents in Cooper Landing rely on community facilities in neighboring communities, such as Soldotna. Section 3.3.1.3 describes the present trends and status of community and public facilities in full detail.

3.27.5.4 Housing and Relocation

The geographic area of analysis of cumulative impacts for housing and relocations is the project area (see Map 3.27-1).

Historical Census data indicates a total of 6 homes existed within Cooper Landing prior to 1939 (USCB 2003a). Additional homesteads and home sites were made available by the USFS in the 1930s and 1940s, but with only "summer residence" permits granted. With the completion of the Sterling Highway and its improvements in the 1940s and 1950s, roadhouses were built to accommodate travelers, as well as gas stations, lodges, and ferry operations. By 1950, the Sterling Highway was a "modern highway," providing increased access to travelers along the Kenai Peninsula (CRC 2010). Homestead sites and businesses continued to increase with demand throughout the latter half of the twentieth century. By 1980, there were 108 recorded homes in Cooper Landing (USCB 2003b). While housing information before 1970 is not available for places with a population of fewer than 1,000, population information for Cooper Landing suggests variability in residents over time—88 in 1960, 31 in 1970, and 116 in 1980 (USCB 1982). Since 1980, housing units have steadily increased. Total housing units in 1990, 2000, and 2010 were 299, 372, and 395, respectively.

3.27.5.5 Economic Environment

The geographic area of analysis for cumulative economic effects encompasses the Cooper Landing community, which is approximately the project area (see Map 3.27-1).

The economy in Cooper Landing originally was based on mining and logging. Those interests have decreased dramatically, and the economy today is heavily based on tourism, recreational fisheries, and recreation. Tourism has been growing in importance across the Borough over the last decade. Cooper Landing is also a second-home and retirement community. Businesses tend to be either river-based (serving anglers, boaters, and overnight guests) or highway-based (including gas stations, restaurants, lodges, and gift shops). Personal income in Cooper Landing is on the rise, growing 4.4 percent annually (USBEA 2011). The *Kenai Area Plan* (DNR 2001) set the stage for future development of additional lands on Unit 395, and Borough platting of the Birch and Grouse Ridge Subdivision began the process of adding private lands in the Bean Creek area. See Section 3.5 for more details on present economic trends.

3.27.5.6 River Navigation

The geographic area of analysis for cumulative impacts for river navigation encompasses the Kenai River within the project area (see Map 3.27-1).

Float trips are common on the upper Kenai River due to its popularity as a fresh-water fishery and because the area is scenic. In 1955, the Russian River Ferry was established near MP 55 for access to the mouth of the Russian River. In response to increasing use of the river and its subsequent threat to the river system's health, the Alaska legislature established the Kenai River

Special Management Area (KRSMA) in 1984 as a unit of the State park system. The KRSMA consists of more than 105 linear miles of rivers and lakes, including Kenai Lake, Skilak Lake, and the Kenai River from Cooper Landing downstream to Kenai. Much of the upper Kenai River in the project area has been designated "non-motorized," which reduces wake impacts on stream bank habitat; reduces motorized/non-motorized user conflicts; and creates a high-quality recreational experience for rafting, canoeing, kayaking, fishing from boats and from the bank, and other non-motorized uses. Commercial navigational use (e.g., guiding services) of the upper river is limited by permit. On Kenai Lake, powered watercraft are allowed. See Section 3.7 for more details regarding river navigation.

3.27.5.7 Park and Recreation Resources

The geographic area of analysis for the parks and recreation resources cumulative impacts analysis is the project area (see Map 3.27-1).

The project area grew increasingly popular for recreation from the early 1900s onward, reflecting "discovery" of the area's fish and wildlife resources for anglers and hunters, increases in access (opening of the Sterling Highway), increased population in Anchorage, the development of Kenai and Soldotna (largely spurred by oil and gas development), and increases in tourism in Alaska. The Kenai and Russian rivers are the two most popular fisheries for sockeye salmon in the state. Many trails cross the project area and are accessible from the Sterling Highway. Several campgrounds also are found in the area. These all are heavily used facilities. Table 3.8-5 in the Park and Recreation Resources section shows numbers of annual visitors at area facilities from 2008 to 2012, which generally show an upward trend each year. See Section 3.8 and Chapter 4 for more details on present park and recreation resources trends.

3.27.5.8 Historic and Archaeological Preservation

The geographic area of analysis of the cumulative impacts analysis for historic properties is the project area (see Map 3.27-1).

Many parts of the project area, particularly the river bottom areas, have a rich history, with continued use from prehistoric times up to today. Substantial prehistoric use of the area is evident in the now-buried sites of villages, ceremonial houses and other homes, food storage areas, and burial sites of Alaska Natives. Historic use is evident in the sites of mining claims, mining buildings, prospecting pits, trails, and other indications of mining. In 1981, the Sqilantnu Archaeological District was determined eligible for the NRHP. Fieldwork for the early Sterling Highway Draft EIS located "significant prehistoric sites within the construction limits of the preferred alternative and throughout the area" (DOT&PF 1994). In the 1990s, the Beginnings and K'Beq Heritage sites began to be used for cultural interpretation and minor improvements were made (e.g., small parking lots, interpretive signs, pathways, etc.). In 2011, the Beginnings site was closed to reduce foot traffic and erosion. In general, the trend in the project area and Kenai Peninsula is toward additional formal identification, preservation, and protection of historic properties by the Kenaitze Indian Tribe, CIRI, and Federal and State agencies, including the U.S. Congress in the RRLA. See Section 3.9 for more details on the current status of historic properties.

3.27.5.9 Water Bodies and Water Quality

The geographic area of analysis for cumulative impacts for water quality encompasses the Quartz Creek, upper Kenai River, and middle Kenai River watersheds within the upper Kenai Peninsula watershed (see Map 3.27-1).

These three watersheds all contribute to the upper Kenai River. They include numerous rivers, streams, and lakes. The National Hydrologic Dataset (NHD) from the United States Geological Survey, identifies 40 creeks and streams within these three watersheds, totaling approximately 620 miles of channel length. This includes Crescent Creek, Daves Creek, Devils Creek, Quartz Creek, Primrose Creek, Ptarmigan Creek, Cooper Creek, Hidden Creek, Russian River, and the Kenai River. There are also numerous lakes identified in these watersheds on the NHD. More than 30 lakes exist with approximately 51,725 acres of surface area. Due to limited development, little has changed the character of these resources over time. The Kenai River has seen increased pressure from fishing and other recreational use. For those reasons, the KRSMA was formed in 1984 (see Section 3.27.5.6).

Water quality data indicate that all water bodies in the geographic area of analysis meet current water quality standards and are not considered impaired (ADEC 2013b). The Alaska Department of Environmental Conservation (ADEC) indicates that available data are insufficient to determine water quality attainment for Quartz Creek, Juneau Creek, and Cooper Creek (ADEC 2013b). Roadway runoff is the only known source of potential nonpoint pollution in the watershed. Pollution from roadway runoff has not exceeded regulatory limits within the project area (Stevens, personal communication 2006).

Specific information for groundwater quality in the geographic area of analysis is limited. However, from a Borough perspective, water from the water table aquifers is generally low in dissolved solids but high in iron. High levels of mineralization (primarily iron and hydrogen sulfide) cause staining and bad tastes from well water in some areas. Artesian aquifers that range in depth from 60 to 300 feet below the land surface typically exhibit the highest quality groundwater (KPB 2005b).

In accordance with the Safe Drinking Water Act as amended in 1986 and 1996, ADEC developed a Drinking Water Protection Program that includes wellhead protection area plans (ADEC n.d.). In 2002, source water assessments were conducted in Cooper Landing that identified wellhead protection areas within the project area. See Section 3.13.1.4 and Map 3.13-2 for additional detail.

Over the past few decades, several regulatory programs have been instituted that regulate storm water and impacts to water bodies. State of Alaska projects must obtain several water quality and water body permits—see Section 3.24 for additional information.

3.27.5.10 Air Quality

The geographic area of analysis for cumulative impacts for air quality is the Borough (see Map 3.3–1 and Map 3.27-1), with consideration for global impacts related to greenhouse gas emissions and climate change.

Since 1938, human development in the Borough has gradually increased in the form of roads, power transmission lines, homes, and businesses. The addition and improvement of roads for

vehicle and truck traffic has led to an increase in vehicle use. However, there are no recorded instances of air quality standards being exceeded within the Borough.

3.27.5.11 Noise

The geographic area of analysis for cumulative impacts for noise encompasses the project area (see Map 3.27-1).

Since 1938, human development has gradually increased in the form of traffic and roads, power transmission lines, homes, and businesses, most of which have increased noise levels in developed areas. The increased population and tourism coupled with the addition and improvement of roads has led to an increase in vehicle use. As a result, traffic-related noise has increased over time. The level of noise varies by time of day and season and is reflective of active human use in the project area. In addition, sensitive noise receptors such as campgrounds and homes have increased over time. Much of the project area remains largely undeveloped and is considered quiet.

3.27.5.12 Visual Environment

The geographic area of analysis for cumulative impacts analysis for visual resources is the project area.

Since 1938, human development has gradually increased in the form of traffic and roads, power transmission lines, homes, and businesses, all of which have altered the visual environment. The Sterling Highway today is a State Scenic Byway. The project area is a major recreation destination, with world-class fishing, campgrounds, trailheads, and river floating. The project area also includes ample opportunities for viewing and photographing scenery from the highway, the Kenai River, and trails. Views within the project area are of moderate to high quality, encompassing mountains, forests, rivers, and streams as well as engineered facilities.

3.27.5.13 Floodplains

The geographic area of analysis for cumulative floodplains effects encompasses the Quartz Creek, upper Kenai River, and middle Kenai River watersheds within the upper Kenai Peninsula watershed (see Map 3.27-1).

Waterways have always flooded due to upstream glacial outbursts, downstream ice jams, snow and glacier melting, and periods of high precipitation, but formal floodplain delineation is relatively recent and covers only a small portion of the project area. The 100-year floodplain was originally mapped by the Federal Emergency Management Agency (FEMA) and was adopted by the Borough in 1981 and is, to this day, the Borough's officially adopted floodplain map. Within the project area, mapped floodplains exist for only the area between approximately MP 47 to 55 for a portion of the Kenai River, Russian River, and Cooper Creek (Map 3.19–1). The Borough Floodplain Development Ordinance (KPB 1988) requires that floodplain encroachments not result in any increase in flood levels during the occurrence of the base flood discharge. This no-net-rise policy applies to areas both upstream and downstream of any floodplain encroachment.

3.27.5.14 Wetlands and Vegetation

The geographic area of analysis for cumulative impacts for wetlands and vegetation encompasses the Quartz Creek, upper Kenai River, and middle Kenai River watersheds within the upper Kenai Peninsula watershed (see Map 3.27-1). With an area of more than 650 square miles, the

geographic area of analysis has approximately 10,000 acres of wetlands of various types (not including lakes).

Since the 1950s, wetlands within the Kenai Peninsula lowlands (mostly outside the geographic area of analysis) have shrunk and dried, with invasion of lakes by woody and upland species (Klein et al. 2005), and this likely has occurred in the area of analysis as well. Vegetation types within the geographic area of analysis are consistent with the types found in the project area. Needle-leaved forests, broad-leaved forests, mixed needle-leaved and broad-leaved forests, shrub thickets, dry meadows, and wet meadows are the vegetation types that exist within these three watersheds. Historic wetland and vegetation losses due to development within the geographic area of analysis are small in comparison with the amount available within these three watersheds.

3.27.5.15 Wildlife

The geographic area of analysis for cumulative wildlife impacts focuses on Game Management Units (GMUs) 7, 15A, and 15B (see Map 3.27-1), with some variation by species.

The interagency working group identified nine mammal species that could be the most affected by the proposed project and/or that the group considered to be key indicators of potential effects to terrestrial wildlife (HDR 2004a). The species selected were moose, brown bear, black bear, river otter, Dall sheep, mountain goat, Canada lynx, wolf, and wolverine (HDR 2004a). Seasonal habitats and use in the project area by all nine of the mammal species are summarized in Tables 3.22-2, 3.22-5, and 3.22-6. Section 3.22.1.1 includes information on the life history, habitats, and population trends of each of these species.

The interagency working group identified brown bear and moose as species of particular importance for evaluation of potential impacts (Ruediger 2004). For this reason, the cumulative impacts analysis for terrestrial wildlife, while generally addressing all nine mammal species, provides additional detail on brown bear and moose.

Birds are also discussed, with a specific focus on bald eagles due to protections under the Bald and Golden Eagle Protection Act.

Brown Bears

The brown bear population is reported and managed on a larger scale for the entire Kenai Peninsula, an area that encompasses all of GMUs 7 and 15, including GMU 15C. While a formal survey of brown bear population number or density has never been conducted for the Kenai Peninsula, a recent genetic analysis conducted by an ADF&G, USFWS, and National Park Service interagency team estimated the Kenai brown bear population to be approximately 624 (Morton, Bray, et al. 2013). This same study concluded that genetic diversity is lower in Kenai brown bears than in mainland Alaska brown bears, thereby implying a lack of connectivity between mainland and Kenai brown bear populations and a consequent increased risk to the Kenai brown bear population (Morton, Bray, et al. 2013).

The lack of a complete population survey of brown bears on the Kenai Peninsula prevents quantitative assessment of historic population fluctuations and investigations on the effects of human-induced landscape changes. However, genetic analysis has revealed that the Kenai brown bear population experienced a genetic bottleneck, an indicator of severe population decline, in the distant past (over 100 generations ago; Morton, Bray et al. (2013)). In addition, brown bear hunting regulations have been modified to prevent the over-harvest of Kenai bears several times

in the past 30 years (Selinger 2011a). These modifications were not based on population data, and were, instead, enacted in an attempt to balance bear harvests with growing numbers of defense of life and property (DLP) bear kills associated with increased human development on the Kenai Peninsula (Selinger 2011a).

Brown bears on the Kenai Peninsula use a wide variety of habitats, including rivers and streams, forests, and subalpine and alpine areas (Goldstein, Poe, et al. 2010), generally avoiding areas in proximity to roads during spring and summer (Suring, Farley, et al. 2006). Brown bears are likely to move back and forth across the Kenai Peninsula in a northwest-southeast direction over the Kenai Mountains and across the Kenai River within the project area. High-quality brown bear habitat and movement corridors have been identified north of the Kenai River in GMU 7. North-south landscape linkages have been identified in the Juneau-Cooper creeks and Round Mountain areas (Juneau Creek and Russian River), and east-west landscape linkages were identified along Bean Creek (Morton, Magness, et al. 2010). Brown bear population and habitat information for the project area is described in detail in Section 3.22, Wildlife.

Factors influencing the persistence of brown bears include: 1) the quality of available habitat, 2) the number of humans within that habitat, and 3) the relationship of those humans to brown bears (Mattson et al. 1996, McLellan 1998, Apps et al. 2004). Natural or human-induced landscape-scale changes influence brown bear populations through habitat loss, changes in habitat suitability, changes in habitat use (e.g., displacement from habitat or disruption of movement patterns), or reduced survival (Goldstein, Suring and Preston 2004). These changes may result in fragmentation of brown bear habitat, modifications of brown bear habitat use, and decreased population sustainability (Goldstein, Suring and Preston 2004).

Moose

Moose population information for the greater project area is summarized in Section 3.22, Wildlife. There are no moose population surveys for GMU 7 due to heavy forest cover (McDonough 2010a). Other information indicates that the moose population in GMU 7 is stable with a “chronically low” density that supports less than 10 percent of the entire Kenai Peninsula moose harvest (see Table 3.22-4). The ADF&G population estimate for moose in GMU 15A was 1,600 in 2010, continuing a trend of a slow but steady decline since 1991 (Table 3.22-4 (2010a)). The 2010 moose population in GMU 15B was estimated at 960 animals and was believed to have been stable since 1999 (Table 3.22-4 (2010a)).

The factors most affecting the moose population on the Kenai Peninsula are declining habitat quality, predation, and mortality caused by vehicle collisions. Moose killed by vehicles within GMU 7 as a whole (which includes MP 45–55 of the Sterling Highway and 75 miles of the Seward Highway) ranged from 16 to 30 per year from 2002 to 2009 (averaging 24 per year; Morton, personal communications (2011a, 2011b, 2011c)). Weather is also considered a factor in GMU 7, where a high mortality rate for moose has been linked to consistent severe winters with heavy snowfall (McDonough 2010a).

Birds

Species that occur in the geographic area of analysis are common and widely distributed in Southcentral Alaska. Waterbirds, raptors, landbirds, and upland game birds occur in the project area and use habitat in the project area for nesting, brood rearing, wintering, and migration. Most bird species occurring within the geographic area of analysis are migratory, arriving or passing

through in the spring and migrating south in late summer or fall to wintering grounds in North or Central America. Migratory birds are protected by the Migratory Bird Treaty Act. Several species of birds found in the geographic area of analysis are on USFWS, USFS, and Audubon conservation lists (see Table 3.22-8). No Threatened or Endangered species occur in the project area.

Specific attention is given to bald eagles due to protections under the Bald and Golden Eagle Protection Act. Surveys of the KNWR indicated that in 2001, 90 pairs of eagles were nesting in the KNWR and about 400 bald eagles were using the Kenai River and the Fox River (GMU 15C, outside the geographic area of analysis) valleys as winter habitat (USFWS 2010a). Nest surveys have also indicated that the proportion of nests where eaglets have successfully fledged has declined since the late 1980s (USFWS 2010a). The reason for the decline is unknown. Within the project area, there were 25 bald eagle nests identified in a 2014 aerial survey. Of these, 8 bald eagle nests are located within 660 feet of the existing highway (660 feet is USFWS's recommended disturbance buffer zone for eagle nests).

Human disturbance of nesting activities can lead to nest abandonment as well as disruption, destruction, or obstruction of roosting and foraging areas. The location of active nests near the highway indicates that some eagles in the area are likely habituated to highway noise and traffic.

3.27.6 Cause-and-Effect Relationships between Activities and Resources

As a result of the combined effects of human activities, the natural environmental is affected in ways that may be less obvious than that of a direct impact of an action on a resource. The following summarizes the relationships between the effects on the natural environment from human activity stresses:

- Housing and Relocation
  - Unintended consequences of development can lead to sprawl and potential burden on local governments related to the expansion of utilities or services to newly developed areas.
  - If human activities result in the removal of existing housing, the housing market may not be able to support relocation needs of individuals who have been displaced.
  - Visual resources can be affected through new development actions that change the landscape.
- Social and Economic Environment
  - Sudden changes in growth or transportation patterns can lead to new stresses on existing social services such as schools and fire protection. In addition, growth and new transportation patterns can alter community character.
  - A sudden influx of goods and services during construction can lead to an unstable economy and labor market.
- River Navigation – Changes to existing bridge configurations, new river obstructions, or increases in use of river services can reduce overall navigation within the Kenai River.
- Parks and Recreation – Unintended effects of human actions on parks and recreation resources can include overcrowding or interruption in the natural setting of resources.

- Historic and Archaeological Preservation – Human actions can result in fragmentation of an existing historic district and cultural site degradation from streambank erosion, site development (e.g., grading, leveling, etc.), and vandalism.
- Wetlands, Water Bodies, and Water Quality
  - Human activities can cause a loss of wetland habitat and the related services they provide, such as sediment and nutrient removal and surface water runoff storage.
  - Water quality degradation due to increased nonpoint-source pollution from new developments can occur.
- Wildlife
  - Human activities can create habitat loss, modification of habitat use, and habitat fragmentation from the cumulative effects of land clearing and development activities.
  - Increasing road density within wildlife habitat can increase mortality from vehicle collisions and DLP kills.
- Air Quality – Multiple new developments can create a cumulative effect of producing emissions that lower ambient air quality and add to regional and global atmospheric conditions such as global warming.

3.27.7 Magnitude and Significance of Cumulative Effects

The potential project-related impacts, combined with existing actions or anticipated RFFAs within the geographic boundaries for cumulative effects analysis for each resource, can indicate the potential stresses on a given resource.

Table 3.27-3 identifies those RFFAs that have the potential to add stresses to the resources being evaluated. The potential impacts of the RFFAs, combined with the existing conditions of the affected resources (which have been influenced by past and present actions), provide the context for determining the magnitude and significance of the cumulative effects of the Sterling Highway MP 45–60 Project. The following sections characterize the cumulative effects of past, present, and reasonably foreseeable future actions on each resource and describe how the magnitude and significance of those effects would change with the Sterling Highway MP 45–60 Project.

The following sections discuss the magnitude and significance of the cumulative effects for each resource.

Table 3.27-3. Existing actions or RFFAs potentially impacting resources

Existing Actions or RFFAs	Resources[a]	Primary Impact Location
Sterling Highway Maintenance and Bridge Replacement	1, 6, 9, 13,14,16	Project Area
Sterling Highway Rehabilitation and Passing Lanes	1, 3, 15	Project Area
Sterling Highway MP 57 Erosion Protection (existing)	9, 13	Project Area
Senior Citizen Housing Development	3, 4, 5, 14, 15	Project Area
Chugach Electrical Association, Cooper Lake Hydroelectric Facility Relicensing	1, 5, 7, 9, 14, 15	Middle Kenai River Watershed
CIRI Land Development	1, 3, 5, 14, 15	Project Area
CNF Bean North Vegetation Management (existing)	14, 15	Project Area
Cooper Landing Residential Development	1, 4, 5, 10, 14, 15	Project Area
State Land Management Unit 395 Residential Development	1, 4, 5, 10,14, 15	Project Area
Cooper Landing Walkable Community Project	3, 5	Project Area

[a] Resource key:

1 – Land Ownership and Land Uses
2 – Land Use Plans and Policy
3 – Social Environment
4 – Housing and Relocation
5 – Economic Environment
6 – River Navigation
7 – Parks and Recreation
8 – Historical and Archaeological
9 – Water Bodies and Water Quality
10 – Air Quality
11 – Noise
12 – Visual Environment
13 - Floodplain
14 – Wetlands and Vegetation
15 – Wildlife

3.27.7.1 Land Ownership and Land Uses

Cumulative Effects - No Build Alternative

The Sterling Highway Maintenance and Bridge Replacement RFFA would require a minor change in land ownership and land use because of new bridge and road construction. This would be limited to areas around these specific projects, and the potential exists of no requirement for new right-of-way associated with the bridge replacements or passing lanes. The development of subdivisions located in Cooper Landing and on State Management Unit 395, development of CIRI Tract A, the senior citizen housing development, and the reauthorized Cooper Lake Hydroelectric Project would convert open space (Borough, State, and Federal public lands) into developed areas; however, the conversion of land ownership has already been planned as part of these developments. The other RFFAs would not require any change in ownership type. Cumulative effects on land ownership would not be substantial with the No Build Alternative in combination with past, present, and RFFAs.

There is an un-maintained road that takes off from the existing USFS road within Unit 395 and that traverses west through Unit 395 and across USFS land to within 0.36 mile of the Mystery Creek Wilderness boundary. USFWS anticipates that the section of the existing road within Unit 395 would be incorporated in a residential subdivision of Unit 395 or, if not, would be used as a recreation trail by future residents. Topography from the end of the unmaintained road to the

boundary of the Wilderness area may provide the opportunity for access by ATV to the Wilderness area. ATV traffic in the Wilderness area could affect the area through noise and vegetation impacts and, if it occurred, would affect Wilderness qualities like the opportunity for a quiet setting. Managing any such impact would be an administrative impact to the USFWS.

Cumulative Effects - Build Alternatives

Federal, State, Borough, Native, and private lands would be required for the build alternatives, and these lands would be converted to roadway right-of-way. The build alternatives would convert 215–387 acres of land to public highway rights-of-way, depending on the alternative selected (see Section 3.1, Land Ownership). A total of 13,500 acres of land exists in project area. At most, this would remove 3 percent or less of the total land area to roadway right-of-way. The development of subdivisions located in Cooper Landing and State Management Unit 395, development of CIRI Tract A, the senior citizen housing development, and the reauthorized Cooper Lake Hydroelectric Project would convert open space (Borough, State, and Federal public lands) into developed areas; however, the conversion of land ownership has already been planned for as part of these developments. The other RFFAs would not require any change in ownership type. Therefore, the build alternatives, in combination with past, present, and reasonably foreseeable future actions, the build alternatives would not have substantial cumulative effects on land ownership or uses. Impacts from ATV use in designated Wilderness from Unit 395 could occur with or without the development of the Sterling Highway project alternatives.

3.27.7.2 Land Use Plans and Policy

Cumulative Effects - No Build Alternative

The No Build Alternative would not alter any existing land use plans. The present action (CNF North Bean Vegetation Management) and the RFFAs generally are consistent with existing land use plans and policy. Therefore, the No Build Alternative, in combination with past, present and RFFAs, would not have substantial cumulative effect on land use plans and policies.

Cumulative Effects - Build Alternatives

All build alternatives would impact lands that have sensitive land uses or classifications, including private lands, the KRSMA and proposed additions to the KRSMA, Inventoried Roadless Areas (IRAs), the Resurrection Pass Trail, and Federally designated Wilderness within the KNWR. The *Kenai National Wildlife Refuge Comprehensive Conservation Plan, Chugach National Forest Land and Resource Management Plan¸ Kenai Peninsula Borough Comprehensive Plan,* and *Cooper Landing Land Use Classification Plan* may need to be amended.

The impacts of past, present, and future actions (RFFAs), combined with the impacts of the build alternatives, would result in a cumulative impact that would likely result in changes to land use planning documents that guide land management in the area; however, because the vast majority of land would remain in State and Federal ownership, there is not anticipated to be a substantial impact to land use plans and policy.

3.27.7.3 Social Environment

Cumulative Effects - No Build Alternative

Population and Social Groups. Past trends of slow population growth, and a shift toward an older, retiree population are likely to continue under the No Build Alternative. Completion of the senior citizen housing development would create an additional 30 housing units and a new senior center, which might increase the attractiveness of the area to additional retirees, continuing the trend of an increasingly aging population. Development of Unit 395 could result in 243 developable parcels. If half were developed, with 50 percent for permanent residents and 50 percent for weekend recreation cabins, Unit 395 development could increase the Cooper Landing population by 63, or approximately 20 percent more than the existing permanent population (calculation assumes 1.8 residents per household, which is the 2010 Census average household size in Cooper Landing). Other RFFAs would not likely affect population growth trends or demographic trends.

Community Character. The No Build Alternative would have an adverse cumulative impact on community character. Traffic projections for the No Build Alternative are based on an annual traffic growth rate of 1 percent, which includes traffic anticipated as a result of the RFFAs. The No Build Alternative would route all traffic through the length of the community on an undersized road. Even with implementation of *Walkable Community Project* (RFFAs) over time, growing traffic would likely reduce quality of life. As traffic and congestion continued to grow, the highway would become more of a barrier to local vehicle, bicycle, and pedestrian movement. The increased traffic congestion as a result of the No Build Alternative and RFFAs would reduce the desirability and quality of life of Cooper Landing for visitors and residents. This in turn could result in relatively slower build-out of Unit 395 and other undeveloped properties slated for community development.

Community and Public Facilities. The effects of the No Build Alternative, when combined with the RFFAs, would result in adverse cumulative effects to community facilities and public services. Increasing traffic volume and congestion along the existing highway, especially during peak summer months, would result in more crashes, generate more emergency response needs, and make it more difficult to access existing public and private recreational facilities and services. The number of emergency response runs increased approximately 50 percent from 2001 to 2006 (Mecum 2006). Emergency responses are expected to increase as development and corresponding increased traffic result in more congestion in the corridor.

Cumulative Effects - Build Alternatives

Population and Social Groups. Past trends, as described under the No Build, would continue under the build alternatives. The development of lots in Unit 395 may occur slightly more quickly under the build alternatives, because the town center would be more accessible and useable under the build alternatives (see the discussion on Community Character below). Under either of the Juneau Creek alternatives, the highway right-of-way and a land buffer of 100 feet along each side of the highway (required by DNR's land transfer decision) would reduce the full build-out potential of Unit 395 by about 12 percent.

Community Character. Improvements to the transportation system as a result of the build alternatives would make commercial, recreational, and residential areas more accessible for local residents by all means of travel. To varying degrees, the build alternatives would remove

through-traffic from the center of the community, which may encourage positive social interaction within the community. The Cooper Creek Alternative would continue to route all traffic through portions of Cooper Landing, while the other build alternatives would route most of the traffic around the entire community. The G South Alternative or either of the Juneau Creek alternatives, coupled with implementing elements of the *Walkable Community Project* plan (RFFAs), would likely result in a quieter town center with greater ease of mobility between community destinations, which would improve quality of life and attractiveness of the community. In turn, this could result in more interest in staying in or moving to the community. This trend likely would occur under the Cooper Creek Alternative as well, but only for the western portion of the community. With increased development under the RFFAs and improved access within the community as a result of the build alternatives, the community and its social groups may be better able to interact, which would enhance community character, creating a beneficial cumulative impact.

Community and Public Facilities. The build alternatives would improve safety and mobility for residents in Cooper Landing, to the extent that the remaining segment of unimproved existing highway would become more like a minor arterial. It would carry approximately 30 percent of the total traffic volume and would retain the posted speed limits in force today, which are generally much lower than speed limits anticipated for the build alternatives. It also would have a much different roadway character than the build alternatives. Reducing traffic and congestion in the existing corridor within the community, and thereby improving vehicle and pedestrian access to facilities and public services within the community, would be a beneficial cumulative effect of the build alternatives. Emergency response times would improve as a result of lower traffic volumes and congestion on the existing highway. While development would increase under the RFFAs, the build alternatives would provide sufficient capacity to handle the forecasted additional traffic.

3.27.7.4 Housing and Relocation

Cumulative Effects - No Build Alternative

No direct or indirect housing and relocation impacts would be expected as a result of the No Build Alternative. The planned senior housing and residential development RFFAs do not anticipate adverse affects or require relocations to existing residents. Therefore, the No Build Alternative, in combination with past, present, and future actions (RFFAs), would not have cumulative effects on housing and relocation.

Cumulative Effects - Build Alternatives

Privately owned properties would be affected through implementation of the build alternatives due to right-of-way acquisition. The planned senior housing and residential development RFFAs do not anticipate adverse affects or require relocations to existing residents. Therefore, no cumulative effects would occur with the build alternatives in combination with past, present, and RFFAs.

3.27.7.5 Economic Environment

Cumulative Effects - No Build Alternative

The No Build Alternative would not change the existing economic conditions or trends of Cooper Landing. No businesses would be relocated, and travel patterns would remain the same.

Congestion and safety concerns could increase. The draw of the Kenai River and Russian River fisheries would be expected to continue, but some recreationists could choose to overnight or shop elsewhere, or even avoid the entire area if the trip became too cumbersome and the quality of the experience decreased.

While many of the RFFAs have the potential to have positive effects on the local economy, the No Build Alternative would not contribute to a cumulative long-term effect on the local economy. Construction activities associated with any RFFA, and with replacement of bridges and other work anticipated on the Sterling Highway under the No Build Alternative, would provide a short-term increase in goods and services purchased locally as a result of construction workers and related activities within the project area. Housing developments provide new opportunities for full-time residents. The 2007 relicensing requirements for the Cooper Lake hydroelectric facility, with completion of agreed-upon projects, could increase flow to Cooper Creek. This could create better habitat for fish, which could increase fish populations in the stream and improve opportunities for sport fishing in Cooper Creek. Development of senior citizen housing would generate more commerce and health care jobs and would strengthen the goods and services sector, creating a more diverse economy. Expected residential development in Unit 395 and the Cooper Landing subdivisions could stimulate growth in commercial enterprises and add to the Borough tax base.

The improvements to recreational facilities (e.g., parking at the end of Snug Harbor Road for snowmobilers) would support the local economy by increasing recreational opportunities and use during the slow winter months. CIRI's Tract A development (including a visitor center, research center, housing, and lodge) would increase tourism opportunities and generate additional clientele for the local guide services, shops, and restaurants.

The estimated cost of the No Build Alternative would be approximately $64.8 million over 20 years. This includes the projects to realign the curve near MP 45 and the replacement of three existing bridges. Construction costs would likely be shared between FHWA and DOT&PF. The State's estimated average annual operations and maintenance costs for the No Build Alternative are approximately $245,500. No long-term economic burden would exist for local governments or taxpayers within the geographic area of analysis.

Cumulative Effects - Build Alternatives

Implementing any of the build alternatives would potentially cause both beneficial and adverse economic impacts (see Section 3.5.2.2). Diverting traffic onto the new alignment would decrease congestion along the "old" highway, which may improve the travel experience for visitors, pedestrians, and residents, as well as local businesses that use the existing road in their daily business; however, individual businesses may lose business from travelers who would have made spontaneous stops to purchase goods and services.

The positive economic effects of the RFFAs could be affected by implementation of a build alternative. For example, under either of the Juneau Creek alternatives, the highway right-of-way and a land buffer of 100 feet along each side of the highway (required by DNR's land transfer decision) would reduce the full build-out potential of Unit 395 by about 12 percent, potentially affecting growth in commercial enterprises. While the build alternatives would have an adverse affect on some local business that would need to adapt to new travel patterns, the past, present and RFFAs are not anticipated to have adverse effects on the community economy as a whole

and may have beneficial effects on the economy. Therefore, no substantial cumulative adverse effects would occur to the local economy.

The estimated project costs of the alternatives are presented below in Table 3.27-4 and in greater detail in Table 3.5–4. The table provides a comparison of total project costs of the Sterling Highway 45–60 Project alternatives plus other costs to DOT&PF. The "Project Cost" represents project development costs such as right-of-way acquisition, design, and construction management, the capital costs of construction of the alternatives, plus the costs of operations and maintenance over the 20-year life of the project and periodic major activities such as replacement of guardrail and overlays of the pavement surface. The table also includes "Old" Highway Costs—costs associated with the remnant sections of the "old" Sterling Highway, which would require continued maintenance, and with RFFAs such as the Highway Maintenance and Bridge Replacement Program projects. The sum of the two figures provides the costs to DOT&PF of the combined "old" highway and new highway for each alternative. In this way the table reflects the cumulative cost of "old" highway maintenance, the bridge replacement RFFAs, and the cost associated with building and maintaining the new highway.

Construction costs would likely be shared between FHWA and DOT&PF. The State's total estimated annual operations and maintenance costs for the project area corridor (build alternatives and the "old" highway segments) range from $672,000 per year (Cooper Creek) to $779,300 per year (Juneau Creek Alternative). No long-term economic burden would exist for the local government or taxpayers within the geographic area of analysis.

Table 3.27-4. Costs by alternative

	No Build	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Project Costs					
Total Costs[a]	$0	$314.4M	$327.3M	$273.8M	$281.3M
O&M[b] (per year)	$0	$593,400	$585,400	608,600	$611,700
"Old" Highway Costs[c]					
Total Costs	$64.8M	$8.4M	$41.8M	$56.8M	$56.2M
O&M (per year)	$245,500	$78,600	$91,300	$170,700	$160,100
Combined Costs for Project Area Corridor					
Total Costs	$64.8M	$322.8M	$369.1M	$330.6M	$337.5
O&M (per year)	$245,500	$672,000	$676,000	$779,300	$771,900

[a] Total Project Costs reflect project development costs, direct construction costs, O&M over the 20-year life of the project and periodic major activities such as replacing bridges and guardrail, and repaving.

[b] O&M = Operations and maintenance, and includes annual costs such as snow plowing, crack sealing, and other basic maintenance.

[c] The remaining segment of "old" highway varies in length for each alternative, so costs vary for tasks such as snow plowing or pavement patching. Total costs in this case include RFFAs such as bridge replacement projects and, for the No Build Alternative only, the curve realignment. They are presented for reference for cumulative impact analysis and are not costs of the Sterling Highway MP 45-60 Project.

Notes: Many numbers are rounded and do not add up perfectly. All dollar figures represent 2014 dollars. Additional detail can be found in Table 3.5-4.

3.27.7.6 River Navigation

Cumulative Effects - No Build Alternative

Under the No Build Alternative, it is assumed that replacement bridges would have the same clearance or better than the existing bridges. Therefore, it is assumed there would be no permanent impacts to river navigation on the Kenai River. As a result, the No Build alternative, in combination with past, present and RFFAs, would not have a cumulative effect on river navigation.

There would be construction-related impacts to river navigation through full or partial closures of the river channel to boating in the vicinity of the bridges. Impacts to river navigation would be short-term and temporary, and limited to the period when equipment, workers, and temporary structures would be located in the river. Pilings used to support the spans of temporary construction bridges at each bridge construction site would be placed to allow for continued navigation of the river, and sufficient vertical clearance would be provided at the temporary bridges for ease of navigation. For each bridge, it likely would take two seasons to build the bridge and remove the existing bridge.

Cumulative Effects - Build Alternatives

Original construction and past improvements to the Sterling Highway added bridges crossing the Kenai River. The Juneau Creek and Juneau Creek Variant alternatives would not include a new or replacement structure over any navigable waterways within the project area. However, similar to the No Build Alternative, it is assumed that replacement bridges would still be required by 2043. These bridges would have the same clearance or better than the existing bridges and, therefore, would have no adverse or cumulative impact to river navigation.

The Cooper Creek Alternative includes replacing all three bridges along the Sterling Highway as part of the project. These bridges would be built with the same horizontal and vertical clearances or better than the existing bridges, therefore there would be no adverse or cumulative impact to river navigation.

The G South Alternative includes replacing the Schooner Bend Bridge and the construction of a new bridge crossing the Kenai River near MP 52. The Cooper Landing Bridge over the Kenai River and the Cooper Creek Bridge would be replaced as part of the Sterling Highway Maintenance and Bridge Replacement projects by 2043. All bridges would be built so that the vertical and horizontal clearances would be sized at the same dimensions or larger than the existing openings. The G South Alternative would cumulatively result in an additional bridge crossing of the Kenai River compared to the No Build and other build alternatives. However, there would not be substantial adverse impacts to river navigation.

All alternatives would cause construction-related impacts to river navigation through full or partial closures of the river channel to boating in the vicinity of the bridges. Impacts to river navigation would be short-term and temporary, and limited to the period when equipment, workers, and temporary structures would be located in the river. Pilings used to support the spans of temporary construction bridges at each bridge construction site would be placed to allow for continued navigation of the river, and sufficient vertical clearance would be provided at the temporary bridges for ease of navigation. For each bridge, it likely would take two seasons to build the bridge and remove the existing bridge.

3.27.7.7 Parks and Recreation

Cumulative Effects - No Build Alternative

The Sterling Highway, along its existing alignment, fragments habitat, serves as an opportunity for the spread of invasive species, and generates noise impacts. These issues contribute to the degradation of nature-based recreation values across the project area and especially recreation values of designated Wilderness in KNWR. Without highway improvements, traffic congestion would continue to worsen, and access to recreational resources in the project area would become increasingly inconvenient. Growing congestion could detract from the recreational experience. Recreation use trends have remained steady over the past 10 years (see Section 3.8). The No Build Alternative would not change recreational lands or lands proposed as additions to the KRSMA. Water-based recreation would not be altered.

The Cooper Lake Hydroelectric facility project would add a winter recreation/snowmobile enhancement to the area, and the land conveyance to CIRI would result in additional visitor facilities (recreation/tourist attraction) in the area.

Access to the Unit 395 residential development is anticipated to use the USFS logging road referred to as the West Juneau Road. The USFS currently closes this road to motorized vehicles except snowmobiles in winter. Since West Juneau Road likely would serve as the only access to the new subdivision, the road would be plowed and sanded by either the Borough or local residents. Snowmobile use of the road may no longer be feasible along developed road segments and possibly would not be legal, although access to the Resurrection Pass Trail likely would remain open for users who drove up the road and parked within the subdivision. It is possible that the Borough or Forest Service would provide trailhead parking and access within the new subdivision if the new subdivision access road changed recreational access. If parking were not provided, it is possible that recreational users would be induced by the subdivision project to park along the edge of subdivision roads, or to increase use of Bean Creek Trail, or, under certain low snow conditions, they may be less able to access the Resurrection Pass Trail.

Other RFFAs identified in this document are not anticipated to have any direct or indirect affect on recreation resources.

Therefore, the No Build Alternative, in combination with other past, present, and future actions, would not have a cumulative adverse effect on parks and recreation.

Cumulative Effects - Build Alternatives

The build alternatives would have direct impacts on recreational resources, including changes to the overall recreational character of Cooper Landing and the upper Kenai River, the rerouting and shortening of trails, and the likely reclassification of recreation and preservation lands. Segments of the alternatives built on new alignments would provide access to recreational lands in portions of the project area that were previously difficult to access, and ease of travel may increase use of recreation resources. Access to recreation sites along the “old” highway segment under each build alternative would improve as a result of through-traffic predominantly using the new alignment and reducing congestion on the “old” highway.

The impacts of any of the build alternatives would be part of a century-old trend that has increased access to the area and created more recreational developments, simultaneously providing access to natural settings and wilderness-type recreation, and gradually pushing back or eliminating wilderness-type settings in favor of less-wild but still largely natural settings. This

means that naturalness, wildness, "outstanding opportunities for solitude or a primitive and unconfined type of recreation" (Wilderness Act), and spiritual values of nature would be further eroded, particularly under the Juneau Creek Alternative, which is the only alternative that would use land from a designated Wilderness area. Intersection lighting, a wider paved surface, and wider area cleared of forest under all alternatives would incrementally increase the sense of engineered rather than natural surroundings and infringe on the natural dark sky and views of stars. These changes would occur in a valley already impacted by traffic noise, visual presence of roads, and lights, but would add to the sense that the KNWR designated Wilderness areas and USFS non-designated natural and wild areas were less natural and wild. Opportunities for wilderness recreation and sense of solitude, "escape," and renewal would be reduced.

The build alternatives, in slightly different ways described in detail in Section 3.8, would alter transportation patterns and make travel easier, including both through-travel for recreation and access to local recreation destinations.

Similarly, all would adversely impact some elements of the recreational environment, such as natural vegetation, views, trails, and waterways valued as recreational resources. The alternatives would vary in their individual impacts to recreational resources and the recreational enhancements they would provide, but all the CNF, KNWR, and State of Alaska recreation resources would continue to exist and would be expected to remain popular and well used. Use patterns would change somewhat, but recreation would be expected to remain a primary component of human activity in the project area.

Cumulative effects of RFFAs are identical to those discussed for the No Build Alternative, above. Snowmobile access to the Resurrection Pass Trail that would be altered by the plowing and sanding of the road to the Unit 395 residential development would be provided by a winter trailhead pullout under the G South Alternative (Bean Creek Trailhead). Snowmobile access under all of the build alternatives likely would remain available from within the subdivision, as discussed above under the No Build Alternative.

Therefore, the build alternatives, in combination with other past, present, and reasonably foreseeable future actions, would not have a substantial cumulative adverse effect on parks and recreation.

3.27.7.8 Historic and Archaeological

Cumulative Effects - No Build Alternative

The No Build Alternative would not disturb or bury known or unknown historic properties in the project area. Activities anticipated to occur as part of the RFFAs, such as routine highway maintenance, bridge construction, and repaving, could disturb, dig up, or bury historic properties adjacent to the highway. Private and commercial development, and continued updates to Federal, State, and Borough land use planning could impact unidentified and known historic properties. Continued development along and adjacent to the existing highway corridor, as described in current local land use plans, would increase the potential for impacts on both unidentified and known historic properties.

As a result of the RFFAs, increased development and access to currently inaccessible areas from development of residential areas (e.g., senior citizen housing, CIRI Tract A development, and Cooper Landing subdivisions), recreation facilities (e.g., Snug Harbor Road snowmobile parking), and Cooper Lake Hydroelectric projects (e.g., adding water to Cooper Creek,

upgrading access road) would increase the potential for disturbance of historic and prehistoric sites currently protected because of their remote locations.

Gradual development would likely continue to occur in subdivisions and undeveloped areas within the Cooper Landing area, and this increased human activity could result in potential destruction of unidentified historic properties. At the same time, the Tribal entities and Federal and State land management agencies are likely to continue to identify and protect cultural resources. The research center planned by CIRI would aid in formally protecting cultural resources in the area.

The No Build alternative, combined with past, present, and RFFAs, has the potential to have a cumulative effect on historic and archaeological resources. Other RFFAs, such as the Cooper Lake Hydroelectric project, will be studied by FERC and would address impacts to cultural resources from that project. These measures would minimize the potential cumulative impacts on historic and archaeological resources.

Cumulative Effects - Build Alternatives

All build alternatives would adversely affect some known historic properties. Potential for additional impacts from RFFAs are similar to those described above for the cumulative effects under the No Build alternative. These include the potential for disturbing, digging up, or burying undocumented historic properties adjacent to the highway from activities such routine highway maintenance, bridge construction, and repaving. Increased development and access to currently inaccessible areas from development of residential areas and recreation facilities would increase the potential for disturbance of historic and prehistoric sites currently protected because of their remote locations.

The impacts of past, present, and reasonably foreseeable future actions, combined with the impacts of the build alternatives, would result in an adverse cumulative effect on historic properties.

FHWA, in consultation with SHPO, Tribal governments and organizations, the Russian River Lands Act Memorandum of Understanding Group, land managing agencies, and other identified Section 106 consulting parties, is developing an agreement document to address adverse effects to identified historic properties, in accordance with Section 106 of the NHPA. When the selected alternative is identified, additional studies, including field surveys, will be conducted to further define site boundaries and proximity to the project as part of phased mitigation plans to address adverse effects prior to construction. These additional surveys should provide additional protection against future project area disturbances or impacts on documented and undocumented sites and will mitigate project related impacts, but will also benefit the overall understanding of historic and cultural resources in the project area; thereby lessening overall cumulative impacts See Section 3.9.2 for more detail on mitigation for the various build alternatives.

3.27.7.9 Water Bodies and Water Quality

Cumulative Effects - No Build Alternative

The No Build Alternative does not have any direct or indirect impacts on water bodies and water quality. The No Build Alternative would not affect surface water quantity or groundwater quality and quantity. However, the existing highway does not meet current storm water design standards for drainage, storm water runoff, and vehicle pollutants, and pollutants draining from the

roadway would continue to affect water quality (HDR 2003a). As population and traffic grow, runoff from roadways would increase and contribute to additional nonpoint pollution and would introduce runoff into Cooper Creek and other Kenai River tributaries. In addition, the risk of vehicle crashes that would result in pollutants in the Kenai River or adjoining wetlands and connected waterways would remain high.

Development associated with the RFFAs could affect water bodies by encroaching on rivers, streams, and possibly Kenai Lake; modifying topographic features in the watershed with site grade changes; changing stream channels with culvert and bridge crossings; and altering runoff volumes. River-bank stabilization with the Sterling Highway MP 57 Erosion Protection Project and bridge construction and removal under the Sterling Highway Maintenance and Bridge Replacement RFFA, including culvert installation activities and river-bank stabilization, may result in short-term sedimentation and turbidity increases to the Kenai River and other streams in the project area. Impacts to water quality during highway construction could occur from earth-moving activities, temporary increases in nonpoint source pollutant runoff, and debris generation. Spills, leaks, and minor loss of construction material into the water are possible, which could temporarily affect water quality. Short-term impacts from the curve improvements at MP 45 could include the release of debris into surface water and nearby Kenai Lake. No measurable adverse long-term impacts to the water courses and the quality of the water are expected as a result of construction activities. Due to the ongoing potential for nonpoint source water pollution associated with the No Build Alternative, combined with the potential for encroachment on water bodies by RFFAs, a cumulative effect on water bodies and water quality would occur.

The impacts of the RFFAs would be minimized through the Borough requirements that residential and commercial development is set back from streams and vegetation clearing and grading activities is limited adjacent to water bodies (Ordinance 2013-18). This should minimize future development impacts and therefore cumulative impacts on water bodies along the Kenai River and within the project area.

Cumulative Effects - Build Alternatives

All build alternatives involve crossing water bodies and result in an increase in impervious surfaces, which would increase runoff, including runoff into water bodies. Bridge construction and removal, culvert installation activities, and river-bank stabilization may result in short-term sedimentation and turbidity increases to the Kenai River and other streams in the project area. Impacts to water quality during highway construction could occur from earth-moving activities, temporary increases in nonpoint source pollutant runoff, and debris generation. Spills, leaks, and minor loss of construction material into the water are possible, which could temporarily affect water quality. Short-term impacts from the curve improvements at MP 45 could include the release of debris into surface water and nearby Kenai Lake.

However, the new roadway sections would be designed and constructed to meet the current standards for storm water drainage and storm water runoff. DOT&PF is committed to maintaining a functioning drainage system despite global climate change that may alter precipitation and drainage patterns over time. Because micro-climates can vary from drier to wetter in the changing climate, DOT&PF would monitor its culverts to determine whether alterations are needed to support changes in flows.

The risk of pollutants reaching the Kenai River through spills resulting from vehicle crashes would be reduced, as each build alternative would have a greater percentage of roadway set further away from the Kenai River compared to the No Build and existing highway. In addition, removing through-traffic from segments close to the river would help to mitigate any adverse effects associated with an increased impervious area.

Impacts and minimization measures associated with the RFFAs are identical to those discussed under Cumulative Effects – No Build Alternative. Therefore, the build alternatives, combined with the past, present, and reasonably foreseeable future actions, would have a cumulative impact on water bodies and water quality. These cumulative impacts would be minimized through the Borough requirements that development to be set back from streams and vegetation clearing and grading activities be limited adjacent to water bodies (Ordinance 2013-18). Best management practices should avoid and minimize short-term construction impacts to water quality.

3.27.7.10 Air Quality

Cumulative Effects - No Build Alternative

Under the No Build Alternative, traffic congestion would continue to exist, resulting in decreasing air quality in localized areas. Development RFFAs that would increase residential development would increase local traffic due to the addition of residential dwellings. Construction activities associated with the bridge construction and curve realignment projects, as well as other development RFFAs, would result in temporary impacts to air quality from increased dust and particulate matter contained in vehicle and equipment emissions. Dust from dirt, rock, and other fine materials can become airborne when being transported in uncovered trucks and when vehicles cross dry, unpaved dirt surfaces. Ambient carbon monoxide (CO) and nitrogen oxides (NO_x) levels are expected to increase during construction, but are not expected to exceed air quality standards.

Therefore, the No Build Alternative, combined with past, present, and RFFAs, has the potential to have a cumulative effect on air quality. However, National Ambient Air Quality Standards are unlikely to be exceeded and therefore the effect would be minimal.

Several mitigation measures would be used to minimize adverse air quality impacts during construction, as required by the Alaska Pollutant Discharge Elimination System Construction General Permit. The specific best management practices proposed and their frequency of use would be determined by the contractor, and outlined in the project Storm Water Pollution Prevention Plan.

Cumulative Effects - Build Alternatives

None of the build alternatives are anticipated to have direct or indirect impacts on the project area exceeding NAAQS. Similar to the No Build Alternative, local traffic increases associated with RFFAs may have a cumulative effect on air quality.

FHWA did consider the cumulative impact of the project in terms of global climate change; however, under NEPA, detailed environmental analysis should be focused on issues that are significant and meaningful to decision-making.[1] FHWA has concluded, based on the nature of

[1] See 40 CFR 1500.1(b), 1500.2(b), 1500.4(g), and 1501.7

greenhouse gas (GHG) emissions and the exceedingly small potential GHG impacts of the proposed action, as discussed below and shown in Table 3.27-5, that the GHG emissions from the build alternatives will not result in "reasonably foreseeable significant adverse impacts on the human environment" (40 CFR 1502.22(b)). The GHG emissions from the project build alternatives will be insignificant, and will not play a meaningful role in a determination of the environmentally preferable alternative or the selection of the preferred alternative. More detailed information on GHG emissions "is not essential to a reasoned choice among reasonable alternatives" (40 CFR 1502.22(a)) or to making a decision in the best overall public interest based on a balanced consideration of transportation, economic, social, and environmental needs and impacts [23 CFR 771.105(b)]. For these reasons, no alternatives-level GHG analysis has been performed for this project.

Table 3.27-5. Statewide and project emissions potential, relative to global totals

	Global carbon dioxide emissions, MMT[a]	Alaska motor vehicle CO_2 emissions, MMT[b]	Alaska motor vehicle emissions, percent of global total	Project study area VMT, percent of Statewide VMT	Percent change in Statewide VMT due to project
Current conditions (2010)	29,670	2.81	0.0095%	8.06%	(None)
Future projection (2040)	45,500	3.25	0.0072%	8.07%	0.01%

[a] These estimates are from the EIA's *International Energy Outlook 2010*, and are considered the best available projections of emissions from fossil fuel combustion. These totals do not include other sources of emissions, such as cement production, deforestation, or natural sources; however, reliable future projections for these emissions sources are not available.

[b] EPA's Motor Vehicle Emissions Simulator (MOVES) projections suggest that Alaska motor vehicle CO_2 emissions may increase by 15.9% between 2010 and 2040; more stringent fuel economy/GHG emissions standards will not be sufficient to offset projected growth in vehicle miles traveled (VMT).

MMT = million metric tons. Global emissions estimates are *from International Energy Outlook 2010*, data for Figure 104, projected to 2040. Alaska emissions and statewide VMT estimates are from MOVES2010b.

The context in which the emissions from the proposed project will occur, together with the expected GHG emissions contribution from the project, illustrate why the project's GHG emissions will not be significant and will not be a substantial factor in the decision-making. The transportation sector is the second largest source of total GHG emissions in the U.S., behind electricity generation. The transportation sector was responsible for approximately 27 percent of all anthropogenic (human caused) GHG emissions in the U.S. in 2010 (EPA 2012). The majority of transportation GHG emissions are the result of fossil fuel combustion. Carbon dioxide makes up the largest component of these GHG emissions. U.S. carbon dioxide emissions from the consumption of energy accounted for about 18 percent of worldwide energy consumption carbon dioxide emissions in 2010 (EIA 2010). U.S. transportation carbon dioxide emissions accounted for about 6 percent of worldwide carbon dioxide emissions (EIA No date, EPA 2012).

While the contribution of GHGs from transportation in the U.S. as a whole is a large component of U.S. GHG emissions, as the scale of analysis is reduced the GHG contributions become quite

small. Using carbon dioxide because of its predominant role in GHG emissions, Table 3.27-5 presents the relationship between current and projected Alaska highway carbon dioxide emissions and total global carbon dioxide emissions, as well as information on the scale of the project relative to statewide travel activity.

Based on emissions estimates from EPA's Motor Vehicle Emissions Simulator (MOVES) model,[2] and global carbon dioxide estimates and projections from the Energy Information Administration, carbon dioxide emissions from motor vehicles in the entire state of Alaska contributed less than one hundredth of one percent of global emissions in 2010 (0.0095 percent). These emissions are projected to contribute an even smaller fraction (0.0072 percent) in 2040.[3]

Vehicle miles traveled (VMT) in the Borough represents 8.1 percent of total Alaska travel activity, and the project itself would increase statewide VMT by 0.012 percent. As a result, based on the build alternative with the highest incremental VMT,[4] FHWA estimates that the proposed project could result in an increase in Alaska's carbon dioxide emissions in 2040 of 0.004 percent, and a corresponding potential increase in global carbon dioxide emissions in 2040 of 0.00003 percent (less than one ten-thousandth of one percent). This very small change in global emissions is well within the range of uncertainty associated with future emissions estimates.[5,6]

Mitigation for Global GHG Emissions

To help address the global issue of climate change, the U.S. Department of Transportation (USDOT) is committed to reducing GHG emissions from vehicles traveling on our nation's highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency and shifting toward lower carbon intensive fuels. The agencies have jointly established new, more stringent fuel economy and first GHG emissions standards for model year 2012–2025 cars and light trucks, with an ultimate fuel economy standard of 54.5 miles per gallon for cars and light trucks by model year 2025. Further, on September 15, 2011, the agencies jointly published the first fuel economy and GHG emissions standards for heavy-duty trucks and buses.[7] Increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles, will improve air quality and reduce carbon dioxide emissions in future years.

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[2] EPA's MOVES model (http://www.epa.gov/otaq/models/moves/index.htm) can be used to estimate vehicle exhaust emissions of carbon dioxide and other GHGs. Carbon dioxide is frequently used as an indicator of overall transportation GHG emissions because the quantity of these emissions is much larger than that of all other transportation GHGs combined, and because carbon dioxide accounts for 90-95 percent of the overall climate impact from transportation sources. MOVES includes estimates of both emissions rates and VMT, and these were used to estimate the Alaska statewide highway emissions in Table 3.27-5.

[3] Alaska emissions represent a smaller share of global emissions in 2040 because global emissions increase at a faster rate. 2040 is used as it is the closest modeled year to the project design year (2043).

[4] Selected to represent a "worst case" for purposes of this comparison; a selected build alternative may have a smaller contribution.

[5] For example, Figure 114 of the EIA's *International Energy Outlook 2010* shows that future emissions projections can vary by almost 20 percent, depending on which scenario for future economic growth proves to be most accurate.

[6] When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and there is incomplete or unavailable information, the agency is required make clear that such information is lacking (40 CFR 1502.22).

[7] For more information on fuel economy proposals and standards, see the National Highway Traffic Safety Administration's Corporate Average Fuel Economy website: http://www.nhtsa.gov/fuel-economy/.

Consistent with its view that broad-scale efforts hold the greatest promise for meaningfully addressing the global climate change problem, FHWA is engaged in developing strategies to reduce transportation's contribution to GHGs—particularly carbon dioxide emissions—and to assess the risks to transportation systems and services from climate change. In an effort to assist states and metropolitan planning organizations in performing GHG analyses, FHWA has developed a *Handbook for Estimating Transportation GHG Emissions for Integration into the Planning Process.* The Handbook presents methodologies reflecting good practices for the evaluation of GHG emissions at the transportation program level, and will demonstrate how such evaluation may be integrated into the transportation planning process. FHWA has also developed a tool for use at the statewide level to model a large number of GHG reduction scenarios and alternatives for use in transportation planning, climate action plans, scenario planning exercises, and in meeting state GHG reduction targets and goals. To assist states and metropolitan planning organizations in assessing climate change vulnerabilities to their transportation networks, FHWA has developed a draft vulnerability and risk assessment conceptual model and has piloted it in several locations.

At the State level, project planning activities are key to reducing GHG from highway projects, and mitigation of GHGs. To this end, Alaska created the Alaska Climate Change Sub-Cabinet in 2007 under Administrative Order 238. This resulted in the formation of the Climate Change Mitigation Advisory Group. The Mitigation Advisory Group, tasked with analyzing mitigation options to reduce GHG emissions in Alaska, submitted its Mitigation Advisory Group Final Report in 2009. Chapter 7 of the report identified measures to mitigate emissions resulting from transportation and land use patterns. Suggested measures included: reducing idling times for diesel and gasoline vehicles, requiring DOT&PF-approved congestion management plans for all high-traffic-volume construction projects, and promoting the use of alternative fuel vehicles. Alaska also has initiated activities to prepare infrastructure in the state for current and future impacts of climate change.

Even though project-level mitigation measures will not have a substantial impact on global GHG emissions because of the exceedingly small amount of GHG emissions involved, the following measures during construction will have the effect of reducing GHG emissions:

- To reduce impacts associated with construction delays and changes in traffic flow, the contractor would be required to create and execute a Transportation Management Plan (TMP), which would minimize construction-related congestion and would maintain traffic flow throughout the construction site.
- To reduce impacts associated with construction equipment, unnecessary idling of construction vehicles, trucks, and heavy equipment would be prohibited.
- The construction contractor would be required to routinely maintain and service all construction vehicles, trucks, and equipment to ensure they are in proper working condition, and therefore running as efficiently as possible.
- To reduce energy used to retrieve construction materials, construction equipment and material would be located as close to project construction sites as possible to reduce hauling distances and energy consumption.

These activities are part of a program-wide effort by FHWA to adopt practical means to avoid and minimize environmental impacts in accordance with 40 CFR 1505.2(c).

In summary, this document does not incorporate an analysis of the GHG emissions or climate change effects of each of the alternatives because the potential change in GHG emissions is very small in the context of the affected environment. Because of the insignificance of the GHG impacts, those impacts will not be meaningful to a decision on the environmentally preferable alternative or to a choice among alternatives. As outlined above, FHWA is working to develop strategies to reduce transportation's contribution to GHGs—particularly carbon dioxide emissions—and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. Finally, the construction best practices described above represent practicable project-level measures that, while not substantially reducing global GHG emissions, may help reduce GHG emissions on an incremental basis and could contribute in the long term to meaningful cumulative reduction when considered across the Federal-aid highway program.

3.27.7.11 Floodplains

Cumulative Effects - No Build Alternative

Past construction of the Sterling Highway placed the highway facility within what is now understood and mapped as the Kenai River and Kenai Lake floodplain. The No Build Alternative would not change existing encroachments. The Sterling Highway MP 57 Erosion Protection Project is addressing embankment erosion from the river moving closer to the highway after a fall 2012 flood. Existing regulatory processes established within the Borough Flood Management Program and other resource agencies would prevent impacts from RFFAs. Design and placement of the replacement bridges would improve flood carrying capacity. While bridge construction activities may require work platforms to be temporarily placed within the 100-year floodplain, such temporary actions would be evaluated and require approval through the permit process. Therefore, the No Build Alternative, in combination with other past, present, and RFFAs, would not have a cumulative adverse effect on floodplains.

Cumulative Effects - Build Alternatives

Each of the build alternatives would have varied impacts to floodplains within the project area. Only the bridge replacements as part of the Sterling Highway Maintenance and Bridge Replacement Program would involve activities in the regulated floodplain. Design and placement of the replacement bridges would improve flood carrying capacity. Mitigation of impacts resulting from the encroachment and fill in the floodplains would be established during the Borough floodplain development permit review process, including any other applicable permit reviews required for bridge construction. Therefore, the build alternatives, in combination with other past, present, and reasonably foreseeable future actions, would not have a substantial cumulative adverse effect on floodplains.

3.27.7.12 Noise

Cumulative Effects - No Build Alternative

Under the No Build Alternative, the existing highway corridor would be affected by modest increases in traffic noise between 2012 and 2043 due to annual increases in traffic volumes. Existing traffic noise measurements show that two sensitive noise receptors currently experience highway traffic noise above DOT&PF noise impact thresholds. An additional three receptors would be impacted by 2043 (see Appendix D, *Highway Traffic Noise Assessment*).

The RFFAs identified and discussed in Section 3.27.4 are not anticipated to substantially alter vehicle traffic volumes, roadway alignments, or vehicle mix enough to have a noticeable affect on traffic noise in the project area. Repaving, bridge replacement, and other maintenance activities on the existing highway would create noise beyond the usual highway traffic noise. Bridge replacement could include placing new piers, which could involve the noise of pile driving. Both the Cooper Creek and Schooner Bend bridges are located close to campgrounds and recreation trails.

The No Build Alternative, in combination with past, present, and RFFAs, would not have substantial cumulative effect on traffic noise. Construction phasing and mitigation measures would be used to minimize construction noise impacts on sensitive properties.

Cumulative Effects - Build Alternatives

The build alternative would increase noise levels for select noise sensitive receptors. This increase would not contribute to a cumulative effect on traffic noise because the past, present, and reasonably foreseeable future actions are not anticipated to have a noticeable affect on traffic noise in the project area. Therefore, the build alternatives, in combination with past, present, and RFFAs, would not have substantial cumulative effect on traffic noise.

DOT&PF would use construction phasing and mitigation measures to minimize construction noise impacts on sensitive properties from a build alternative and the Sterling Highway Maintenance and Bridge Replacement RFFA.

3.27.7.13 Visual Environment

Cumulative Effects - No Build Alternative

The RFFAs would introduce additional cuts, fills, lighting, and linear elements where there are presently few. River users would be unlikely to have views of RFFA development due to topography or visual limitations posed by vegetation. Unit 395 residential development would potentially affect the visual quality and characteristics of the West Kenai River Uplands landscape (Landscape Unit 8; see Section 3.16 and Map 3.16-1).

No direct impacts are anticipated to the visual environment under the No Build Alternative. Therefore, the No Build alternative, in combination with past, present, and RFFAs, would not have substantial cumulative effect on the visual environment.

Cumulative Effects - Build Alternatives

All build alternatives would impact Key Views by introducing new cuts, fills, additional street lights, and manmade elements (unusual line and form) in previously more-natural settings. New roadway alignments would provide new views, and reducing traffic on the segments that would become the “old” Sterling Highway under each alternative would improve the scenic quality of that segment. See Section 3.16 for details. These effects would be combined with visual effects of past actions and RFFAs.

The overall cumulative impact would be that the visual effects of roads (linear elements through the landscape) and associated cuts and fills, once contained to a smaller area, would occur over a greater area. Bridge replacement activities, both those under the build alternatives and those performed as part of the Sterling Highway Maintenance and Bridge Replacement projects, would involve the use of large cranes that would be onsite for many months for pile driving and girder

placement. This equipment would be visible at a distance and could cause temporary impacts to visual resources.

Past, present, and reasonably foreseeable future actions, combined with the build alternatives, would have an adverse cumulative effect on visual resources in the geographic area of analysis (project area).

3.27.7.14 Wetlands and Vegetation

Cumulative Effects - No Build Alternative

Initial wetland impacts of the existing Sterling Highway construction are not known. The existing highway indirectly impacts approximately 60 acres of wetlands and ponds located within 300 feet of the existing highway (see Section 3.20.2.2). A small amount of wetlands exist in the locations of the RFFAs. State Management Unit 395 residential development contains approximately 82 acres of wetlands. The Birch and Grouse Ridge subdivisions contain approximately 77 acres of wetlands. CIRI Tract A contains less than 0.1 acre of wetlands. It is unlikely that all of these wetlands would be impacted as a result of development. Minor amounts of wetland impacts are expected from widening of the Sterling Highway from MP 58–79. There are no anticipated changes or additional impacts to wetland resources or vegetation from the No Build Alternative. Therefore, the No Build Alternative, in combination with past, present and RFFAs, would not have at cumulative effect on wetlands and vegetation.

Cumulative Effects - Build Alternatives

The build alternatives would directly impact between 11 and 38.5 acres of wetlands (see Table 3.27-6). An additional 14 to 130 acres of wetlands would be indirectly impacted due to a reduction in wetland function in areas adjacent to direct wetland impacts. The totality of these impacts represents less than 0.04 percent of the wetlands within the geographic area of analysis. On a smaller scale, the impacted wetlands account for approximately 0.08 percent of the 1,787 acres of wetlands within the project area. See Section 3.20.2 for more details on the changes to wetland functions and impacts to habitat and hydrology.

Table 3.27-6. Wetland and vegetation impacts by alternative

	Approximate Area of Impact (acres)[a]			
Wetland Type	**Cooper Creek**	**G South**	**Juneau Creek**	**Juneau Creek Variant**
Direct wetland impacts (total wetlands and ponds filled)	11.0	26.6	38.5	37.5
Indirect impacts to new alignment	14	67	130	119
Vegetation impacts	188	202	269	256

[a] See Section 3.20, Tables 3.20-5, 3.20-6, and 3.20-7.

Vegetation impacts of the build alternatives range from approximately 188 to 269 acres (see Table 3.27-6). Within the geographic area of analysis, a rough estimate of upland areas is 356,700 acres (total watershed areas minus wetlands and lakes). The impacted area is a fraction

of the available vegetative areas. On a smaller scale, approximately 85 percent of the project area is uplands (approximately 4,500 aces). The build alternative impacts represent a loss of approximately 0.06 percent of the total vegetative areas.

To minimize impacts to wetlands, any project would be designed to avoid and minimize effects to wetlands when possible, and unavoidable impacts would be mitigated via the U.S. Army Corps of Engineers compensatory mitigation ruling (see Section 3.20.2.3).

Most RFFAs would involve the removal of small amounts of vegetation from large vegetated areas. There would be an undetermined loss of needle-leaved forest from the curve realignment between MP 45–46 associated with the Sterling Highway Maintenance and Bridge Program. Other RFFAs include development of natural areas. In most cases, previously vegetated areas would not be revegetated but would be replaced with structures. While the extent of the vegetative impacts are not known at this time, the impacts at this location are not anticipated to be large in comparison to the amount of this type of vegetation within the geographic area of analysis (nor within the project area).

The impacts of past, present, and reasonably foreseeable future actions, combined with the impacts of the build alternatives, would not have a substantial cumulative adverse effect on wetlands and vegetation.

3.27.7.15 Wildlife

Brown Bears

Cumulative Effects - No Build Alternative

Impacts to brown bears under the No Build Alternative would result from continued bear-vehicle collisions along the existing highway, and decreased habitat connectivity associated with bear avoidance of crossing the existing highway. This impact would increase in magnitude as traffic volumes continued to rise. See Section 3.22.3.1 for more details.

Despite the large runs of salmon in the Kenai River and other streams, the 2013 estimated population density is closer to the lower densities of Interior Alaska bears (non-salmon-dependent populations) than to the higher densities associated with salmon-dependent coastal brown bear populations elsewhere in Alaska (Morton, Bray, et al. 2013). Human disturbance and development from past and existing projects, including forest clearing in areas with high-quality habitat on the Kenai Peninsula, may help explain this lower density (Suring, Barber, et al. 1998). The stability of the population is unknown, however the increased harvests of brown bear in 2013 and 2014 suggest that the population may have declined. USFS, in its role as a cooperating agency for this EIS, has indicated their concerns about the size and stability of the brown bear population. The consequences of bear mortality resulting from vehicle collisions or DLPs as a result of the RFFAs or project alternatives are more substantial if the population is low.

Most RFFAs identified in this analysis would result in the loss of bear habitat, habitat fragmentation and decreased habitat connectivity, avoidance of habitat near human developments, and increased potential for bear-human encounters and a corresponding increase in DLP bear mortality. USFWS, in its role as cooperating agency for this EIS, has commented that the cumulative fragmentation of the KNWR by continual improvements of the Sterling Highway and by associated residential development is of great concern. RFFAs that result in increased human development in bear habitat would cause the greatest impact to brown bears.

The development of Unit 395, in particular, could result in the loss and fragmentation of habitat of approximately 595 acres of high quality brown bear habitat (Areas 11 and 16 on Map 3.22–1). Development of the CIRI Tract A also would impact areas identified by agencies as important habitat for brown bears (Area 17 on Map 3.22–1).

Increased human development would result in habitat loss and fragmentation, a decline in adjacent habitat quality, impediments to bear movement, displacement of bears, and behavioral changes of bears in the area. These developments could reduce the amount and availability of food resources and could affect population sustainability. A large proportion of the lands surrounding the project area are managed by the USFS, USFWS and the National Park Service. Given the potential of these areas to provide important food resources for bears, the exact effects of project-related habitat disturbance on food resources and bear populations are unclear. Increased human activity and new developments would displace brown bears from existing habitat and result in behavioral changes, such as avoidance.

In areas where increased human development is anticipated, brown bear movement could be reduced, and the remaining pieces of habitat would be of reduced value because of fragmentation, edge effects, and increased human disturbance. These impacts would continue the trend of decreasing brown bear habitat effectiveness on the Kenai Peninsula relative to undeveloped conditions (Suring, Barber, et al., Analysis of Cumulative Effects on Brown Bears on the Kenai Peninsula, Southcentral Alaska 1998). Furthermore, as road density and housing structures in brown bear habitats increase, the probability of occurrence of female brown bears with cubs in these areas would likely decrease (Goldstein, Suring and Preston 2004). The decline in use of the high-quality habitat within the project area by female brown bears could in turn affect reproduction due to the relationship between high-quality habitat and reproductive abundance in brown bears, and consequent population stability (Goldstein, Suring and Preston 2004).

Road construction associated with residential development, including expansion of current residential facilities such as the proposed senior center expansion, also would result in decreased habitat effectiveness, and could result in increased mortality from bear-vehicle collisions, although these roads would be posted at a relatively low speed. The probability of human interactions resulting in DLP kills would likely increase as road and trail density increases (Goldstein, Suring and Preston 2004).

Increased traffic on the Sterling Highway, coupled with the Sterling Highway MP 58–79 Project's plan for a wider road, has the potential to constrain north-south movement of brown bears on the Kenai Peninsula. Concerns about constraining wildlife movements and severing the Kenai Peninsula into two distinct parts have been raised by KNWR managers (Morton, Refuge Notebook - Splitting the Kenai: Two Halves Don't Make a Whole 2007). If barriers to brown bear movements between bear habitats develop, populations may become isolated and could lose viability over time. This potential is exacerbated by the relatively low genetic diversity currently seen in Kenai Peninsula brown bears as compared to mainland brown bear populations (Morton, Bray, et al. 2013). Furthermore, DLP kills may increase if bears need to thread their way through increasingly developed areas (ADF&G 2000). However, DOT&PF expects that the MP 58–79 Project will include wildlife passage measures, such as underpass crossings of the highway, that are intended to maintain connections across the highway. The effectiveness of such crossings would not be known for many years.

For a genetically robust brown bear population, such as those found in the rest of Alaska, the existing conditions in combination with the RFFAs would likely have minimal adverse impacts. However, given the relatively low population connectivity and unique ecology of the Kenai Peninsula population of brown bears, the impacts of the existing conditions (as well as the No Build Alternative) in combination with the RFFAs could have substantial adverse effects on the abundance, distribution, ecology, and movement characteristics of brown bears at both local and GMU scales.

Cumulative Effects - Build Alternatives

Direct and indirect impacts on brown bears under the build alternatives would include loss of habitat from roadway development; habitat displacement from, and avoidance of, remaining habitat; and a decrease in habitat connectivity. All build alternatives are likely to contribute to a cumulative impact on brown bear mortality through changes in the probability of DLP kills and vehicle collisions over the No Build scenario.

As discussed for the No Build Alternative, human disturbance and development from past and existing projects may contribute to the lower density of Kenai Peninsula brown bears compared to other salmon-dependent coastal brown bear populations in Alaska (Morton, Bray, et al. 2013). Most RFFAs would adversely affect brown bears, resulting in additional loss of bear habitat, habitat fragmentation and decreased habitat connectivity, avoidance of habitat near human developments, and increased potential for bear-human encounters and a corresponding increase in DLP bear mortality. Any of the build alternatives, in conjunction with the Sterling Highway MP 58-79 Project, have the potential to add constraints on the north-south movement of brown bears on the Kenai Peninsula. Unit 395 residential development would directly impact high value brown bear habitat and increase road density.

Of the build alternatives, the Cooper Creek Alternative would likely have the least incremental cumulative impact on brown bears because it would create the shortest length of new roadway (3.6 miles), would result in the smallest increase in road density, and would not bisect areas identified by agencies as key brown bear habitat.

The G South Alternative would contribute an intermediate amount of impact on brown bears. The G South Alternative would bisect the lower Juneau Creek drainage, an area identified by the interagency working group as important habitat for brown bears. The increase in road density under the G South Alternative is predicted to be moderate (greater than the road density predicted for the Cooper Creek Alternative but less than that of the Juneau Creek and Juneau Creek Variant alternatives). This would be a new east-west impediment to brown bear movement, with 5.6 miles of new highway roughly parallel to the existing barriers of the Sterling Highway and the Kenai River. There are currently no infrastructure barriers to bear movement on the north side of the Kenai River between about MP 50 and MP 53. Unit 395 development would not require any land reservations for the G South Alternative; therefore, it could be developed to its full extent.

Because of the length of the segment built on a new alignment (10 and 9 miles, respectively) and the location of the new segment in important bear habitat north of the Kenai River, the Juneau Creek and Juneau Creek Variant alternatives would contribute to the largest cumulative effect on brown bears. These alternatives would leave a large area of important habitat intact in lower Juneau Creek and the bench lands west of the creek; however, the combination of the new highway with Unit 395 residential development would fragment this section. Impacts would

include loss of high-quality habitat; displacement from, and avoidance of, remaining habitat; and the constriction of brown bear movements leading to decreased habitat connectivity.

Under all build alternatives, mitigation measures would reduce impacts. DOT&PF has begun a wildlife movement study that is expected to aid in the design of one or more wildlife crossings and other measures to accommodate wildlife movement. DOT&PF is prepared to establish an appropriate number of crossings based on a prudent expenditure of public funds. In addition, DOT&PF would reserve access rights for the segment of each build alternative built on a new alignment, so no additional side roads or driveways would be permitted. This would prevent strip development along the new highway and would prevent any housing or business development occurring as a result of the project. This would prevent the project build alternatives from inducing the growth changes that would cause further habitat fragmentation and wildlife movement constriction as an indirect result of the project (see Section 3.22 for details), although such impacts are likely to occur regardless.

The impacts of past, present, and reasonably foreseeable future actions, combined with the impacts of the build alternatives, would result in a cumulative impact on brown bears, adversely impacting local abundance, distribution, ecology, and movement patterns. The cumulative impact of the build alternatives over the No Build Alternative is anticipated to be relatively small. It is anticipated that bear mortality as a result of vehicle collisions and DLPs would be greater under the build alternatives. USFS, in its role as a cooperating agency for this EIS, has commented their concerns about the size and stability of the brown bear population. The consequences of bear mortality resulting from vehicle collisions or DLPs as a result of the build alternatives in combination with the RFFAs are more substantial if the population is low.

However, the limited data on current and historic population size and distribution for Kenai Peninsula brown bears complicate an assessment of the effects of past development activities on brown bears, and, consequently, limits the ability to appraise the potential effects of future development activities.

Moose

Cumulative Effects - No Build Alternative

Impacts on moose under the No Build Alternative would result from continued moose-vehicle collisions along the existing highway, decreased habitat connectivity due to physical and traffic impediments to highway crossings, and avoidance or reduced use of habitats along the highway corridor as traffic increased over time.

As a result of the RFFAs that include incremental growth of human developments in Cooper Landing, some degree of moose displacement, habitat fragmentation and avoidance, and decreased habitat quality would occur. Development of Unit 395, in particular, would result in the loss and fragmentation of habitat within approximately 595 acres in an area identified by agencies as important moose habitat (see Area 13 on Map 3.22–1). Road widening as part of the Sterling Highway MP 58–79 Project would further decrease habitat connectivity by increasing the physical impediment to crossing the highway. The recent CNF Bean North vegetation management project would have potentially positive effects on moose through improvements to moose forage. Positive effects would be unlikely to mitigate the overall adverse cumulative effects of development. The impacts of the No Build Alternative and the RFFAs have the

potential to adversely affect the local abundance and distribution of moose in the geographic area of analysis.

Cumulative Effects - Build Alternatives

Direct and indirect impacts on moose under the build alternatives would include permanent habitat loss, fragmentation, and alteration; avoidance of habitat near the highway corridor; and increased moose-vehicle collisions. New segments of roadway likely would be a partial barrier to moose movement. DOT&PF would retain access rights along the segment of each of the build alternatives that would be built on a new alignment, so no additional side roads or driveways would be permitted. This would prevent strip development along the new highway, preventing further habitat fragmentation and wildlife movement constrictions associated with this project (see Section 3.22 for details).

Combined with the RFFAs, the build alternatives would contribute to a cumulative effect on moose, including adverse effects on the local abundance, distribution, and movement characteristics of moose.

Of the build alternatives, the Cooper Creek Alternative would likely have the least incremental cumulative impact on moose because it would create the shortest length of new roadway (3.6 miles) and would not impact important moose habitat near Bean Creek and west of Juneau Creek. The new highway segment would occur south of the river near existing development in Cooper Landing. Wildlife movement in this area already is influenced by the existing highway, community development, and the river.

The G South Alternative would contribute to a greater cumulative impact on moose due to its location (crossing important moose habitat near Bean Creek and Juneau Creek) and length of the new road (5.6 miles). There are currently no infrastructure barriers to moose movement on the north side of the Kenai River between about MP 50 and MP 53. The addition of collision threats and a movement barrier where there were none before would impact moose.

The Juneau Creek and Juneau Creek Variant alternatives would contribute to the greatest cumulative impact on moose due to their length of new roadways (10 and 9 miles, respectively) and locations (crossing important moose habitat near Bean Creek and Juneau Creek). There are currently no infrastructure barriers to moose movement on the north side of the Kenai River between about MP 50 and MP 53. The addition of collisions threats and a movement barrier where there were none before would impact moose.

DOT&PF has begun a wildlife movement study that is expected to aid in the design of one or more wildlife undercrossings and other mitigation measures to accommodate wildlife movement across the build alternatives in important areas. These crossings are intended to minimize collisions between motor vehicles and wildlife and retain connections between habitat areas.

As discussed for the No Build Alternative, most RFFAs would adversely affect moose habitat and movement. The impacts of past, present, and reasonably foreseeable future actions, combined with the impacts of the build alternatives, would adversely affect the local abundance and distribution of moose in the project area, resulting in a cumulative impact; however, the increase in cumulative impact is anticipated to be relatively small in comparison to the No Build Alternative. The cumulative impacts of the build alternatives and the RFFAs would have very little impact on moose abundance, distribution, or ecology at the GMU level.

Other Mammals

Cumulative Effects - No Build Alternative

Few new impacts on wolves, lynx, wolverines, river otters, black bears, Dall sheep, and mountain goats would be anticipated for the No Build Alternative. Impediments to movements and some animal-vehicle collisions would continue, and may increase, as future traffic volumes rise. Increased traffic and human use could reduce prey species (for wolves, lynx, and wolverines) and increase DLP kills of black bears. Increased displacement from habitats adjacent to the highway could occur for some species.

Most RFFAs would result in loss of habitat, habitat fragmentation, and decreased habitat connectivity; avoidance of habitat near human developments; increased potential for bear-human encounters and a corresponding increase in DLP kills (for black bears); and increased wildlife-vehicle collisions. The development of Unit 395 and the CIRI Tract A areas, in particular, would result in the loss of habitat in areas identified by agencies as important habitat for black bears (Area 16 and 17 on Map 3.22–1). Impacts to Dall sheep and mountain goats are likely to be minimal, as these species generally inhabit the higher elevation areas away from current and reasonably foreseeable human development. The development of the Birch and Grouse Ridge Subdivision could impact riparian habitat used by river otters near Bean Creek.

As a result, the impacts of the No Build Alternative in combination with the RFFAs could adversely affect the local abundance, distribution, and movement characteristics of other wildlife.

Cumulative Effects - Build Alternatives

Direct and indirect impacts to wolves, lynx, wolverines, river otters, and black bears as a result of the build alternatives would contribute to a cumulative effect on these species from permanent loss of habitat, habitat fragmentation, and displacement of animals from habitat (especially for wolves, lynx, and wolverines). These impacts could contribute to lower population sizes, impediments to movements across the new highway, and direct mortality resulting from vehicle collisions (especially of wolves, lynx, and black bears) or DLP kills for black bears. River otters could be affected by project-related changes to rivers and streams, especially near Bean Creek (G South and the two Juneau Creek alternatives). Direct impacts on black bears would be similar to impacts reported for brown bears, including habitat loss, habitat fragmentation, behavioral changes due to human activity, and injury or mortality from traffic collisions and DLP kills. Increased traffic and human use could reduce prey species (for wolves, lynx, and wolverines), and increase poaching of black bears. Because Dall sheep and mountain goats generally inhabit the higher elevation areas away from the proposed build alternatives, direct and indirect impacts on them would likely be minimal.

Of the build alternatives, the Cooper Creek Alternative would likely have the smallest cumulative impact on wolves, lynx, wolverines, and river otters because the alternative would cross a limited amount of high-value habitat for these species. Cumulative impacts on wolves, lynx, and wolverines are likely to be greater under the G South, Juneau Creek, and Juneau Creek Variant alternatives because these alternatives would result in the loss of high-value, undisturbed habitat located north of the existing highway. This includes bisecting Juneau Creek drainage, an area identified by the interagency working group as an important movement corridor for wildlife.

The G South, Juneau Creek, and Juneau Creek Variant alternatives would also have a larger cumulative impact on river otters through impacts to several riparian areas.

Cumulative impacts to black bears are anticipated to be similar among the four build alternatives. The Cooper Creek, Juneau Creek, and Juneau Creek Variant alternatives each cross two areas of predicted use for black bears (Areas 2 and 10 for Cooper Creek, Areas 2 and 16 for the Juneau Creek and Juneau Creek Variant Alternatives; see Map 3.22–1), while the G South Alternative crosses just one black bear use area (Area 2 on Map 3.22–1).

As discussed for the No Build Alternative, most RFFAs would result in the loss of habitat, habitat fragmentation and decreased habitat connectivity, avoidance of habitat near human developments, and increased potential for bear-human encounters and a corresponding increase in DLP bear mortality.

The impacts of past, present, and reasonably foreseeable future actions, combined with impacts of any of the build alternatives, would result in a cumulative impact on wolves, lynx, wolverines, and river otters, adversely impacting local abundance, distribution, and movement. The impacts of past, present, and reasonably foreseeable future actions, combined with the impacts of any of the build alternatives, would result in a cumulative impact on black bears. The build alternatives in combination with past, present, and reasonably foreseeable future actions would not have substantial cumulative effects on Dall sheep or mountain goat populations. For all mammals discussed, any increase in cumulative impacts is anticipated to be relatively small in comparison to impacts from the No Build Alternative.

Birds

Cumulative Effects - No Build Alternative

The No Build Alternative would have minimal direct impacts on birds or habitat. Therefore, the No Build alternative, in combination with past, present and RFFAs, would not have cumulative effect on bird populations.

Cumulative Effects - Build Alternatives

Direct impacts to birds in the project area would include a permanent loss of habitat, disturbance from human activity along the roadway, direct mortality from collisions with vehicles, and disturbance and displacement of birds due to construction activities. Direct and indirect impacts specific to bald eagles are similar to those discussed for other bird species. The loss of habitat would include the potential reduction in food sources (including decrease in available hunting areas and reduced availability of prey base), cover, breeding habitat, and perching sites. The removal of riparian habitat used by bald eagles for breeding and foraging could reduce roosting and foraging habitat in the area. Given the high degree of nest site fidelity shown by bald eagles (Jenkins and Jackman 1993), it is anticipated that the project build alternatives would have moderate impacts to bald eagle nesting activity in the project area.

Of the build alternatives, the Cooper Creek Alternative would likely have the least incremental cumulative impact on birds because it would create the shortest length of roadway built on a new alignment (3.6 miles) and would impact the least amount of vegetated habitat (188 acres). The G South Alternative (5.6 miles) would impact 202 acres of vegetated habitat, while the Juneau Creek and Juneau Creek Variant alternatives (10 and 9 miles, respectively) would impacts 269 and 256 acres of vegetated habitat, respectively. Habitat loss as a result of the build alternatives ranges from 1.3 to 1.9 percent of mapped vegetated habitat within the project area.

Improvements to sections of the existing highway would remove some riparian habitat that could eliminate bald eagle nesting and roosting habitat in this area. The Juneau Creek Variant Alternative would require the removal of one inactive bald eagle nest along its proposed alignment.

Most RFFAs, and particularly those associated with incremental growth in Cooper Landing, would result in some degree of bird displacement, habitat fragmentation, and habitat avoidance from areas with increased human access and activities. This is potential fragmentation would be additional to habitat loss, fragmentation, and displacement from past development activities. In addition, road construction and improvement activities, such as the proposed project, may allow for future increases in human activity and traffic which would result in further disturbance and displacement of bird species. Some species are likely to be displaced from preferred habitats. Depending upon the species, displaced birds would relocate to other adjacent suitable habitat areas. Habitat loss or human disturbance in riparian areas adjacent to the Kenai River would have the greatest effect on bald eagles because the upper Kenai River area has been identified as one of the more important wintering areas for bald eagles in Southcentral Alaska (Bailey, et al. 2008); however most RFFAs would not be located adjacent to the Kenai River, and substantial segments of each build alternative would be located away from the river. The current vegetation management project in the CNF would have potentially positive and adverse effects on bird species. Positive effects would not likely offset the adverse cumulative effects of development.

The habitat fragmentation and loss associated with the project build alternatives, in combination with past, present, and reasonably foreseeable future actions, would result in moderate potential disturbance and displacement of birds in the project area. The availability of vegetated habitat elsewhere within the geographic area of analysis may provide potential alternative habitat for some species. In addition, because the majority of the bird species found in the project area are migratory, the cumulative impacts associated with the project build alternatives, in combination with past, present, and reasonably foreseeable future actions, may have effects reaching beyond the geographic area of study.

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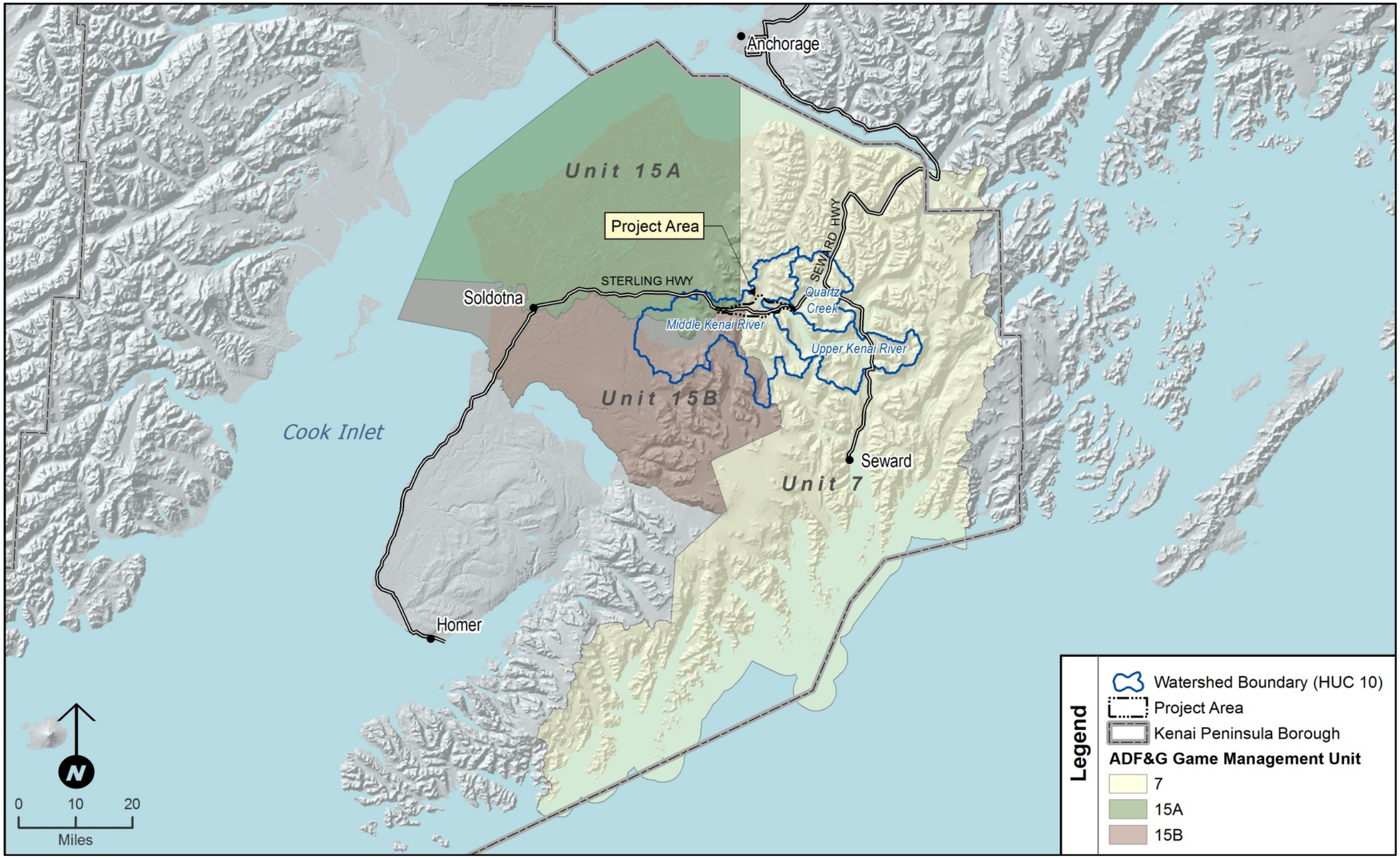

Map 3.27-1. Cumulative boundaries

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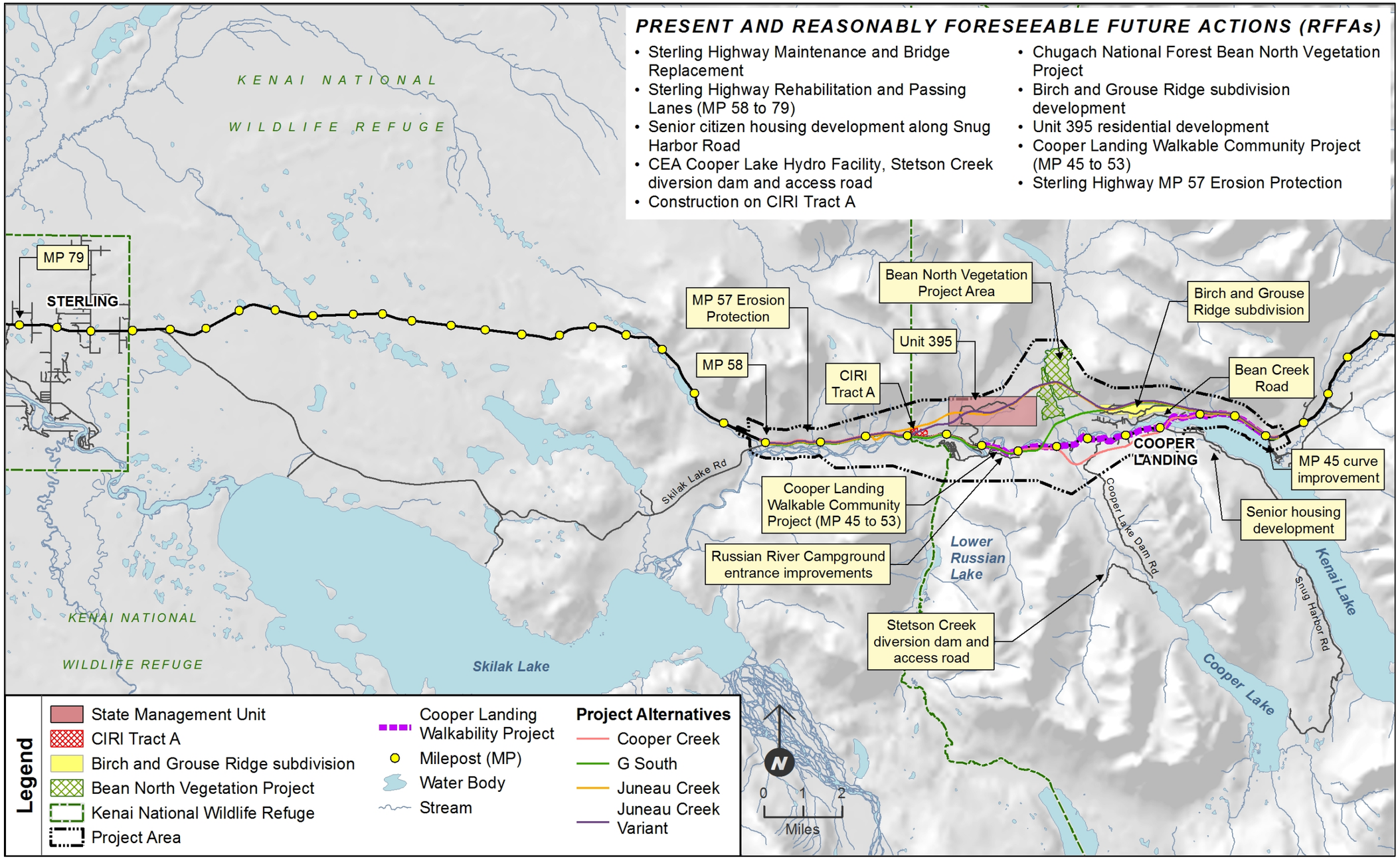

Map 3.27-2. Present and Reasonably foreseeable future actions (RFFAs)

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Sterling Highway MP 45–60
Draft SEIS and Draft Section 4(f) Evaluation

Chapter 4
Draft Section 4(f) Evaluation

STERLING
HIGHWAY MILE POST 45 TO 60
ALASKA

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March 2015

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4 Draft Section 4(f) Evaluation

4.1 Introduction

4.1.1 Project and Legal Background

Section 4(f) of the Federal Department of Transportation Act prohibits use of certain parks, recreation areas, wildlife refuges, or historic properties for transportation projects unless there is "no prudent and feasible alternative" or the impacts are "*de minimis*." This chapter further explains the law and analyzes properties in the project area protected by Section 4(f) and the impacts to those resources that would be caused by the various alternatives.[1] The project area is depicted on Map 4-1 at the end of this chapter.

Section 4(f) Maps

The numbering convention for maps in this chapter is different than the numbering used in other chapters. While maps in other chapters are labeled according to the subsection in which they appear, all maps in this chapter are numbered simply as Map 4-1, 4-2, etc., and all appear together at the end of the chapter.

Section 4(f) of the Department of Transportation Act of 1966 (as amended), 49 United States Code (USC) § 303(c), states:

> The Secretary (of Transportation) may approve a transportation program or project (other than any project for a park road or parkway under section 204 of title 23) requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if—
>
> (1) there is no prudent and feasible alternative to using that land; and
>
> (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

Also, 49 USC 303 states requirements related to minimal impacts to a Section 4(f) resource:

> [Section 4(f)] requirements…shall be considered to be satisfied…if the Secretary (of Transportation) determines, in accordance with this subsection, that a transportation program or project will have a *de minimis* impact on the area.
>
> 49 USC 303(d)(1)(B)

[1] Some information in this chapter is based on *Background for FHWA Determination of Section 4(f) Applicability* (*Background*; (HDR 2008c), a report on file with the Federal Highway Administration (FHWA) and Department of Transportation and Public Facilities (DOT&PF). The *Background* document contains confidential information on historic properties and therefore is not published for general distribution, but information from the report is summarized in this chapter and in Chapter 3 of this Supplemental Environmental Impact Statement (SEIS).

The Secretary may make a finding of *de minimis* impact for historic sites only if—

(A) the Secretary has determined, in accordance with the consultation process required under Section 106 of the National Historic Preservation Act (16 USC 470f), that—

(i) the transportation program or project will have no adverse effect on the historic site; or

(ii) there will be no historic properties affected by the transportation program or project;

(B) the finding of the Secretary has received written concurrence from the applicable State historic preservation officer or tribal historic preservation officer (and from the Advisory Council on Historic Preservation if the Council is participating in the consultation process); and

(C) the finding of the Secretary has been developed in consultation with parties consulting as part of the process referred to in subparagraph (A).

49 USC 303(d)(2)

The Secretary may make a finding of *de minimis* impact for parks, recreation areas, and wildlife or waterfowl refuges only if—

(A) the Secretary has determined, after public notice and opportunity for public review and comment, that the transportation program or project will not adversely affect the activities, features, and attributes of the park, recreation area, or wildlife or waterfowl refuge eligible for protection under this section; and

(B) The finding of the Secretary has received concurrence from the officials with jurisdiction over the park, recreation area, or wildlife or waterfowl refuge.

49 USC 303(d)(3)

The term "feasible and prudent (avoidance) alternative" (from the first quoted block above) is defined in the Federal Highway Administration (FHWA) Section 4(f) regulations in 23 Code of Federal Regulations (CFR) 774.17: an alternative is not feasible if it cannot be built as a matter of sound engineering judgment and is not prudent if it conflicts with the project purpose or creates extraordinary impacts.

This chapter evaluates Section 4(f) resources, the impacts of the proposed alternatives, alternatives that could avoid use of Section 4(f) resources, and all possible measures to minimize harm to these resources (see the "Process" box in Section 4.1.4 and in subsequent sections).

4.1.2 Project Purpose and Needs Summary

The summary presented here is based upon the detailed purpose and need description in Chapter 1.

The Sterling Highway is part of the National Highway System and the Interstate Highway System, but in the greater Cooper Landing area it also functions like a rural collector road. The purpose of the project is to bring the highway up to current standards for a rural principal arterial to efficiently and safely serve through-traffic, local community traffic, and traffic bound for

recreation destinations in the area, both now and in the future. In achieving this transportation purpose, the Alaska Department of Transportation and Public Facilities (DOT&PF) and FHWA recognize the importance of protecting the Kenai River corridor.

DOT&PF and FHWA have identified three interrelated needs to resolve problems in the Milepost (MP) 45–60 project area:

- ***Need 1: Reduce Highway Congestion.*** The construction of multiple driveways and connecting side streets over time, combined with a curvy, constrained alignment with little passing opportunity and increasing traffic volumes, has led to considerable congestion that is forecast to worsen in future years. As a result, the highway performs below a desirable level of service for a rural principal arterial that is a component of the National Highway System.
- ***Need 2: Meet Current Highway Design Standards.*** Existing characteristics of the Sterling Highway do not meet current design standards for a rural principal arterial road. The existing highway contains curves, grades along Kenai Lake, shoulders, guardrail, and clear zones[2] that do not meet current design standards.
- ***Need 3: Improve Highway Safety.*** Due to the interrelated effects of highway congestion and outdated highway design characteristics, the project area has a higher-than-average number of traffic crashes and a greater severity of crashes when compared to the statewide average.

4.1.3 Alternatives

Chapter 2 of the Supplemental Environmental Impact Statement (SEIS) describes the project area and alternatives, including the alternatives development process, and alternatives previously considered but determined not reasonable. These alternatives figure into the discussion of potential ways to minimize harm to Section 4(f) properties that appears in Section 4.6. Section 4.6 provides greater detail on various past alternatives than does Chapter 2, so no additional detail is provided here.

4.1.4 Section 4(f) Properties Considered and Process Used

All build alternatives would use land from multiple Section 4(f) properties in the project area. Those 4(f) properties for which there is a use by any of the build alternatives appear in Table 4.1-1. There are several other Section 4(f) properties in the project area—notably Sportsman's Landing Boat Launch near MP 55; Cooper Creek Campground near MP 51; several adjoining and overlapping U.S. Forest Service (USFS) properties along the Russian River, namely the Russian River Recreation Area, USFS Russian River Campground, Russian River Trail, and Russian River Angler's Trail; New Village Traditional Cultural Property (TCP); and several historic buildings, including Broadview Guard Station, Gwin's Lodge, and historic structures along the existing highway in the community of Cooper Landing. Map 4-1 at the end of this

[2] Clear zone: A clear zone is an unobstructed, relatively flat area that runs the length of a highway beyond the edges of the outer lanes. Such an area allows a driver to stop safely or regain control of a vehicle that leaves the traveled way (FHWA 2006a).

chapter illustrates the Section 4(f) properties in the project area. The map includes all the properties listed in Table 4.1-1 plus other Section 4(f) properties[3] for which there would be no

Section 4(f) use, because these other properties have been central to the analysis for this project and their context is important in later discussion (particularly discussion of rerouting alternatives to minimize harm to individual Section 4(f) properties). Map 4-2 through Map 4-12 provide detail on the properties that would be used by one or more of the alternatives. The mosaic of Section 4(f) properties in the project area, coupled with the mountain and river geography of the Kenai River Valley, creates a particularly complex set of Section 4(f) properties through which to thread any transportation alignment. All four build alternatives would use land from multiple properties subject to Section 4(f) protection.

Process used in this Section 4(f) Evaluation

Because the Sterling Highway project area presents a complex set of Section 4(f) properties, informational boxes like this one will be used to outline the steps employed and to indicate where the reader is in the process. The process outline, with the current step in bold, is as follows.

1. **Identify Section 4(f) properties.**
2. Evaluate whether any impact is likely to be a *de minimis* impact.
3. Identify any alternatives that would avoid all Section 4(f) properties.
4. Present the impacts of proposed alternatives on Section 4(f) properties.
5. Identify alignment shifts that could avoid individual Section 4(f) properties or minimize harm to individual properties, and identify other measures to minimize harm.
6. Evaluate least overall harm (preliminary evaluation).

This chapter examines potential impacts to the Section 4(f) properties by the project alternatives, as well as the potential to avoid Section 4(f) properties or to minimize harm to the properties (see the accompanying "Process" box above). Table 4.1-1 also indicates generally which alternatives would affect each Section 4(f) property. Sites not subject to Section 4(f) protection are not discussed in most of this chapter, and unaffected sites usually are mentioned only in the context of potential avoidance alternatives. For information on the effects to parks, recreation resources, and other properties not subject to Section 4(f), see Section 3.8, Park and Recreation Resources, and Section 3.9, Historic and Archaeological Preservation.

The process concludes with an analysis to assist in determining which alternative would have the "least overall harm." That analysis serves as a summary of the rest of the chapter and incorporates the most important issues from the rest of the Draft SEIS (see Section 4.8). Table 4.8-12 through Table 4.8-17 at the end of this chapter present a summary of the least overall harm factors.

[3] Some historic properties, including archaeological sites and traditional cultural properties, are not shown to protect historic resources.

Table 4.1-1. Section 4(f) resources used by Sterling Highway alternatives

Property type and name	Ownership (*management, if different*)	Property Size (acreage)	Alternatives that would use this 4(f) property
Park			
Kenai River Special Management Area	State	720.0[a]	CC, GS, JCV
Wildlife Refuge			
Kenai National Wildlife Refuge	USFWS	1.92 million	JC
Recreation Area			
Resurrection Pass Trail	USFS	4,600.0	JC, JCV
Bean Creek Trail (recreation portion)[b]	USFS, State (*USFS*)	31.0[b]	GS
Stetson Creek Trail[b]	USFS, Borough (*USFS*)	51.0[b]	CC
USFS Kenai River Recreation Area	USFS	282.0	CC, GS, JCV
Juneau Falls Recreation Area	USFS	320.0	JC, JCV
Cooper Landing Boat Launch and Day Use Area	State	5.3 0.55	CC (temporary use)
Historic/Archaeological Area			
Sqilantnu Archaeological District [c]	Multiple	12,600.0	All
Confluence TCP[d]	Multiple	1,187.0	All
Bean Creek Trail (historic portion)[b]	USFS	26.0[b]	GS, JC, JCV
Stetson Creek Trail[b]	USFS, Borough (*USFS*)	51.0[b]	CC
Charles G. Hubbard Mining Claims Historic District	USFS, State	444.0	CC, GS
Kenai Mining and Milling Co. Historic District	USFS, State, Borough	29.1	CC

[a] The KRSMA encompasses 105 river miles from the east end of Kenai Lake nearly to the mouth of Kenai River. Full acreage is not reported by Alaska State Parks. In the project area, the park is the submerged lands of the Kenai River and Kenai Lake only, and within the boundaries of KNWR it is the water column only. The submerged lands portion under State ownership is calculated for this document at 720 acres.

[b] Both the Bean Creek and Stetson Creek trails qualify for Section 4(f) protection for their recreation qualities *and* historic qualities. The portion of Bean Creek Trail that is recreation only and does not overlap the historic route is 6 acres.

[c] The Sqilantnu Archaeological District includes thousands of individual features within more than 200 historic properties that contribute to the district. All alternatives pass through the district boundaries.

[d] The Sqilantnu Russian River Confluence Site TCP (Confluence TCP) is wholly contained within the Sqilantnu Archaeological District and contributes to the district, but also is individually eligible for the National Register of Historic Places.

Note**:** Borough = Kenai Peninsula Borough; CC = Cooper Creek Alternative; GS = G South Alternative; JC = Juneau Creek Alternative; JCV = Juneau Creek Variant Alternative; KRSMA = Kenai River Special Management Area; TCP = Traditional Cultural Property; USFWS = U.S. Fish and Wildlife Service

4.2 Descriptions of Section 4(f) Resources

4.2.1 Background Regarding Section 4(f) Resources in the Project Area

Preparation of this Section 4(f) Evaluation involved investigation of all parks, recreation areas, wildlife and waterfowl refuges, and historic and archaeological properties in the project area. The focus was on those that could be affected by project alignments and their proposed right-of-way areas. For historic and archaeological properties, preparation considered all known properties within the Area of Potential Effect (APE) under Section 106 of the National Historic Preservation Act (NHPA). FHWA, in consultation with the State Historic Preservation Officer (SHPO) and other consulting parties, determined which additional sites were eligible for the National Register of Historic Places (NRHP) and documented those previously determined eligible. Any individually eligible property or any property that contributes to an eligible historic or archaeological district is subject to Section 4(f) protection. Section 3.9 of the Draft SEIS discusses historic properties and the applicability of Section 106 of the NHPA and Executive Order 13175. Section 3.8 contains information regarding park, recreation, and wildlife refuge resources in and around the project area.

To help determine which properties were subject to Section 4(f) protection and which were not, DOT&PF prepared a document titled *Background for FHWA Determination of Section 4(f) Applicability* (*Background;* (HDR 2008c)) that presented the features, ownership, attributes, and current uses of the different properties. The document examined the particulars of each property that had potential to be subject to Section 4(f) protection. The *Background* document includes confidential information about cultural sites, so is not published for general distribution. FHWA's decisions regarding applicability are reflected in Section 4.1.4 and Table 4.1-1, above. The properties listed are those that FHWA has determined are subject to Section 4(f) protection and that were considered in light of impacts by the four main build alternatives or by potential avoidance alternatives. Section 3.8 of this Draft SEIS discusses park- and recreation-oriented lands to which Section 4(f) protection does not apply, as well as impacts to these non-4(f) properties. Both Sections 3.8 and 3.9 discuss certain properties that may be protected by Section 4(f) but for which there is no Section 4(f) use by any of the alternatives.

Public Land Orders. Within the project area, on Chugach National Forest (CNF) lands, there are several areas withdrawn for recreation purposes by public land order. Often they are called "recreation areas." Withdrawals by public land order on a national forest are undertaken by the Secretary of the Interior with the concurrence of (usually at the request of) the Secretary of Agriculture. Public land order withdrawals are undertaken under the authority of Executive Order 10355, "Delegating to the Secretary of the Interior the authority of the President to withdraw or reserve lands of the United States for public purposes" (May 26, 1952). The executive order also specifically delegates to the Secretary of Interior "the authority to modify or revoke withdrawals and reservations of such lands heretofore or hereafter made." The public land orders withdraw the subject lands from mineral entry and prevent their conveyance to other uses, such as conveyance to the State of Alaska under the Statehood Act or conveyance to Alaska Native corporations under the Alaska Native Claims Settlement Act (ANCSA). Some of the withdrawals were made in perpetuity, and others were made with an expiration date. The USFS has indicated that the Federal Land Policy and Management Act required a 20-year limit on public land orders. Some of the recreation withdrawals in the project area were established by public land order before passage of the Federal Land Policy and Management Act and had no

expiration (e.g., Cooper Creek Camp and Picnic Ground). Others were established after passage of the Federal Land Policy and Management Act and had an expiration date. The USFS considers this a statutory limit, not a limit on the agency's intent to retain the current status of the land (Vaughan, personal communication 2006a, 2006b). The USFS indicates that a forest supervisor can request from the U.S. Bureau of Land Management a public land order to revoke or recast a previous land order. Further detail on the application of public land orders to each area is provided under the specific recreation resources in the following pages.

Trail Widths. Trails on CNF land typically do not lie within a legally defined right-of-way or easement. Rather, they were constructed by the USFS across USFS lands without alteration of land status. The study team and USFS have documented widths of similar trails and have met to help arrive at a trail width for consideration under Section 4(f), particularly for the Resurrection Pass National Recreation Trail in CNF. (Documentation of this process appears in Attachment C and correspondence in Attachment D of the *Background* document (HDR 2008c).) In addition to their recreation value, the trails in question are eligible for the NRHP. Consultation on these trails did not define a width.

DOT&PF and FHWA initially proposed a width of 50 feet for the Resurrection Pass Trail, which appeared to equal a short section of legal easement at the north end of the trail and to equal or exceed other nearby trail easements held by the USFS. The USFS countered with a 1,000-foot width, based primarily on the desired width in the *Iditarod National Historic Trail Comprehensive Management Plan* (BLM 1996) for a sister trail in the National Trails System. Therefore, FHWA opted for purposes of the Section 4(f) Evaluation to assess a corridor 1,000 feet wide (500 feet each side of centerline) as the recreation resource for Section 4(f) trail evaluation purposes regarding the Resurrection Pass Trail.

For the Stetson Creek and Bean Creek trails, which are not part of the National Trails System, FHWA has determined that using a uniform width of 100 feet (50 feet each side of centerline) is appropriate to make a balanced assessment of impact among alternatives.

Section 106 and Section 4(f). Section 4(f) protection applies to any historic or archaeological property found eligible for the NRHP. Eligibility for the NRHP is determined through a process laid out under Section 106 of the NHPA (23 CFR 774.11[e]). For purposes of this document, properties protected under Section 4(f) and the determinations of impact on specific cultural sites mirror those made in the determinations of eligibility and determinations of effect under the Section 106 process.

Remainder of Section 4.2. The remainder of this section details each of the Section 4(f) properties listed in Table 4.1-1. The *Background* document provides additional confidential information on cultural properties as well as information on those properties to which Section 4(f) does not apply.

4.2.2 Kenai River Special Management Area

Section 4(f) Property Type: Park

4.2.2.1 Size and Ownership, Including Agreements Related to Ownership

The Alaska Legislature established the Kenai River Special Management Area (KRSMA) as a unit of the State park system. It is managed by the Alaska Division of Parks and Outdoor Recreation (DPOR). It was established in recognition of the importance of the Kenai River for

fish habitat and for fishing, both commercial and sport fishing, when development and popularity of fishing were threatening the river. Generally, the park is owned by the State. Within the boundaries of KNWR, KNWR owns the submerged lands, but DPOR and KNWR both assert management authorities over activities on the water and do so cooperatively. The legislative boundaries within the project area encompass the Kenai River itself and Kenai Lake (shown in crosshatch on Map 4-1, Map 4-2, and Map 4-11; on other maps, Kenai Lake, the river, and visible beaches without vegetation would be part of this park unit, except for the submerged lands within the boundaries of KNWR). The special management area includes "the Kenai River… upstream to and including the waters of the Kenai and Skilak Lakes." Overall, the KRSMA protects 105 miles of the river system. DPOR does not report a total acreage; within the project area, the river and Kenai Lake submerged lands under State ownership encompass approximately 720 acres. In total, the KRSMA is estimated at some 44,000 acres.

The Sterling Highway right-of-way in the project area crosses the Kenai River in two locations and extends into the river where the highway parallels the river in several locations. Whether on dry land or submerged lands, any construction activity for transportation within the right-of-way is not considered to be a Section 4(f) use of land. This is because such use would not be a conversion of land use from protected refuge and park property to transportation uses; the land already has been incorporated for transportation uses.

There are areas proposed for addition to the KRSMA, but FHWA has determined that Section 4(f) does not apply to the proposed additions because they are designated in a management plan specifically awaiting legislative action to add them to the park. Without formal status as a "park," these additions are not subject to Section 4(f) protection.

4.2.2.2 Functions, Available Activities, Existing and Planned Facilities

The KRSMA park unit is an important salmon migration and spawning area and hosts Alaska's most popular salmon sport fishery. Salmon returning to the Kenai and Russian rivers are important for commercial fishing in Cook Inlet. Within the project area, KRSMA activities include raft and boat trips on the Kenai River for scenic viewing and sport fishing, as well as fishing along the banks. Discussions with land managers, including DPOR, USFS, and U.S. Fish and Wildlife Service (USFWS; the Federal agencies that manage the river corridor) did not indicate plans for substantial changes in management direction or addition of facilities.

4.2.2.3 Access and Use Levels

Access to the Kenai River and Kenai Lake is generally from the Sterling Highway and from public boat launch ramps such as those at Sportsman's Landing and Cooper Landing in the project area (see Map 4-4 and Map 4-11). Some rafting and fishing outfitters launch directly from their own property along the river. Use of the Kenai River is high in summer, both for sport fishing and recreational boat trips (rafting, canoeing, kayaking, drift boats). Many commercial sport-fishing and boating outfitters operate on the river. DPOR rangers take occasional counts of river bank use, private boats of any kind, and commercial boats of any kind, mostly counted near the Cooper Landing and Sportsman's Landing boat launch sites. DPOR uses a formula to extrapolate the number of users throughout the month and throughout the year. The counts are not considered to be highly reliable and are thought to undercount actual use (Carrico, personal communication 2007). For 2005, DPOR reported bank use at 21,034 persons, users of private boats at 29,964, and users of commercial boats at 3,233. Use continues in the winter in low numbers. In 2012, the USFS counted 67,069 visitors who stayed overnight in the area, used

USFS Campgrounds and Russian River day-use parking, or were counted in the Cooper Landing vicinity (HDR and USKH 2013). The estimated number of visitors boating the upper stretch of the river during a typical summer by the Kenai National Wildlife Refuge (KNWR) is around 25,000 (HDR and USKH 2013).

While there is recreational use of both Kenai Lake and the Kenai River for sport fish and harvest, it is the Kenai River that is more heavily used. Over an 8-year period, from 2004 to 2011, Alaska Department of Fish and Game (ADF&G) statewide harvest surveys reported an average of about 120,000 anglers fished the entire Kenai River per year, versus an average of about 500 per year on the lake. The effort expended averaged 51,000 angler-days per year on the upper Kenai River (project area) in the 2004–2011 period (HDR and USKH 2013). The University of Alaska Anchorage Institute for Social and Economic Research (ISER) indicated the importance of the Kenai River in studies related to the balance of commercial and sport fisheries of Kenai River salmon (1996). Using 1993 and 1994 data, ISER indicated that residents of Southcentral Alaska made nearly 626,000 fishing trips throughout Southcentral Alaska. Twenty-five percent of all trips were to the Kenai and Russian rivers, "by far the most popular sport-fishing sites in the region," according to ISER. Also, about 98,000 nonresidents made sport-fishing trips in the region, and 54,000 of these were to the Kenai River system. "Altogether, residents and visitors spent $136 million in 1993 for sport-fishing trips in Southcentral Alaska, with $34 million of that for trips to the Kenai and Russian rivers." As an indication of harvest, each year species harvest surveys (1997–2006) indicate that anglers keep about 16,000 Chinook (king) salmon; 225,000 sockeye (red) salmon; 43,000 coho (silver) salmon; 10,000 pink salmon; 3,000 rainbow trout; and 6,000 Dolly Varden (as reported in HDR and USKH (2013)). Although the numbers of Kenai River king salmon caught are far fewer, Kenai River kings have an international reputation for their trophy size—up to 100 pounds.

Although fishing is "by far the primary recreation activity" (DNR, ADF&G, KPB 1997), the Kenai River serves many user groups, including anglers (bank, drift-boat, and power-boat) and scenic boaters, and supports other non-angling activities that include rafting, viewing scenery, viewing wildlife, picnicking, and camping (DNR 2010). Of the 24,941 who that used the upper Kenai River between Kenai Lake and Skilak Lake in 2004, 38 percent were not anglers. These various recreational opportunities, in addition to the prime fishing, provide the market for guided trips and tours. On average, 388 guides are permitted annually to use the river (DNR 2012), making the river more accessible to those less experienced with the area, while providing stimulus to the local economy.

4.2.2.4 Relationship to Similarly Used Lands in the Vicinity

There are many other lands managed for developed and dispersed recreation in the project area as part of the national forest and the national wildlife refuge. Beyond the immediate project area, the KRSMA downstream also is heavily used for sport fishing. Many other rivers and streams and vast coastal areas also are used for sport fishing, and marine areas are important for commercial and sport fishing. Salmon that spawn in or transit through the project area are important to sport fisheries upstream and downstream and to commercial fisheries in Cook Inlet.

4.2.2.5 Other Factors

The formally designated park unit in much of the project area is submerged land—land below ordinary high water of Kenai River and Kenai Lake. Exposed gravel bars and beaches generally are included, but forested uplands are not part of the park unit. Where the Kenai River flows

through the KNWR, the United States of America owns the submerged lands, but both the Federal and State governments manage the water column. Day-to-day management of the corridor is cooperative between USFWS and DPOR, and generally there is no conflict. Both KRSMA and KNWR are Section 4(f) properties, so the distinction between KRSMA and KNWR within the refuge boundaries does not change whether the river is protected under Section 4(f), but the 4(f) "property" associated with the river within the refuge is KNWR property not KRSMA property. See next subsection.

4.2.3 Kenai National Wildlife Refuge

Section 4(f) Property Type: Wildlife Refuge

4.2.3.1 Size and Ownership, Including Agreements Related to Ownership

The KNWR is shown in light green on Map 4-1; see also Map 4-13. The United States of America owns the KNWR, and the USFWS manages it. State law concurrently designates the same area a State game refuge and may apply State refuge status to State-owned lands within the boundaries of the Federally owned KNWR as they existed in 1960. The KNWR is 1.97 million acres, part of 76.8 million acres of Federal wildlife refuges in Alaska. A 2001 agreement regarding a land claim by Cook Inlet Region, Inc. (CIRI), a regional Native corporation, was put into effect through the Russian River Land Act. The act does not appear to have resulted in any substantial change to the KNWR ownership in the project area but did result in some 500 acres of "archaeological estate" at the KNWR's eastern border being transferred to CIRI. DOT&PF holds a transportation easement 300 feet wide for highway purposes (the Sterling Highway) for about 20 miles across the KNWR. Under the terms of the easement, DOT&PF is to coordinate with the KNWR before undertaking any new work in the easement, and the easement terms allow the KNWR to use portions of the easement (USFWS 1971, Robinson 2006), subject to the provisions of USC Title 23. DOT&PF has rights to use the easement for highway purposes, and KNWR uses of the easement area may not interfere with highway operations and maintenance. Because DOT&PF holds an easement for transportation purposes, FHWA has determined that any use of land for transportation purposes within the right-of-way is not a use of Section 4(f) property, unless a constructed refuge recreation facility is affected. In the project area, the trailhead for the KNWR's Fuller Lakes Trail and the parking and circulation areas associated with a KNWR visitor contact station lie within the DOT&PF Sterling Highway easement.

The *Kenai National Wildlife Refuge Comprehensive Conservation Plan* (USFWS 2010a) is the document that guides management of the refuge. The KNWR was first established as the Kenai National Moose Range by executive order 8979 in 1941 to protect the breeding and feeding range of moose. It was re-designated by the Alaska National Interest Lands Conservation Act (ANILCA) of 1980 as the KNWR, and the plan repeats the refuge purposes laid out in ANILCA. The KNWR purposes are to preserve all wildlife populations and their habitats "in their natural diversity," to protect associated waters, to meet treaty obligations, and—compatible with wildlife and habitat—to provide for science/education and recreation. ANILCA also created designated Wilderness areas within the KNWR totaling 1.3 million acres. The Mystery Creek Unit and Andrew Simons Unit are both within the project area, respectively north and south of the Kenai River. For the proposed project, the Mystery Creek Wilderness is the most pertinent. The unit lies in the project area immediately north of the existing Sterling Highway and comprises 46,086 acres.

4.2.3.2 Functions, Available Activities, Existing and Planned Facilities

The *Comprehensive Conservation Plan* does not address potential Sterling Highway improvements or propose any changes to the Fuller Lakes Trail. A new visitor contact station is proposed for the west end of Skilak Lake Road in a plan for the Skilak Wildlife Recreation Area (incorporated by reference in the KWNR management plan); it is not clear whether the existing contact station (Map 4-3) would remain or be removed under that scenario. Overall, the plans call for little or no change to management of "intensive management" areas such as the Sterling Highway corridor, and no new facilities are planned for the corridor in the project area (Campellone, personal communication 2008; Ernst, personal communication 2011).

Overall, the KNWR functions for protection of wildlife and, although recreation is subsidiary to wildlife conservation purposes in the enabling legislation, the KNWR includes a substantial recreation function. Most of the KNWR is overlain by a Congressional Wilderness designation, including portions of the Mystery Creek and Andrew Simons Wilderness units in the project area (respectively, north and south of the Kenai River and of the highway corridor). Wilderness is managed for its own set of functions under the Wilderness Act, which defines Federal Wilderness as land that

> …retains its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; has at least 5,000 acres…; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value. - 16 United States Code 23

The KNWR provides an opportunity for recreation in a designated Wilderness environment, plus more developed recreation opportunities in non-Wilderness areas, including a visitor center and a separate visitor contact station. The visitor contact station is adjacent to the Sterling Highway within the project area, and lies at the edge of the Skilak Wildlife Recreation Area, a recreation area that is within (and part of) the KNWR. The recreation area includes campgrounds, trails, and boat launch ramps on the Kenai River and Skilak Lake outside the project area. Other foot trails and canoe trails exist across the KNWR, but the Fuller Lakes Trail is the only refuge trail that begins within the project area (see Map 4-3). Except for use of the Fuller Lakes Trail, use of the Mystery Creek Wilderness near the existing highway is relatively rare, comprised of hunting and activities such as searching for antlers or mushrooms (USFWS 2009). Dense vegetation, steep slopes, and lack of trails limit use. This area is characterized as good brown bear habitat, with day beds and cover for sows with cubs that move up off the river for a place to retreat (and to escape from human fishermen) during lulls in fishing. Just outside the project area on the south side of the Kenai River (and accessible only by non-motorized boat) is the Surprise Creek Trail in the Andrew Simons Wilderness. It follows Surprise Creek to alpine elevations, at which point hikers and hunters could travel cross country over a ridge and be within a broad view of the Kenai River Valley and project corridor. Relatively few people are thought to use the trail and fewer still to access views of the existing highway corridor.

For purposes of this SEIS, any recreation areas and features that are part of the KNWR and on KNWR land are not further discussed as potential separate Section 4(f) recreation properties. They are considered KNWR land and have Section 4(f) protection as parts of the larger refuge. The trailhead for the Fuller Lakes Trail, the KNWR visitor contact station, and the Russian River

Ferry (including Sportsman's Landing Boat Launch) are given extra consideration below because they overlap the highway easement or lie adjacent to the highway easement, and are KNWR-owned recreation facilities.

The USFWS operates a KNWR visitor contact station at the western end of the project corridor, at approximately MP 58 of the Sterling Highway. The site is labeled #1 on Map 4-1 and also appears on Map 4-3. The visitor contact station is within the boundaries of the KNWR, and the site heavily overlaps the highway easement. The site is located on the north side of Sterling Highway and is immediately adjacent to the highway. The facility is located near the junction of Skilak Lake Road and the Sterling Highway, at the edge of the Skilak Wildlife Recreation Area. The site is not located on a separate parcel of land, but measured around the developed features, the site encompasses approximately 1.6 acres, much of which lies within the highway easement. Facilities consist of a small, periodically staffed building with interpretive information, books, and maps; a large parking area; and two separate, small public toilet buildings (vault toilets that were built immediately outside the highway easement). Parking and circulation areas are located partly within the easement. A cul-de-sac turnaround at the western toilet building is fully within the easement.

The visitor contact station is the first staffed facility in the KNWR for travelers coming from the east (Anchorage, Seward). The contact station provides information and education for refuge visitors and serves as a rest stop for travelers. River floaters also park at the contact station site and walk up from Jim's Landing to retrieve their vehicles after completing their float trips; permitted river guides are required to park at the contact station. Jim's Landing is a short walk away across the highway on an apparently unmaintained trail through the woods. Pedestrians cross the highway to move between Jim's Landing and the parking lot.

The Fuller Lakes Trail, managed by the USFWS, is a recreation trail that is fully within the boundaries of KNWR and provides primary access to the KNWR Mystery Creek Wilderness. Its trailhead is located within the Sterling Highway easement, where there is a parking area adjacent to the north side of the Sterling Highway near MP 57 (#2 on Map 4-1; see also Map 4-3). Facilities include a simple gravel parking lot, trailhead sign/register kiosk, and wood-and-earth steps that begin the trail. The site does not have a separate delineated land parcel, but measured from the highway shoulder around the northern side of the level, developed parking lot, the site encompasses 0.2 acre. The entire 0.2-acre area, including the steps, kiosk, and parking lot, are located wholly within the highway right-of-way, as is the beginning of the trail itself. The USFWS has completed minor trailhead improvements.

Another important USFWS recreational feature is the Kenai-Russian River Campground and Russian River Ferry, located south of the highway at the KNWR eastern boundary (Map 4-4). Access is through the Sportsman's Landing Boat Launch. Sportsman's Landing is a State-owned facility, but through an interagency agreement, it is managed by the USFWS in unison with the Russian River Ferry site. The Sportsman's Landing parcel has parking spaces for 50 vehicles or more (or approximately half that number if all are towing boat trailers). The adjacent KNWR parking and camping area at the ferry landing provides for approximately another 80 vehicles. Sportsman's Landing is mentioned frequently in the remainder of this document as a landmark and as a recreation site that is surrounded by other Section 4(f) properties. It is also addressed in Section 3.8, Parks and Recreation Resources. A separate boat launch/landing, owned and managed by KNWR, is located just outside the project area at the eastern end of Skilak Lake Road near MP 58 of the Sterling Highway.

4.2.3.3 Access and Use Levels

Access to KNWR in the project area is principally via the Sterling Highway. Sport fishers and river enthusiasts also boat through KNWR in the project area on the Kenai River. In the project area, public use and access to KNWR are primarily at the developed sites: the ferry/campground/boat launch complex at Sportsman's Landing (along with the stream bank on the south side of the Kenai River), the Fuller Lakes Trail, and the visitor contact station. Thousands of visitors fish the Russian River confluence area each summer, moving between KNWR, the State park (KRSMA), and the national forest. As indication of recreational use, the Russian River Ferry and Sportsman's Landing parking lots are full during peak fishing season in midsummer, and motorists attempt to park on the edge of Sterling Highway, which has little or no shoulder. Another indication of use levels in this area is that the annual harvest in the Russian River (exclusive of the Kenai River) routinely exceeds 50,000 fish and in some years has approached 200,000 fish (ADF&G 2009). The Russian River has a 10-year average of 57,815 angler-days per year (ADF&G 2006). Managers from ADF&G (personal communication 2009) and USFWS (2009) both indicated a huge volume of traffic for up to about 8 weeks each summer, including drivers who have driven for 2 hours or more to fish, and who wait along the highway for spots to open within the Russian River Ferry-Sportsman's Landing area. USFWS in its role as a cooperating agency indicated that the current limitations of the parking lot and the absence of shoulders or other nearby parking help control the amount of use of the Kenai River at Sportsman's Landing and Russian River Ferry.

Several thousand visitors stop each year at the visitor contact station. The *Kenai National Wildlife Refuge Final Revised Comprehensive Conservation Plan* estimates that approximately 1.2 million people travel on the Sterling Highway through the Kenai National Wildlife Refuge each year, and an estimated 300,000 visitors spend extended periods of time in KNWR (USFWS 2010a). Refuge-wide, a 2006 study reported that 659,525 "visits" were made to the KNWR, more than any other refuge in Alaska (Carver and Caudill 2006, as reported in HDR and USKH (2013)). The study found that about two-thirds of the visits to the KNWR were made by Alaska residents. Additional data indicate that 393,000 visits were for non-consumptive activities, such as use of nature trails, wildlife observation and birding, and beach/water use; 248,000 visits were for sport fishing; 18,525 visits were for sport hunting, including relatively similar amounts of big game hunting (5,500), small game hunting (5,100), and migratory bird hunting (7,925). The Fuller Lakes Trail is considered a popular hike and connects with the Skyline Traverse route that terminates outside the project area farther west on the Sterling Highway. A month-long summer trail count study in 2004 indicated 540 users in July–August, an intermediate number on KNWR trails studied (the range was 44 users to 962 users in that month, depending on the trail (KNWR 2004)).

4.2.3.4 Relationship to Similarly Used Lands in the Vicinity

KNWR is the only wildlife refuge in the project area and provides the closest designated Federal Wilderness areas to most of Alaska's population. The CNF adjoins KNWR on its east side and is managed for multiple uses, of which wildlife protection and outdoor recreation are two. These uses are similar (but not identical) to the mandates of KNWR as described in ANILCA, which include purposes "to conserve fish and wildlife populations" and "provide… for fish and wildlife-oriented recreation." State game refuges and designated critical habitat areas exist near Anchorage, Homer, and Clam Gulch (see Map 4-13).

4.2.3.5 Other Factors

As described at the end of the opening paragraph, above, the language of the highway easement defers more to the manager of the underlying land (USFWS) than typical highway easements. The easement for highway purposes indicates that KNWR has the right of review and approval of any new highway design within the easement (USFWS 1971).

4.2.4 Resurrection Pass National Recreation Trail

Section 4(f) Property Type: Recreation Area

4.2.4.1 Size and Ownership, Including Agreements Related to Ownership

The Resurrection Pass National Recreation Trail is located entirely within the CNF (shown north of the Kenai River on Map 4-1; see also Map 4-5). The trail is a 38-mile route from the community of Hope to the Sterling Highway. A portion of the trail is historic (see Bean Creek Trail in Section 4.2.13). The trail is part of the National Trails System that includes National Historic Trails and National Scenic Trails, which are designated by Congress, and National Recreation Trails, which are designated by Federal agencies.

The USFS lands traversed by the Resurrection Pass Trail are managed for multiple uses. The USFS has no separate easement or management corridor for the trail. Therefore, a trail width of 1,000 feet (500 feet each side of centerline) is assumed for Section 4(f) purposes, except where this width overlaps non-CNF land. This width is based on consultation with the USFS. Further information is contained above in Section 4.2.1. This width results in a total acreage of approximately 4,600 acres for the entire trail.

4.2.4.2 Functions, Available Activities, Existing and Planned Facilities

The USFS indicates the Resurrection Pass Trail has high recreation value and is the "crown jewel" of the CNF trail system (USFS 2009, and Vaughan, personal communication 2006a). The trail has been designated a National Recreation Trail and is considered a "conservation system unit" under ANILCA, affording it certain protections. The trail is heavily used by hikers, hunters, skiers, snowmobilers, mountain bikers, sport fishers, horseback riders, and others year-round. The trail traverses the Kenai Mountains from relatively low forested valleys to high alpine passes. The route links several lakes, designated camping sites, and eight public use cabins. The USFS has been incrementally working on improving the trail tread and replacing aging cabins associated with the route. No other planned changes are known.

4.2.4.3 Access and Use Levels

Access to the southern end of the trail is directly off the Sterling Highway, immediately west of the highway's Schooner Bend Bridge over the Kenai River. In the project area, the Resurrection Pass Trail is also accessible via the Bean Creek Trail, which is the historic southern end of the Resurrection Pass Trail (see separate entries below both under the recreation section and the historic properties section) and via West Juneau Road. The northern end of the trail is located near Hope, where there is a separate trailhead with access off the Hope Highway. The trail has been featured nationally (e.g., in *Backpacker* magazine, "Best Hikes Ever," November 2010), and cabins along the route typically are booked far in advance throughout the summer. The trail also is well used in winter. An annual average of 1,321 trail users registered at the south end

trailhead from the years 2006 to 2010 (HDR and USKH 2013). [4] This does not count those who access the trail via the Bean Creek Trail, where there is no register, or who come all the way through from Hope or other connecting side trails (Devils Pass Trail, Summit Creek Trail, and West Juneau Road).

The West Juneau Road route follows old USFS logging roads that are closed to vehicles except snowmobiles in winter. The USFS holds a 60-foot-wide easement for these roads where they cross State land, Unit 395. The route is used as alternate access to the Resurrection Pass Trail for horses in summer and snowmobiles in winter, and the USFS encourages horse and snowmobile access via West Juneau Road to minimize conflict on the lower Resurrection Pass Trail and because winter conditions generally are better (DOT&PF 2009). West Juneau Road is classified by USFS as a road, not a trail, and there is a gap between the road system and the Resurrection Pass Trail where the route is marked but there is not a constructed roadbed or trail tread. For these reasons, USFS considers the West Juneau Road route a road (USFS 2002a) and temporary route used for recreation, but it is not considered part of the Resurrection Pass Trail and is not considered a separate recreational trail in its own right.

4.2.4.4 Relationship to Similarly Used Lands in the Vicinity

The Resurrection Pass Trail is one of several trails on CNF and in KNWR in the project area. The Resurrection Pass Trail is the only National Recreation Trail in the project area. The Johnson Pass Trail to the east of, but outside, the project area (with trailheads along the Seward Highway) is also part of the National Trails System as a segment of the Iditarod National Historic Trail.

4.2.5 Bean Creek Trail

Section 4(f) Property Type: Recreation Area

4.2.5.1 Size and Ownership, Including Agreements Related to Ownership

The Bean Creek Trail connects Slaughter Ridge Road on the northern edge of Cooper Landing with the Resurrection Pass National Historic Trail on the east side of Juneau Creek (see Map 4-1 and Map 4-6). The Bean Creek Trail is designated for recreation in the *Chugach National Forest Revised Land and Resource Management Plan* (USFS 2002a). It is also an historic route (see separate entry below in the Historic Properties section). Besides Federal land, it also uses public lands owned by the State. FHWA has determined that, for Section 4(f) purposes, the trail begins where it enters State public lands. The unimproved access road (platted public right-of-way for the extension of Slaughter Ridge Road and Cecil Road) serves as part of the trail in winter and at other times when the road is not easily passable by vehicles; the road easement is owned by the Kenai Peninsula Borough (Borough). See “Other Factors” below.

Slaughter Ridge Road is a gravel-surface road maintained by the Borough that “ends” at a small cul-de-sac but also continues as an old Forest logging road that is unimproved and in poorer condition as it proceeds toward its terminus. Because the multiple agencies involved have not yet

[4] The *Recreation Analysis* (HDR and USKH 2013) indicates that these data come from voluntary registration kiosks and likely under-represent participation. The *Recreation Analysis* cites a USFS 2009 Observational Use Study at Multi-Use Trailheads during the summer season, reporting that 19 to 40 percent of user groups signed in to the trail registration system.

established a formal trailhead, the ultimate length of the trail could change. Based on starting at the State boundary, it is approximately 2 miles long.

There is no formal trailhead at the State boundary; it is merely an area where conditions limit the ability of street vehicles, even many four-wheel-drive street vehicles, from proceeding and where there is space to park nearby on public (State) land.

The trail begins as an old logging road on State land; the initial portion of the continuing logging road on State public land is open to the public but is without a dedicated public trail or road easement (see Map 4-6). The Bean Creek Trail uses about 1,800 feet of the road extension where there is no easement and then descends to cross Bean Creek and join the historic Bean Creek Trail. A USFS 25-foot public trail easement exists on the historic Bean Creek Trail alignment on an adjacent unit of State land (State Unit 393). The connection between the beginning of the trail and the USFS Bean Creek Trail easement is approximately 3,500 feet total and crosses State public land that is open to the public but is without a dedicated public corridor easement.

As indicated above in Section 4.2.1, FHWA in consultation with USFS decided a uniform trail width of 100 feet (50 feet each side of centerline) is a reasonable width for Section 4(f) impact assessment purposes for this trail, and this width is used throughout the length of the trail regardless of the presence or absence of trail easement. The trail is recorded by the USFS as 2.02 miles long.

4.2.5.2 Functions, Available Activities, Existing and Planned Facilities

The trail functions principally for recreation, accommodating snowmobiling, hiking, mountain biking, skiing, and dog mushing. The *Chugach National Forest Revised Land and Resource Management Plan* (USFS 2002a) designates the trail for these uses and prohibits summer motorized uses. The Bean Creek Trail currently functions as an alternative to the southern portion of the Resurrection Pass Trail (i.e., south of the Juneau Falls area) and an alternative access to the falls. It does not have notable intermediate destinations along its length but likely is used for relatively short out-and-back hike or ski trips. Both the USFS and the Borough indicated they are actively working, albeit slowly, to establish a dedicated USFS trail easement on State and Borough land to allow for USFS maintenance of the trail (Mueller, personal communication 2006; O'Leary, personal communication 2006).

4.2.5.3 Access and Use Levels

The Bean Creek Trail is used year-round. The USFS, State, and Borough do not maintain a trail register or other method of tracking use numbers, so actual use levels are not known. The Bean Creek Trail is used as an alternative access to the Resurrection Pass Trail, particularly in winter when snow, ice, and cross-slope conditions on the southern portion of the Resurrection Pass Trail make traversing the main trail difficult.

4.2.5.4 Relationship to Similarly Used Lands in the Vicinity

The Bean Creek Trail is one of several recreational trails managed by the USFS in the project area. It is used less and managed or maintained less than the Resurrection Pass Trail and nearby Russian Lakes Trail.

4.2.5.5 Other Factors

There is no exact location that can be pinpointed as the end of the Slaughter Ridge Road and the beginning of the trail. If weather conditions make the road less drivable, the "trail" on that given

day starts farther back on Borough land within the road easement. If the weather is dry and the road is in reasonable condition, standard vehicles may drive to State land. In winter, the unengineered portion of Slaughter Ridge Road is not plowed at all, and trail users park their cars where maintenance ends; thus the winter trail starts farther back than in summer. The USFS has worked with the State and Borough to ensure automobile access and a trailhead, and has made minor improvements to eroded areas of the Slaughter Ridge Road (on the Borough-owned road right-of-way). As stated above, for Section 4(f) purposes, the point at which Slaughter Ridge Road enters State land is considered the beginning of the trail. Jurisdiction over the trail and its maintenance is not placed solidly with any one agency and is not clearly delineated in management plans, but FHWA determined that it functions primarily for public recreation.

4.2.6 Stetson Creek Trail

Section 4(f) Property Type: Recreation Area

4.2.6.1 Size and Ownership, Including Agreements Related to Ownership

The Stetson Creek Trail is located primarily in the CNF, but its lower segment is located on Borough land within a 50-foot-wide USFS right-of-way easement. It is listed by the USFS as 5.24 miles long in the *Revised Land and Resource Management Plan* (2002a). Map 4-1 and Map 4-8 show the trail. The USFS has given it a recreational trail number (Forest Trail #322). For Section 4(f) evaluation purposes, FHWA in consultation with USFS has determined a width of 100 feet is appropriate for defining the recreation resource (see trail width discussion in Section 4.2.1). The trail is historic; see the separate entry in Section 4.2.14.

4.2.6.2 Functions, Available Activities, Existing and Planned Facilities

The Stetson Creek Trail is an historic route to mining areas along Cooper and Stetson creeks. The trail starts at the southern end of the Cooper Creek Campground and heads uphill in a southerly direction, roughly parallel to Cooper Creek for 3 miles and Stetson Creek for 2 miles. The trail is drivable by all-terrain vehicles (ATVs; four-wheelers) over much of its length but is a hiking path at its upper end. The trail is used today for access to mining claims and for recreation. There is no USFS trailhead or trailhead sign; the trail simply begins behind a gate. Separately, off the Sterling Highway just west of the campground, there is a cleared area for trailhead parking on USFS land. The USFS manages the trail for mining access, allowing ATV and motorcycle access for miners with valid claims. The trail is listed among other recreation trails in the *Revised Land and Resource Management Plan* (USFS 2002a) and is managed to be open to the general public for horses, bicycles, hiking, snowmobiles, and dog sledding but not to motorized vehicles in summer (except for miners with valid claims). Discussions with land managers did not indicate plans for substantial changes.

4.2.6.3 Access and Use Levels

Access to the trail is from the Sterling Highway through the south side of the USFS Cooper Creek Campground. Alternate informal access is available directly off the Sterling Highway on Borough land, but there is no public easement for this informal access. The USFS does not maintain a trailhead register to estimate use but has said the use level is considered low to very low (USFS 2009) or low to moderate (Vaughan 2007).

4.2.6.4 Relationship to Similarly Used Lands in the Vicinity

There are several other recreational trails in the project area, including the USFS Bean Creek Trail, Resurrection Pass Trail, Russian Lakes Trail, and Russian River Angler's Trail, and KNWR Fuller Lakes Trail. The Cooper Lake Dam Road, which provides maintenance access up Cooper Creek to a hydroelectric dam, functions as a trail for some users. It parallels much of the Stetson Creek Trail on the opposite side of Cooper Creek (see Map 4-1 and Map 4-8).

4.2.6.5 Other Factors

There is no formal trailhead or parking provided by the USFS. There is only an informal parking area on Borough land.

4.2.7 USFS Kenai River Recreation Area

Section 4(f) Property Type: Recreation Area

4.2.7.1 Size and Ownership, Including Agreements Related to Ownership

The Kenai River Recreation Area is located entirely within CNF (350 acres) and is owned by the Federal government. It is shown in red-orange color on Map 4-1 and Map 4-9. The area parallels the Kenai River and the existing Sterling Highway from the CNF western boundary east to Cooper Creek Campground, where there is another recreation area withdrawal (see Cooper Creek Public Camp and Picnic Ground). The recreation area was designated with the highway as a reference point. That is, the area is defined as:

- All land between the highway and the Kenai River
- On the side of the highway opposite the river, all lands in a strip between the highway and a line set 400 feet from the highway and parallel to the highway

See Section 4.2.7.5 ("Other Factors"), below.

The USFS considers this area a "special place" recognized by the public (Vaughan 2007). The recreation area generally is the Kenai and Russian rivers confluence area, which has been popular for sport fishing from CNF land for decades. The USFS had also, during earlier coordination, indicated the importance of the Kenai River Recreation Area as a buffer and as a Federal holding that prevented transfer of the land for other purposes, such as State or Native corporation selection and potential private development (Vaughan, personal communication 2006a; USFS 2009).

4.2.7.2 Functions, Available Activities, Existing and Planned Facilities

Much of the recreation area along the highway is not developed. The USFS has indicated the main recreation function of the area is to allow the public to access land along the Kenai River (USFS 2009). Portions of the recreation area that are developed include the driveway entrance that leads to the Russian River Campground and to the trailhead for the Russian Lakes Trail. Located off the driveway and within the recreation area is a large overflow parking area used principally at the height of fishing season. The parking area also serves as the winter trailhead for the Russian Lakes Trail, when the continuing driveway is not plowed. The USFS has entered into an agreement with FHWA for the redesign of the entrance and access road to the Russian River Campground. This redesign will consider several alternatives for traffic entering and exiting the

campground from the Sterling Highway (current alignment) and is expected to be complete in 2015.

The Resurrection Pass Trail's trailhead and its driveway and a small parking area and informal trail near MP 53.7 also are located within the Kenai River Recreation Area.

Besides these access and parking facilities, the K'Beq Footprints Heritage Site is a developed feature within this recreation area. The K'Beq Footprints Heritage Site encompasses approximately 34 acres and is managed by the Kenaitze Indian Tribe through an agreement with CNF. While it is focused primarily on cultural interpretation, it is also available for recreation that is not related to archaeology or the Tribe: there are picnic tables, people fish from the site, and people pay to park there and walk offsite to hike or fish nearby, and do so particularly when other parking is full. The USFS mandates that the Tribe allow this kind of use, and the Tribe is actively working to increase use of the site by others, such as boaters stopping for lunch. The Tribe is working for slow expansion of services and facilities offered at the K'Beq site, including potential of new trails and facilities. See further discussion below under the Sqilantnu Archaeological District.

CIRI Tract B (20.5 acres), adjacent to the K'Beq site, was transferred from the national forest in 2012, removing 20 acres of Kenai River Recreation Area land from Federal ownership. However, the USFS retained a public easement along the river through this parcel for recreational access to the river, and this easement retains Section 4(f) protection as part of the recreation area.

4.2.7.3 Access and Use Levels

Access to the recreation area is directly from the Sterling Highway and from boaters on the Kenai River. Short driveways lead from the highway to the K'Beq interpretive site and Resurrection Pass trailhead, and a longer driveway leads to the Russian River Campground. Use of the Kenai River Recreation Area is dispersed and not formally counted.

4.2.7.4 Relationship to Similarly Used Lands in the Vicinity

This recreation area abuts the Russian River Campground Area and Cooper Creek Public Camp and Picnic Ground, both designated for recreation purposes. It also abuts the Sportsman's Landing Boat Launch and KNWR. The heritage site, in addition to providing interpretation of area archaeology (see Sqilantnu Archaeological District, below), offers some recreation amenities similar to those offered at nearby campgrounds and the KNWR visitor contact station (short trails, information, public toilets, public parking, river access).

4.2.7.5 Other Factors

The public land order that created the recreation area (Public Land Order 6884) defines the area boundaries in terms of a distance from the highway, but does not define "the highway," so it is not clear whether the 400-foot measurement is meant to be taken from the centerline of the highway, the edge of the constructed highway, or the edge of the highway right-of-way. Title research (Robinson 2006) indicated that the recreation area was established "subject to valid existing rights," and the highway right-of-way predated the 1991 establishing public land order. The State of Alaska believes the edge of the right-of-way is the appropriate point of reference. The maps for this SEIS portray the recreation withdrawal based on this belief. The public land order indicates that the recreation withdrawal area is 350 acres. Since that time, two large parcels have been transferred to CIRI, and recreation area boundaries also encompass other private

parcels. Calculations for this project using geographic information systems result in a total of 282 acres. It appears that the acreage originally was estimated based on inclusion of all lands adjacent to the highway, including the parcels in private hands today. Even then, the total does not reach 350 acres.

4.2.8 Juneau Falls Recreation Area

Section 4(f) Property Type: Recreation Area

4.2.8.1 Size and Ownership, Including Agreements Related to Ownership

The Juneau Falls Recreation Area is a 320-acre area entirely within CNF boundaries withdrawn for recreation purposes by Public Land Orders 6888 and 7769 and originally "segregated" from other lands in 1968 for its recreation potential (USFS 1990). This rectangular parcel lies well north of the Kenai River and about 700 feet higher. It is shown in an orange color on Map 4-1 and is the subject of Map 4-10. The USFS considers the area defined in the public land order to be a "special place." The USFS has indicated that the area was defined to protect the general area of the Juneau Creek Falls (Vaughan, personal communication 2006a, 2006b).

4.2.8.2 Functions, Available Activities, Existing and Planned Facilities

The site encompasses a long reach of Juneau Creek, the Juneau Creek Falls, an informal falls viewing point, a USFS-designated tent camping site with two bear-resistant food lockers, the junction of the Resurrection Pass and Bean Creek trails, and portions of both trails (1.5 to 2 miles of trail, total). The primary activity is trail use, with the falls and canyon as a visual draw along the trail. Trail use is described under Sections 4.2.4 and 4.2.5 ("Resurrection Pass National Recreation Trail" and "Bean Creek Trail," respectively) above.

The *Chugach National Forest Revised Land and Resource Management Plan* (USFS 2002a) does not distinguish between management of the recreation withdrawal and the lands around the withdrawal; both are managed primarily under a "Backcountry" prescription that emphasizes retention of the natural environment (with trails, camp sites, and cabins) and opportunities for solitude and challenge.

4.2.8.3 Access and Use Levels

There is no direct road access to the Juneau Falls Recreation Area. Developed access is entirely from the Resurrection Pass Trail and Bean Creek Trail via foot, mountain bike, snowmobile, skis or snowshoes, or horse. A winter route, marked by the USFS and using old USFS logging roads west of the recreation area as alternate winter access to the Resurrection Pass Trail, also provides access. It is likely that Juneau Falls, or the trail bridge across Juneau Creek a short distance upstream of the falls, is a frequent destination or turnaround point for day hikers and mountain bikers. Except for camping at the backcountry camp site and likely some hunting and other dispersed use of the undeveloped forest areas, little or no use of the recreation area separate from trail use is known.

4.2.8.4 Relationship to Similarly Used Lands in the Vicinity

There are other recreation areas throughout the project area. Most others are adjacent to the Sterling Highway. Only the Lower Russian Lake Recreation Area, which lies upstream of the Russian River Campground described above, is away from the road system like the Juneau Falls Recreation Area.

4.2.9 Cooper Landing Boat Launch and Day Use Area

Section 4(f) Property Type: Recreation Area

4.2.9.1 Size and Ownership, Including Agreements Related to Ownership

The Cooper Landing Boat Launch is a 5.3-acre parcel of State-owned land, shown as #9 on Map 4-1; see also Map 4-11). The land is located adjacent to the Sterling Highway's Cooper Landing Bridge at the Kenai Lake outlet. ADF&G owns the parcel, which was acquired with Federal fisheries enhancement funds. However, DPOR manages the parcel jointly with ADF&G through an Interagency Land Management Assignment. The concrete boat launch ramp is located wholly within the Sterling Highway right-of-way and adds 0.55 acre to the site. The ramp was developed along with the rest of the site and was funded as a Federal Transportation Enhancement Activity. It was jointly undertaken by DOT&PF, DPOR, and ADF&G, with participation by FHWA in funding (Robinson 2006). Technically, the Federal government still has title to the land within the right-of-way and CNF still has some management authority over this land as provided in the highway easement.

4.2.9.2 Functions, Available Activities, Existing and Planned Facilities

The site is a boat launch at the upper end of the Kenai River, providing river access downstream to Skilak Lake and upstream into Kenai Lake. Site amenities include two latrines, a water well and septic system, a viewing platform, informational signs, and a caretaker's cabin that is occupied year-round. The launch ramp principally provides access for recreational boating and sport fishing on the Kenai River, which is a State park unit. Discussions with land managers did not indicate plans for substantial changes.

4.2.9.3 Access and Use Levels

Access to the boat launch area from the land side is directly off the Sterling Highway. The facilities are also accessible from the water. The DPOR has a mechanical vehicle counter at the entrance, and the agency uses a formula to derive user numbers from the mechanical counts. Reported use was 73,848 vehicles in 2003, 62,529 in 2004, and 83,396 in 2005. Under the DPOR formula, these numbers translate to 221,544 persons, 187,587 persons, and 250,188 persons, respectively (Carrico, personal communication 2007). The mechanical counter does not distinguish between vehicles that launch boats, park at picnic tables, or stop only at the restroom. Those who do launch boats may be counted also in river use counts for the upper Kenai River (see KRSMA). Use is steady at the boat launch throughout the year, with a substantial summer peak (17,761 vehicles in July 2005 alone).

4.2.9.4 Relationship to Similarly Used Lands in the Vicinity

Sportsman's Landing, another boat launch in the project area, is located downstream at the confluence of the Kenai and Russian rivers. Jim's Landing is located just beyond the project's western end in the KNWR. Boat access is also available from Quartz Creek Campground just outside the project's eastern end. All provide access to the KRSMA, a State park unit.

4.2.9.5 Other Factors

The land ownership and management are somewhat unusual, because the parcel is a recreation area but effectively managed as a State park. It is not legislatively designated as a park or proposed for designation. The parcel is designated in an adopted plan and functions for recreation purposes and for access to the legislatively designated park unit.

4.2.10 Historic Properties Introduction

There are many archaeological sites in the project area and several historic features associated with mining activity. These sites have been subject to ongoing evaluation under Section 106 of the NHPA. This document addresses those sites identified as being located within the APE for any of the project alternatives and qualified for Section 4(f) protection. The following subsections provide summary information pertinent to each of these sites, beginning with the Sqilantnu Archaeological District. More detail may be found in the ongoing Section 106 documentation for the project (see Section 3.9, Historic and Archaeological Preservation). For historic properties, Section 4(f) applies to those on or eligible for inclusion in the NRHP.

4.2.11 Sqilantnu Archaeological District

Section 4(f) Property Type: Historic property

4.2.11.1 Eligibility and Significance

The Sqilantnu Archaeological District encompasses a large portion of the entire project area (see Map 4-1). It was originally determined eligible for the NRHP in November 1981 by the Alaska Office of History and Archaeology. At that time, the Sqilantnu District was found eligible under Criterion D of Section 106 of the NHPA,[5] for the potential of the district to reveal important information about Dena'ina Indian occupation of the area. In 2012, FHWA found the district eligible under Criterion A as well, for association with significant events in the prehistory of the Dena'ina and other Native people (HDR 2012). All the individual historic properties[6] that contribute to the district are assumed to be eligible based on Criteria A and D, but most have not had individual eligibility determinations. There are literally thousands of known cultural features in several hundred contributing historic properties within the Sqilantnu Archaeological District. The individual historic properties are not mapped for this document, to help protect their locations.

The district as a whole can be characterized as a late prehistoric-early historic Dena'ina occupation with associated smaller sites. The district is considered to have extensive archaeological data that document the nature of Dena'ina use and occupancy of this part of the Kenai Peninsula during the 19th century. For this reason, contributing historic properties within the district should be considered:

> …collectively, rather than as individual properties, because of their cultural and geographical unity…. It is important to include summer and winter village sites, burials, cemeteries, camp sites, and cache pit clusters within the District because they represent different aspects of the seasonal round, a broad range of former activities, and changes in the patterning of these activities through time. – *Eligibility Determination, 1981*

Cultural features listed in the 1981 Sqilantnu Archaeological District nomination include house pits, pit features, depressions, cache pits, and burials. Numerous other cultural features, including house pits, cache pits, burials, middens, and surface depressions, have been documented since

[5] Criteria A–D for determining eligibility of historic sites for the NRHP ((NPS 2002); see also Section 4.2.10 of this chapter).

[6] "Historic property" is a general term used in the NHPA to encompass both historic and prehistoric areas or structures, including archaeological sites. In this specific instance, the "historic properties" are all archaeological.

1981 and added as contributing to the district. Regarding significance, the SHPO indicated in a letter to FHWA for this project (Bittner 2007) that the collective pattern of sites makes up the information potential of the district as a whole and that adverse impacts to individual historic properties would compromise the information potential of the whole.

Within the Sqilantnu Archaeological District and within the areas of potential effects of the project alternatives, there are two areas—one large, one small—that have been delineated separately and that have been determined individually eligible for the NRHP as TCPs:

- Sqilantnu Russian River Confluence Site TCP (Confluence TCP), 1,187 acres
- New Village TCP, 4.5 acres

While the entire district is considered significant and subject to Section 4(f) protections, the designation of these two TCPs added an additional layer of significance to these areas. They are discussed further in the following pages under their own subheadings. The TCPs, however, are contributing elements of the Sqilantnu District. Within the large Confluence TCP are multiple other sites of note for their roles in interpretive and cultural activities by the Kenaitze Indian Tribe, a Dena'ina tribe currently based in the Kenai/Soldotna area. These include the Beginnings and K'Beq Footprints Heritage Sites. Also, one contributing historic property is associated with human burials and has particular importance to the Kenaitze Indian Tribe. Lands within the Confluence TCP selected by CIRI under ANCSA and the Russian River Land Act also are important. These areas and the individual archaeological features within them are further discussed in following pages under the heading for the Russian River Confluence Site—Traditional Cultural Property. They are important both to the TCP and to the broader Sqilantnu Archaeological District.

4.2.11.2 Size and Ownership, Including Agreements Related to Ownership

The original boundaries of the Sqilantnu District were described in 1981. The researchers at that time considered the cultural and geographic center of the district to be the Russian River from Lower Russian Lake to the river's confluence with the Kenai River, and therefore defined the eastern and western boundaries as being where there is "a decrease in the concentration of cultural features that relate directly to the sites at the confluence." Since the original nomination in 1981, many more historic properties found outside of the original boundaries have been determined to contribute to the Sqilantnu Archaeological District. For this project, Section 106 consultation between DOT&PF, FHWA, SHPO, USFS, USFWS, and tribal entities has resulted in a revised boundary, as shown on Map 4-1. This area covers the majority of the project area up to about elevation 1,000 feet on both the north and south sides of the Kenai River Valley. The total area within the boundaries is 12,600 acres. Consulting parties have agreed that all of the mapped area is part of the archaeological district.

Ownership of the lands in question is by the KNWR downstream of the Kenai River-Russian River confluence and by the CNF upstream of the confluence. The Russian River Land Act ratified an agreement to transfer the "archaeological estate" of some 500 acres within the KNWR boundary to CIRI, an Alaska Native corporation and tribal entity, and assigned ownership of found artifacts throughout the district to CIRI. The agreement also provided means to convey a 42-acre "Tract A" and a 20.5-acre "Tract B" within the district to CIRI. Under terms of the agreement, the larger parcel is slated to become an archaeological/cultural interpretive center for

the district in the future. Within the CNF boundary, there are many land owners, including the Borough, the State of Alaska, and private owners. Most of the district encompasses public lands.

4.2.11.3 Other Factors

Virtually all other park, recreation area, refuge, and historic properties in the project area that are protected under Section 4(f) fall at least partly within the boundaries of the Sqilantnu District, creating an overlapping mosaic of Section 4(f) properties. Also, the Confluence TCP and the multiple important cultural and archaeological sites within it are contributing elements of the Sqilantnu District. Separating consideration of the TCP and the archaeological district is not possible. The heavy overlap and nesting of Section 4(f) recreational and archaeological properties within the Sqilantnu District is unusual. As an example: the burial site noted above is a relatively small site contained within CIRI Tract A, an important part of the Confluence TCP contained within the Confluence TCP, which in turn falls within the greater Sqilantnu District.

4.2.12 Sqilantnu Russian River Confluence Site—Traditional Cultural Property

Section 4(f) Property Type: Historic Property

4.2.12.1 Eligibility and Significance

FHWA in consultation with the Kenaitze Indian Tribe and others have determined that the Sqilantnu Russian River Confluence Site TCP (Confluence TCP) is culturally significant for its association with the confluence of the Kenai and Russian rivers and the broader cultural practices and tradition of the Kenaitze community as a place of village life, fishing, and burial. See Map 4-1 and Map 4-12. The area is delineated to encompass multiple sites of particular importance to the Kenaitze Indian Tribe and CIRI:[7]

- CIRI conveyances Tract A (containing the known burial site) and Tract B
- A 500-acre area of cultural resource rights within Kenai National Wildlife Refuge
- A winter village and ceremonial house site, and similar sites nearby
- Beginnings Heritage Site
- K'Beq Heritage Site

These are significant cultural places that have an integral relationship with the beliefs and practices of the Kenaitze community. These sites are significant for the performance of historically rooted practices, and for the continued education and cultural identity of the Kenaitze.

The Confluence TCP is eligible under Criterion A of the NRHP, for its association with a broad pattern of events or trends. Further, the significance of these areas is indicated by CIRI's selection of portions of this area as places of cultural and historical significance under provisions of Section 14(h)(1) of ANCSA. Significance also is indicated by the identification of the confluence area in the Russian River Land Act: "Congress (finds that these lands) contain abundant archaeological resources of significance to the Native people of the Cook Inlet Region,

[7] Several of these are not mapped to protect sites sensitive to the Kenaitze Indian Tribe and CIRI, and because several of them are removed from any of the proposed alignments.

the Kenaitze Indian Tribe, and the citizens of the United States." The archaeological historic properties (approximately 103 have been delineated within the TCP boundaries) are considered a rich source of information that mostly has yet to be investigated, and the TCP also is eligible for the NRHP under Criterion D, for its information potential.

4.2.12.2 Size and Ownership, Including Agreements Related to Ownership

The Confluence TCP, shown on Map 4-1 and Map 4-12, encompasses a total of 1,187 acres and generally follows the Kenai River from the K'Beq Heritage Site near MP 51.3 of the existing Sterling Highway downstream about 4.4 miles to about MP 55.7. The TCP includes the last mile of the Russian River. The portion west of the river confluence and southwest of the Russian River is KNWR land. The portion east of this area is CNF land, interspersed with a few private properties, including the two CIRI tracts.

The Russian River Land Act ratified an agreement related to Federal and CIRI ownership, including agreements to transfer the archaeological estate on more than 500 acres of KNWR land to CIRI, grant ownership of found artifacts (archaeological resources) to CIRI, and lay out the framework for cooperative management for cultural purposes and ultimately for a planned complex with archaeological interpretation, cultural center, and lodging components on CIRI Tract A.

4.2.12.3 Functions, Available Activities, Existing and Planned Facilities

The land is culturally important to the Kenaitze Indian Tribe. The Beginnings Heritage Site (now closed as a public interpretation site) and K'Beq Heritage Site have been used for culture camps, archaeological investigation, and ongoing public interpretation of Kenaitze history and culture. Other sites also have been subject of archaeological research by the Kenaitze and others. Besides these activities and functions, the area is heavily used for sport fishing, camping, and outdoor recreation. Other Section 4(f) properties, including the Russian River Campground, Sportsman's Landing, Russian River Ferry, USFS Kenai River Recreation Area, and recreational trails, all center on the confluence area. The KRSMA (a State park) is the Kenai River running through a portion of this area. CIRI, in cooperation with USFWS and USFS, eventually plans to develop a cultural center and lodge on Tract A. Also, under terms of an agreement ratified by the Russian River Land Act, CIRI has pre-approval by Congress to trade USFWS lands in the confluence area for other CIRI lands valued by USFWS but located elsewhere, and thereby gain additional land in the confluence area for CIRI.

4.2.12.4 Specific Properties within the TCP

K'Beq Footprints Heritage Site. The K'Beq Footprints Heritage Site is completely within the Confluence TCP and Sqilantnu Archaeological District. The 34-acre[8] site, labeled #6 on Map 4-1 and shown on Map 4-12, is located on the north side of the Sterling Highway across from the entrance to the USFS Russian River Campground. The land is owned by the Federal government (USFS) and is part of the Kenai River Recreation Area discussed above. The site is operated by the Kenaitze Indian Tribe (Tribe) under a special use permit from the USFS. Within the

[8] The special use permit held by the Kenaitze Indian Tribe for the K'Beq site notes the permitted site as "approximately 16 acres." When mapped, the result was 34 ac. Subsequent correspondence with the USFS indicated that the site boundaries used appeared correct and that if the result was 34 ac., that acreage should be used.

permitted area are two contributing historic properties, one 6.2 acres in size and one 0.6 acre. The smaller historic property is the one used for interpretive activities. Facilities on the site include a paved parking lot capable of handling pull-through traffic (buses, motorhomes, trailers), a paved road, a small visitor center and gift shop building, interpretive signs, and a boardwalk/pathway running to and through a house pit and five associated archaeological features. The Tribe charges a modest fee for guided and unguided tours. In 2006, according to the Kenaitze Indian Tribe cultural and educational director (Lindgren, personal communication 2007), the Tribe created four reconstructions of cache pits on the site, using them to preserve salmon over the winter. The Tribe and USFS have discussed plans to reconstruct a full-sized replica Dena'ina house on the site. CIRI in 2012 took ownership of adjacent land (Tract B) and could develop complementary facilities there.

The general public, including tour groups (Elderhostel and Road Scholar tours regularly stop) and school groups, use the site. Presentations are made to three to four youth groups and two to three school groups per year. The Tribe uses the site for cultural activities and summer camps, and the site employs tribal youth.

The Tribe considers K'Beq significant for interpreting and experiencing Dena'ina culture, both prehistory and modern culture, to the public in general and within the Tribe. The Tribe also considers the site important for interpreting natural history and for recreation (Lindgren, personal communication 2006).

Section 4(f) protections apply to the area in general as part of the TCP and part of the larger Sqilantnu District, but there is no extra protection afforded the permitted area. The 34-acre site is part of the Kenai River Recreation Area and is afforded Section 4(f) protection as part of a recreation property as well.

Beginnings Heritage Site. The Beginnings Heritage Site was the original cultural interpretive site operated by the Kenaitze Indian Tribe. The Tribe's governing council voted in 2008 that the site should be closed to reduce foot traffic and resulting erosion of the site along the Kenai River (Lindgren, personal communication 2008). The use of the site for interpretive activity predated the larger and more developed K'Beq Heritage Site. The area known as "Beginnings" is larger than the area once used for interpretation and includes nine individual delineated archaeological sites. The existing Sterling Highway right-of-way runs through and overlaps the Beginnings area. Those portions of Beginnings not overlapping the highway right-of-way are within the USFS Kenai River Recreation Area. The Beginnings Heritage Site is used in part for non-cultural recreation, including access to the Kenai River (see also the separate entry above under Kenai River Recreation Area).

The Kenaitze Indian Tribe indicated that the site was significant for the same reasons as the K'Beq Heritage Site: for experience and education of Dena'ina culture, both prehistory and modern culture, for the general public (in the past), and for the Tribe itself (Lindgren, personal communication 2006; HDR (2012)).

CIRI Tract A. Tract A is a 42-acre irregular polygon owned by CIRI. It is located within CNF immediately north of the Sterling Highway and immediately east of the CNF border with KNWR (see Map 4-12). Tract A overlooks the confluence of the Kenai and Russian rivers from a bluff. It is currently undeveloped except for a minor power line at its southern edge. Tract A was a key part of the Russian River Land Act, giving CIRI title to Federal land with provisions for creating

a cultural and archaeological research and interpretive center, in cooperation with USFWS and USFS, and a lodge in the heart of the area considered culturally important.

Burial Site. This is an archaeological historic property that contains substantial burials of human remains, likely indicating long use of the site for burials using different burial methods. The site includes both Eskimo and Dena'ina Indian burials. Modern burials of repatriated remains have occurred on this site as well. The burial portion, in particular, is sensitive, and important to the Kenaitze Indian Tribe. The USFS has completed substantial subsurface work at this site, but the full extent of the burials has not been determined with finality. Because of the human remains, importance to the Kenaitze, and location on Federal land, the Native American Graves Protection and Repatriation Act likely would apply to any items found at this location.

CIRI Tract B. Tract B is a 20.5-acre polygon owned by CIRI. It is located adjacent to the Sterling Highway, Kenai River, and K'Beq Heritage Site and across from the entrance to the Russian River Campground (see Map 4-12). Besides association with archaeological sites, the cultural significance of Tract B is due principally to its location and adjacency to K'Beq and its value for interpreting the cultural heritage of the area to modern visitors. CIRI selected Tract B from national forest lands that were part of the Kenai River Recreation Area, and the USFS retained a public access recreation-related easement on this parcel adjacent to the river banks. The easement area has Section 4(f) protection as part of the Confluence TCP and larger Sqilantnu District, and as part of the Kenai River Recreation Area.

4.2.12.5 Other Factors

The heavy overlap and nesting of Section 4(f) recreational and archaeological properties within the Confluence TCP is unusual.

4.2.13 Bean Creek Trail/Original Resurrection Pass Trail

Section 4(f) Property Type: Historic Property

4.2.13.1 Eligibility and Significance

The historic Bean Creek Trail/Resurrection Pass Trail, also once known as the Juneau Creek Trail, is located east of Juneau Creek and west of the small drainage of Bean Creek (see Map 4-1 and Map 4-6). It is an historic route used originally by prospectors and miners and is the original route of the Resurrection Pass Trail. The historic trail is considered significant for its association with 19th century exploration and settlement of the northern Kenai Peninsula and with the Alaska gold rush. It is also significant for its association with Joseph Cooper, a miner of local significance who was the first to record use of the trail in the 1880s. The USFS determined it eligible for the NRHP in 1987.

4.2.13.2 Size and Ownership, Including Agreements Related to Ownership

The historic Bean Creek Trail lies mostly in the CNF, partly on State land within a USFS easement and partly on State public land without any easement, and once existed on what is now developed private land and roads (likely including portions of driveways and Bean Creek Road). Most of the historic Bean Creek Trail also is used and managed as a recreation trail (see separate entry for Bean Creek Trail as a recreation area, above). Portions of the recreational trail have been rerouted to avoid conflict with local homeowners. The rerouted portion is not historic, but provides public access because it is located on public land. The southern end of the historic route crosses State land and once crossed private land, but there is no dedicated public access on a

portion of the State land and no dedicated public access on private land (the USFS relinquished an easement once held on private land to reduce conflicts). The eligibility documentation indicated the trail probably once continued south to the mouth of Bean Creek. The Bean Creek Road may overlie part of the historic route. From the edge of private property upstream, the historic trail is about 1.9 miles long to its junction with the Resurrection Pass Trail.

The entire Bean Creek/Resurrection Pass historic trail is more than 35 miles long, terminating at its north end near Hope. The historic segment within the project's APE is the Bean Creek Trail. The historic Bean Creek Trail's southern end is assumed to be at the edge of the private residential subdivision. The northern end is at the Resurrection Pass Trail northeast of Juneau Falls. The historic portion of the Bean Creek Trail and Resurrection Pass Trail (i.e., the portion north of its junction with the Bean Creek Trail) is the trail that has been determined eligible for listing in the NRHP. The rerouted southern end of the Bean Creek Trail leading to Slaughter Ridge Road is not part of the historic route determined eligible for the NRHP.

On CNF, the Bean Creek Trail has no defined right-of-way or easement or management boundary. On one parcel of State land, there is a CNF easement that is 25 feet wide and 0.5 mile long. On an adjacent parcel of State land, the trail is on State land but has no easement. The documentation under Section 106 of the NHPA did not ascribe a resource width to the trail. In consultation with the USFS, FHWA determined that a trail width of 100 feet (50 feet each side of centerline) is considered a reasonable width for Section 4(f) impact assessment purposes for this trail. This width is used throughout the length of the trail regardless of the presence or absence of easements (see trail width discussion in Section 4.2.1).

4.2.13.3 Other Factors

The USFS relinquished its public trail easement to landowners and, in cooperation with the State of Alaska, rerouted the public trail around the private properties. This removed the southernmost portion of the recreational trail from its historic alignment. This section of this document considers only the historic portion; see the above discussion of the recreational significance of the trail and the non-historic portion.

4.2.14 Stetson Creek Trail

Section 4(f) Property Type: Historic property

4.2.14.1 Eligibility and Significance

The Stetson Creek Trail is an historic route to mining areas along Cooper and Stetson creeks (see Map 4-1 and Map 4-8). The USFS determined the Stetson Creek Trail eligible for the NRHP in 2005. The trail includes a section of corduroy road (logs laid side-by-side as a crude pavement) where it crosses an unnamed stream 1.5 miles south of the Sterling Highway. Just south of this stream is the beginning of an old hydraulic mining ditch that both parallels and crosses the trail. After about 4 miles, the trail turns into a barely visible vehicle track route and then into a hiking trail that follows the historic trail for about 0.5 mile, paralleling the large hydraulic ditch that is covered in alders. Once past the alders, the trail continues inside the mining ditch for its duration into Stetson Creek Valley. Ditches in Stetson and Cooper creeks near the trail were reportedly hand excavated between 1898 and 1902.

The trail was found eligible for its association with significant events related to Gold Rush mining (Criterion A) and for the information it could provide (Criterion D). The USFS also

considers the route significant as a recreation trail based on its classification of the trail (see the Stetson Creek Trail entry above, Section 4.2.6) as a recreation area.

4.2.14.2 Size and Ownership, Including Agreements Related to Ownership

The Stetson Creek Trail is recorded by the USFS as 5.24 miles long in the *Revised Land and Resource Management Plan* (USFS 2002a). Although it probably originally began at the mouth of Cooper Creek, the trail now starts near the southern end of the Cooper Creek campground and heads uphill in a southerly direction, roughly parallel to Cooper Creek for 3 miles and Stetson Creek for 2 miles. The trail, designated Forest Trail #322, is located primarily on CNF land, but its beginning is located on State of Alaska and Borough land, within a 50-foot-wide USFS right-of-way. There is no right-of-way associated with the trail where the trail is located on CNF land, and Section 106 documentation did not ascribe a resource width. A trail width of 100 feet was considered reasonable to define the resource width for this trail for Section 4(f) evaluation purposes and is used throughout the length of the trail.

4.2.14.3 Functions, Available Activities, Existing and Planned Facilities

The trail is used today for access to mining claims and for recreation (see the Stetson Creek Trail entry above) as a recreation trail.

4.2.15 Charles G. Hubbard Mining Claims Historic District

Section 4(f) Property Type: Historic property

4.2.15.1 Eligibility and Significance

In 1910, at the peak of mining activity on the upper Kenai River, Charles Cunningham found gold on the Kenai River about a mile below the mouth of Cooper Creek (Buzzell 1986, II-8). That same year, Charles G. Hubbard, a mining promoter previously associated with one of the Kennecott copper mines in Alaska, came to the upper Kenai River area and purchased 8 of Cunningham's claims for $40,000 (Jones 1970, Buzzell 1986). He increased his holdings to 57 claims right away and increased his holdings further over time. Hubbard prospected and mined in the area with various partners until about 1957. As part of this project, the Hubbard mining claims (17 claims) were found eligible for the NRHP in August 2007 for their association with significant events (Criterion A) and for the information they could provide (Criterion D). The district discussed here is not mapped in this document, to protect potentially sensitive sites. The 17 contiguous claims, stretching some 3 miles along the Kenai River valley, meet the definition of a district as "a concentration, linkage, or continuity of site, building, structures or objects united historically or aesthetically by plan or physical development." The cluster of mining features on mining claims named Ava, Ace, and Ada; Fern and Robin; and Alpha; and the Hubbard Cabin are contributing resources to the district. These claims were part of those purchased by Hubbard in 1910. Mining activities on these claims continued up to the 1970s.

4.2.15.2 Size and Ownership, Including Agreements Related to Ownership

The district encompasses 444 acres and includes the Ace and Alice claims (11 mining trenches and 6 prospect pits); the Fern and Robin mining claims (3 mining trenches, 2 prospect pits, 2 historic pits, and an old roadbed); the Alpha mining claim (2 prospect pits), and the Hubbard Cabin. Each of these is an individually eligible historic property encompassed within district boundaries that include these and other mining claims held by Charles Hubbard. The land

encompassed by these historic claims is mostly CNF land but also overlaps the KRSMA (State park) and some private lands.

4.2.16 Kenai Mining and Milling Co. Historic Mining District

Section 4(f) Property Type: Historic property

4.2.16.1 Eligibility and Significance

The Kenai Mining and Milling Company Historic District is the location of an early 20th century mining camp near Cooper Creek. The district is not mapped in this document, to help protect potentially sensitive sites. In 2005, the Cooper Lake Hydroelectric Relicensing Project (Chugach Electric Association and Federal Energy Regulatory Commission) determined the district eligible for the NRHP for its association with:

- Significant events (Criterion A), namely "Kenai Peninsula and Turnagain Arm Gold Rush 1895–1898" and "Post Gold Rush Mining Activities on the Kenai Peninsula and Turnagain Arm, 1900–1940s."
- Significant persons (Criterion B). Individuals who worked this area constitute a "Who's Who" of early 20th century mining in the area. Section 106 documentation lists 14 men, including James Stetson, Joseph Cooper, and Charles Hubbard.
- Information it could provide (Criterion D).

4.2.16.2 Size and Ownership, Including Agreements Related to Ownership

The mining and milling operations inhabited the area at the lower reaches of Cooper Creek, an area used for both mining and logging, and for milling lumber. The boundary for the district extends from Cooper Creek west to the vicinity of the Stetson Creek Trail (a separate historic resource) and from the existing Sterling Highway upstream to the mouth of Cooper Creek Canyon, encompassing approximately 29 acres in and around the USFS Cooper Creek Campground. The land ownership in the area is a mix of USFS, State, and Borough land, and a small portion of a private parcel.

4.2.16.3 Features

As originally defined, the district was composed of *Tasdliht*, Huecker's Hovels, and a collection of several nearby mining features. An historic trail segment is an additional contributing element discovered as part of this project. The trail is 4 to 5 feet wide and angles up the slope west of Cooper Creek. It apparently served as an access route from the flat area south of Huecker's Hovels to the Stetson Creek Trail on top of the bench. The Stetson Creek Trail, which runs through a portion of the district, was separately determined eligible for the NRHP, also in 2005.

Both *Tasdliht* and Huecker's Hovels are along the western side of Cooper Creek. *Tasdliht* is composed of three rectangular depressions and two berms, while Huecker's Hovels consists of a cabin foundation and several nearby surface features, a "well," and two garbage dumps. The collection of mining features is a contributing element and consists of two prospect pits (outside the APE of the alternatives), a flume, and an old roadbed that runs uphill parallel to Cooper Creek. Also included are two older prospects—a round hole and a "U-shaped" excavation in the stream bank.

4.3 Proposed *de minimis* Impact Findings

Some of the Section 4(f) properties described in the previous section may be used, but have such a minimal impact that avoidance analysis under Section 4(f) is not required. FHWA may make a determination of a *de minimis* impact for any use of a Section 4(f) park, recreation area, or refuge resource that does not "adversely affect the activities, features, and attributes" of a Section 4(f) property under certain circumstances (see legal background in Section 4.1.1). For historic properties, a "no adverse effect" or "no historic properties affected" finding under Section 106 may result in a *de minimis* impact finding under Section 4(f). If FHWA proposes a *de minimis* finding for more than one Section 4(f) property, FHWA must propose a separate finding for each Section 4(f) resource affected. Following an opportunity for public review and comment, the agency official with jurisdiction must concur in writing that the proposed project's use of a park, recreation area, or refuge will not adversely affect the activities, features, and attributes of the Section 4(f) property, and in the case of historic properties, the SHPO must concur in writing in the "no adverse effect" or "no historic properties affected" Section 106 finding.

Process used in this Section 4(f) Evaluation

Because the Sterling Highway project area presents a complex set of Section 4(f) properties, informational boxes like this one will be used to outline the steps employed and to indicate where the reader is in the process. The process outline, with the current step in bold, is as follows.

1. Identify Section 4(f) properties.
2. **Evaluate whether any impact is likely to be a *de minimis* impact.**
3. Identify any alternatives that would avoid all Section 4(f) properties.
4. Present the impacts of proposed alternatives on Section 4(f) properties.
5. Identify alignment shifts that could avoid individual Section 4(f) properties or minimize harm to individual properties, and identify other measures to minimize harm.
6. Evaluate least overall harm (preliminary evaluation).

Section 4.5 discusses impacts in detail. The draft *de minimis* finding forms are found in Appendix F. The forms discuss each resource; the impacts and proposed measures to minimize harm, including mitigation and enhancement measures for those impacts; and the results of coordination with the officials with jurisdiction over each resource.

The analysis indicates there are uses of Section 4(f) resources by project alternatives that likely qualify as *de minimis* uses under 49 USC 303(d) and 23 CFR 774.3(b). However, all four build alternatives use other Section 4(f) properties where the impacts are greater than *de minimis*. Table 4.3-1 summarizes these preliminary findings.

Based on the impact discussion later in this chapter (Section 4.5) and the draft *de minimis* analysis in Appendix F, FHWA intends to make *de minimis* impact findings for use of two properties in the project area, as follows:

- **Kenai River Special Management Area.** FHWA proposes a *de minimis* impact finding for the Cooper Creek Alternative's use of KRSMA. The Juneau Creek Alternative and Juneau Creek Variant Alternative would have no Section 4(f) use of KRSMA, and the G South Alternative impacts are considered greater than *de minimis.*
- **USFS Kenai River Recreation Area.** FHWA proposes *de minimis* impact findings for the Cooper Creek, G South, and Juneau Creek Variant alternatives' impacts to the Kenai River Recreation Area. The Juneau Creek Alternative would not use land from the Kenai River Recreation Area.

The information provided and proposed findings are based on information and analysis completed to date. Following an opportunity for public and agency input, FHWA proposes to publish final *de minimis* impact findings on a preferred alternative in the Final SEIS.

Table 4.3-1. Proposed findings regarding *de minimis* impact

"Yes" indicates impacts appear to be *de minimis* impacts

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant
KRSMA	**Yes**	No	—	—
Kenai National Wildlife Refuge	—	—	No	—
Resurrection Pass Trail	—	—	No	No
Bean Creek Trail	—	No	No	No
Stetson Creek Trail	No	—	—	—
USFS Kenai River Recreation Area	**Yes**	**Yes**	—	**Yes**
Juneau Falls Recreation Area	—	—	No	No
Cooper Landing Boat Launch and Day Use Area	No	—	—	—
Sqilantnu Archaeological District	No	No	No	No
Confluence TCP	No	No	No	No
Charles G. Hubbard Mining Claims Historic District	No	No	—	—
Kenai Mining and Milling Co. Historic District	No	—	—	—

Notes: A dash (—) indicates that an alternative will not result in a Section 4(f) use of a given Section 4(f) property. Sportsman's Landing, Cooper Creek Campground, USFS Russian River Campground, Broadview Guard Station, New Village TCP, and Gwin's Lodge are not included in this table because there is no Section 4(f) use of these lands by any alternative.

4.4 Potential Avoidance Alternatives

4.4.1 Overview of Avoidance Analyses

As quoted in Section 4.1.1, FHWA may not approve an alternative that uses Section 4(f) property unless the impact is *de minimis* or unless there is "no prudent and feasible alternative" that avoids use of Section 4(f) property. For this reason, Section 4(f) *de minimis* impacts do not require an avoidance alternative analysis. This section discusses avoidance alternative analyses for the Section 4(f) impacts that are greater than *de minimis*.

A "feasible and prudent avoidance alternative" is defined in FHWA regulations at 23 CFR 774.17. For a Section 4(f) avoidance analysis, FHWA's Section 4(f) Policy Paper (FHWA 2012) says that, for larger highway projects with multiple Section 4(f) properties in the project area, it may be desirable to divide the analysis into "a macro- and micro-level

evaluation." These two levels of avoidance analysis are meant to distinguish end-to-end project alternatives that might avoid using any Section 4(f) properties from alternatives or design options that might avoid using any single Section 4(f) property. The guidance notes there is a duty to try to avoid the individual Section 4(f) properties within each alternative.

The Sterling Highway build alternatives would affect multiple Section 4(f) properties. An analysis of alternatives that avoid *all* Section 4(f) properties is presented below in Section 4.4.2. Section 4.4.3 addresses the topic of avoidance of *individual* Section 4(f) properties.

Process used in this Section 4(f) Evaluation

Because the Sterling Highway project area presents a complex set of Section 4(f) properties, informational boxes like this one will be used to outline the steps employed and to indicate where the reader is in the process. The process outline, with the current step in bold, is as follows.

1. Identify Section 4(f) properties.
2. Evaluate whether any impact is likely to be a *de minimis* impact.
3. **Identify any alternatives that would avoid all Section 4(f) properties.**
4. Present the impacts of proposed alternatives on Section 4(f) properties.
5. Identify alignment shifts that could avoid individual Section 4(f) properties or minimize harm to individual properties, and identify other measures to minimize harm.
6. Evaluate least overall harm (preliminary evaluation).

4.4.2 Ability to Avoid All Section 4(f) Properties

As described in Sections 4.1 and 4.2, all of the build alternatives considered "reasonable" for the purposes of the National Environmental Policy Act in this SEIS would use Section 4(f) resources. These alternatives are the Cooper Creek Alternative, G South Alternative, Juneau Creek Alternative, and Juneau Creek Variant Alternative.

As stated in Section 4.1.1, a "feasible and prudent avoidance alternative" is defined in FHWA regulations 23 CFR 774.17. For a Section 4(f) avoidance analysis, FHWA Advisory Circular T 6640.8a (1987) indicates, "Generally this would include alternatives to either side of the property," and "design alternatives should be in the immediate area of the property and consider minor alignment shifts …." However, DOT&PF and FHWA could not identify any alignment that avoided *all* Section 4(f) properties.

Section 4(f) Across the Region. Map 4-13 shows the extent of some of the known Section 4(f) properties across the Kenai Peninsula and Cook Inlet area. The KNWR adjoins Kenai Fjords National Park south of the project corridor. The park and KNWR both are Section 4(f) properties. The park extends through the Harding Icefield to steep-sided fjords at tidewater of the Gulf of Alaska; KNWR extends northward to tidewater at Cook Inlet/Turnagain Arm. A coastal highway route starting in Anchorage, crossing Turnagain Arm, and following the northern coast of the Kenai Peninsula is not an avoidance alternative because of the presence of the State's Anchorage Coastal Wildlife Refuge and Chugach State Park on the Anchorage side, both of which extend into tidewater and are Section 4(f) properties. Furthermore, if there were any chance of following the tideline westward toward the city of Kenai while avoiding KNWR, the Captain Cook State Recreation Area (a Section 4(f) property) located at the mouth of Swanson River extends onto State submerged lands of Cook Inlet and further impedes the route as an avoidance alternative.

Within CNF are other Section 4(f) impediments: the coastal Gull Rock Trail and nearby Hope Point Trail, along with the Porcupine Campground, all at Hope; the Russian Lakes Trail and

Resurrection River Trail south of Cooper Landing; and several other trails, including several branches of the Iditarod National Historic Trail, farther east.

For all these reasons, no new regional highway alternative is possible that would totally avoid Section 4(f) properties.

Ferry Alternative. An alternative that may entirely avoid Section 4(f) properties would begin at the Port of Anchorage, north of the northern boundaries of the Anchorage Coastal Wildlife Refuge (use Map 4-13 for reference). It would need to be a ferry alternative, because any road alternative that crossed Knik Arm and paralleled the shoreline westward along Cook Inlet would have to cross the Susitna Flats State Game Refuge or the Little Susitna State Recreation River, both Section 4(f) properties, and would then have to cross Cook Inlet to get back to the highway system in the Kenai Area. Such a crossing would be at an area too wide and deep to bridge practically.

A proposal for a ferry system would be an entirely different proposal than the Sterling Highway MP 45–60 Project, with different purpose and needs. The existing purpose and needs expressed in Chapter 1 of this Draft SEIS focus on improving the highway to current standards for a rural principal arterial in the MP 45–60 area. A ferry alternative largely would focus on replacing the existing Sterling Highway as the means of accommodating "through-traffic" between Anchorage and western Kenai Peninsula communities and would not address the problems in the MP 45–60 highway section at all. A ferry alternative would not meet the identified purpose and needs for this project.

The No Build Alternative. The No Build Alternative would avoid Section 4(f) use but would not satisfy the purpose and needs identified for this project.

3R Alternative. A resurfacing-restoration-rehabilitation (3R) alternative that remained almost entirely within the existing Sterling Highway right-of-way and affected no Section 4(f) properties was evaluated as a potential avoidance alternative. Section 2.5 of this Draft SEIS discusses the 3R Alternative evaluated in the 1994 DEIS for the Sterling Highway Project. Such an alternative might theoretically avoid all Section 4(f) properties if it stayed within the existing right-of-way. However, it was determined that such an alternative would remain too curvy to meet current rural principal arterial standards and would not satisfy the purpose and needs of the project. In addition, there are archaeological sites that occur within the existing right-of-way, and it is unlikely that all could be avoided. The most important problem would be continued congestion in the developed portion of the Cooper Landing community, where the existing right-of-way is particularly narrow and where there is a long succession of driveways and side roads.

To meet the project's identified purpose and needs, it was determined that frontage roads or a four- or five-lane facility would be necessary, but the narrow right-of-way precludes frontage roads or four lanes in this area without using Section 4(f) properties. Going outside the right-of-way would impact many parcels of private property and multiple buildings, would expand the highway footprint within the Sqilantnu Archaeological District and the Cooper Landing Historic District (both districts are Section 4(f) properties; see Map 4-1), and likely would impact (destroy or relocate) historic buildings in Cooper Landing that would be protected under Section 4(f). In addition, it would not be possible to bring existing sharp curves on other parts of the alignment to current design standards within the constraints of the existing right-of-way, because flattening such curves would require earth cuts up the hillsides outside the right-of-way

(on unstable soils or on USFS recreation area lands protected by Section 4(f)), or would require fill in the Kenai River, a State park unit protected by Section 4(f).

Conclusion. For the reasons stated above, no alternative that could satisfy the project purpose and needs could also avoid all Section 4(f) properties. The remainder of this Section 4(f) Evaluation therefore focuses on the Section 4(f) impacts associated with reasonable alternatives identified during the National Environmental Policy Act process, all possible planning to minimize harm to Section 4(f) resources, and analysis of the alternative with least overall harm.

4.4.3 Ability to Avoid Individual Section 4(f) Properties

As stated in Section 4.4.1, the FHWA Section 4(f) Policy Paper indicates a Section 4(f) Evaluation should assess the ability to route alignments around any single Section 4(f) property when there are several Section 4(f) properties in the project area. Most Section 4(f) properties were known to the initial highway design engineers, and the build alternatives were routed to avoid many Section 4(f) properties entirely. In some cases, such as Sportsman's Landing, a great deal of engineering work was undertaken with the specific aim of avoiding impact to an adjacent Section 4(f) property. As a result of all of these efforts, there would be no Section 4(f) use of the following properties in the project area (see Map 4-1):

- Sportsman's Landing Boat Launch near MP 55
- Cooper Creek Campground near MP 51
- USFS Russian River Campground
- Russian River Recreation Area
- Russian River Trail
- Russian River Angler's Trail
- New Village Traditional Cultural Property
- Historic buildings: Broadview Guard Station, Gwin's Lodge, and structures along the existing highway in the community of Cooper Landing

Where the build alternatives would use Section 4(f) properties, alignment shifts of the reasonable alternatives have been thoroughly examined, and it has been found to be impossible to avoid any impacted *individual* Section 4(f) property without impacting one or more *other* Section (f) properties. In examining ways that the alternative alignments might be shifted on the landscape to avoid any *individual* section 4(f) resource, the FHWA Section 4(f) Policy Paper states that an "alternative that avoids one Section 4(f) property by using another Section 4(f) property is not an avoidance alternative" (FHWA 2012, p. 13). In the Sterling Highway project area, the Sqilantnu Archaeological District is so large that it encompasses almost all of the other Section 4(f) resources (see Map 4-1). The Confluence TCP, the Charles G. Hubbard Mining Claims Historic District, and the USFS recreation areas also are large enough to overlap each other and to incorporate smaller Section 4(f) properties within their boundaries. The KNWR at the western end of the project area is much larger yet, covering 1.9 million acres (Map 4-13).

Any proposal to shift an alignment to go around a Section 4(f) resource would continue to use land from the Sqilantnu District. Any attempt to avoid the Sqilantnu District and all other Section 4(f) resources contained within its boundaries would result in use of KNWR and the

radiating trails. However, the FHWA Policy Paper indicates "a duty to try to avoid the individual Section 4(f) properties within each alternative." Therefore, Section 4.6 describes potential routes around individual Section 4(f) resources, even though they would continue to use land from other Section 4(f) properties. This analysis is presented in the context of the FHWA's consideration of all possible planning to minimize harm to an individual Section 4(f) resource by going around it or using less of it.

Section 4.6 includes sections titled "Measures to Minimize Harm—Alignment Options" that are dedicated to this concept of minimizing harm by shifting alignments to route them around individual Section 4(f) properties. The section also addresses other measures to minimize harm and mitigate impacts in separate subsections.

4.5 Impacts of the Build Alternatives on Section 4(f) Resources

4.5.1 Overview of Alternatives and their Impacts

The following sections address acreage and function impacts to Section 4(f) resources that would be anticipated to arise from the reasonable build alternatives described in Chapter 2 of this SEIS. Impacts to the functions of Section 4(f) properties mean impacts to the activities, features, and attributes of a property that is eligible for Section 4(f) protection.

Table 4.5-1 provides an overview of the acreage of Section 4(f) lands used. The project area includes other Section 4(f) properties not listed in this this table. They are not listed because no alternative would have a Section 4(f) use of the properties. However, any concept for avoiding a Section 4(f) property that is listed in the table has the potential to affect other Section 4(f) properties. Avoidance is discussed particularly in Section 4.6.

Impacts resulting from a project's proximity to a protected property must be considered under Section 4(f). If the project does not take land from the property but nonetheless severely impacts the property indirectly, in rare instances the impact can constitute "constructive use" (23 CFR 774.15). FHWA has made a determination that there would be no Section 4(f) properties substantially impaired by proximity of the project under any of the alternatives. Thus, there would be no constructive use of Section 4(f) property associated with this project. All Section 4(f) use described below is either temporary or permanent use.

The acreages reported in Table 4.5-1 and referenced elsewhere in this document indicate the relative involvement of an alternative with various Section 4(f) properties. However, acreages do not fully characterize the potential impacts. This is particularly true for historic and archaeological districts and the traditional

Process used in this Section 4(f) Evaluation

Because the Sterling Highway project area presents a complex set of Section 4(f) properties, informational boxes like this one will be used to outline the steps employed and to indicate where the reader is in the process. The process outline, with the current step in bold, is as follows.

1. Identify Section 4(f) properties.
2. Evaluate whether any impact is likely to be a *de minimis* impact.
3. Identify any alternatives that would avoid all Section 4(f) properties.
4. **Present the impacts of proposed alternatives on Section 4(f) properties.**
5. Identify alignment shifts that could avoid individual Section 4(f) properties or minimize harm to individual properties, and identify other measures to minimize harm.
6. Evaluate least overall harm (preliminary evaluation).

cultural property. They are areas, potentially with a patchwork of ownership, in which cultural resources are found. The impact is more closely related to how many specific cultural resource sites would be impacted, the cultural importance of the sites and areas impacted, the type of impact. Impacts to the cultural significance of these properties are difficult to assess and explain. Further discussion of the impacts is presented in the subsections that follow and in Section 3.9, Historic and Archaeological Preservation.

Table 4.5-1. Overview of acreage of Section 4(f) resources used

Section 4(f) resource	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Park				
Kenai River Special Management Area [a]	0.8[a]	2.4[a]	0	0
Wildlife Refuge				
Kenai National Wildlife Refuge [a]	0	0	33.4[a]	0[a]
Recreation Area				
Resurrection Pass Trail [b]	0	0	7.4[b]	7.4[b]
Bean Creek Trail (“new” non-historic portion)	0	2.1	0	0
Stetson Creek Trail	See Historic/Archaeological/Cultural Property, below			
USFS Kenai River Recreation Area	41.3	31.9	0	1.2
Juneau Falls Recreation Area [b]	0	0	17.1[b]	17.1[b]
Cooper Landing Boat Launch and Day Use Area	0.55	0	0	0
Historic/Archaeological/Cultural Property				
Sqilantnu Archaeological District [c]				
Existing highway footprint within district	47.1	47.1	47.1	47.1
New/incremental footprint [4(f) use] within district	161.1	165.9	180.0	167.3
Total footprint within district	208.2	213.0	227.1	214.4
Confluence TCP [c]				
Existing highway footprint within district	12.7	12.7	12.7	12.7
New/incremental footprint [4(f) use] within district	29.0	29.0	14.7	19.7
Total footprint within district	41.7	41.7	27.4	32.4
Bean Creek Trail (historic portion) [d]	0	1.0	1.1[d]	1.1[d]
Stetson Creek Trail	2.5[d]	0	0	0
Charles G. Hubbard Mining Claims Historic District [c]				
Existing highway footprint within district	11.6	11.6	11.6	11.6
New/incremental footprint [4(f) use] within district	27.4	25.5	0	0
Total footprint within district	39.0	37.1	11.6	11.6
Kenai Mining and Milling Co. Historic District [d]				
Existing highway footprint within district	0	0	0	0
New/incremental) footprint [4(f) use] within district	4.0	0	0	0
Total footprint within district	4.0	0	0	0

Section 4(f) resource	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative

NOTES: Except for districts and the TCP, impacts are based on the highway right-of-way that would be acquired within the Section 4(f) property boundaries but outside the existing right-of-way. This table does not record acreage of proposed mitigation.

[a] Acreage recorded is acreage impacted outside the existing highway right-of-way only. Expansion of the road within the right-of-way is not considered to be a conversion of use to transportation purposes and therefore is not considered a 4(f) use except where expansion impacts a developed recreation facility or historic property located within the right-of-way.

[b] The Resurrection Pass Trail lies within the Juneau Falls Recreation Area, and acreage reported for the trail is part of the acreage reported for the recreation area. The crossing of the Resurrection Pass Trail footpath is proposed to be overhead (bridge). This table reports the entire area of proposed right-of-way, even where the highway is overhead. Of the impact acreage shown, approximately 4.3 acres of impact to the trail's 1,000-foot recreation resource buffer and approximately 6.2 acres of impact to the Juneau Falls Recreation Area would be included in the right-of-way but would lie beneath the bridge.

[c] Acreages presented are reported on three lines: the first line reports the footprint of the existing Sterling Highway within the district. The second line reports acreage associated with the incremental impact of the new construction, and is the 4(f) use for the project. The third line reports the total acreage of the existing footprint plus the projected new impact of the alternative. Impacts to individual archaeological sites within the districts are not recorded in this table; the individual historic properties have not been sufficiently delineated to calculate acreage of impact, but acreage of impact to these individual sites would be considerably less than shown. For the Confluence TCP, note that (1) the existing highway is considered part of the TCP, and (2) the TCP acreage is a subset of the Sqilantnu District acreage.

[d] To display comparable impact acreages, the number shown includes only land incorporated into highway right-of-way. It does not include impact of a temporary construction access road that would cross the Bean Creek Trail (up to an additional 3 acres). It does not include total acreage of trail bypassed by rerouting Bean Creek Trail or Stetson Creek Trail (rerouting is proposed as mitigation).

4.5.2 Impacts of the Cooper Creek Alternative

The Cooper Creek Alternative would take land from several Section 4(f) properties, or occupy the lands temporarily during construction. Table 4.5-1 indicates acreage of impact. The properties are:

- KRSMA
- Stetson Creek Trail
- USFS Kenai River Recreation Area
- Cooper Landing Boat Launch and Day Use Area
- Sqilantnu Archaeological District
- Confluence Traditional Cultural Property
- Charles G. Hubbard Mining Claims Historic District
- Kenai Mining and Milling Co. Historic District

Other Section 4(f) properties exist near the Cooper Creek Alternative, as shown on Map 4-1, but where there is no use of a property. Discussion appears in Sections 4.5 and 4.6 (addressing recreation and cultural sites, respectively).

4.5.2.1 Kenai River Special Management Area

The Cooper Landing and Schooner Bend bridges over the Kenai River would be replaced with wider bridges on slightly different alignments than existing bridges (Map 4-2 and Map 4-11). Table 4.5-1 indicates the acreage of impact. The Cooper Landing Bridge would be replaced substantially within the existing highway right-of-way; the Schooner Bend Bridge would be replaced substantially outside the existing right-of-way but adjacent to the existing location. The existing bridges would be entirely removed, including piers in the river, except for components of the existing Cooper Landing Bridge that may be used in the new bridge. Use of the KRSMA for bridge abutments and piers would be different than with the current bridges, and fewer piers likely would be used than with the existing bridges. Mitigation measures discussed in Section 4.6 are intended to enhance the appearance of the bridges as seen from the river.

Two noise modeling locations in the Kenai River, one near the Russian River confluence and one near the Juneau Creek confluence, each indicated a 1 A-weighted decibel (dBA) increase in 2043 from existing 2012 noise, identical to predicted noise levels for the No Build Alternative. This change in average noise level is not expected to be perceptible. However, the river parallels the existing highway and proposed highway alignment closely. Under the Cooper Creek Alternative, highway traffic would be readily audible in some locations, as it is today.

Proximity to the river would mean visual effects would continue at levels similar to today. In addition, proximity of all traffic to KRSMA would retain the risk that a spill on the highway could pollute the river. Forty-three percent of the alignment would remain within 300 feet of Tier 1 streams (Section 3.17, Hazardous Waste Sites and Spills, further explains this issue). The Cooper Creek Alternative would include a cut 55 feet high and 350 feet long uphill of the new highway just east of the Russian River Campground entrance. This cut area is depicted on Map 4-9 as a widened area of proposed highway right-of-way on the south side of the highway. Although this cut would be located well outside the KRSMA (across the highway from the river), it likely would be easily visible to boaters from some points on the Kenai River over an area of up to 1 mile. The highway itself in this area would be located up to about 80 feet farther from the river and at slightly higher elevation than the existing highway alignment.

The new highway would provide 8-foot shoulders, and near Sportsman's Landing and Russian River Ferry—prime river access points—the shoulder could tempt the public to park outside these access point parking lots, which charge a fee and often can be full during prime fishing season. Left unmanaged, this additional informal parking could lead to more people in already crowded areas near the confluence of the Russian River and Kenai River and increase the need for management by USFWS (manager of Sportsman's Landing and Russian River Ferry), DPOR, ADF&G, and USFS. Enforceable No Parking signs would be posted to mitigate such issues.

During construction of the bridges, in-water work would be necessary to establish new piers and remove old piers. The construction process likely would require a temporary construction bridge built on multiple pilings at close spacing as a platform for construction of the new bridge. A pile driver would drive the many pilings under the temporary bridge (these would be removed before completion of construction), and would drive the larger pilings under the permanent bridge. Temporary reduction of water quality would result from the driving and removal of pilings as bottom sediments were dislodged. Mitigation measures would minimize the risk of fuel spills and dropping of any material into the Kenai River, but spills, leaks, and minor loss of

construction material into the river are possible and could further reduce water quality. In addition, construction would result in intermittent noise from construction equipment, particularly during pile driving, and would result in temporary closure of the river at the bridge location to boats and fishing when cranes were lifting bridge girders into place and during pile driving near the center of the river. Pile driving near the edges of the river likely would allow sufficient space so that boats could safely pass; when pile driving was taking place on one side of the river, the opposite side of the river would remain open (see Section 4.6 for mitigation measures related to bridge construction and river navigation).

The overall effect to KRSMA of the finished bridges would be similar to effects from the existing bridges, and no substantial impact to the functions of KRSMA—including fish habitat and fish movement, river boating, fishing, and viewing—is expected. Because of mitigation (listed in Section 4.6), including timing of construction related to fish movement and timing of river closures related to recreational boating, the KRSMA habitat and recreation functions would continue during construction.

Other impacts common to Cooper Creek Alternative and other build alternatives. Under any of the four build alternatives, in the MP 56–58 area, boaters and sport fishers on the Kenai River likely may be more aware of the highway presence following construction than they are today. All build alternatives include retaining walls or riprap erosion protection at several locations along the river west of Sportsman's Landing (about MP 55). The existing highway is near the river at these same locations, but additional riprap or walls could add an engineered look to those viewing the river banks. It is likely that some of these riprap or retaining wall areas would be built within the edge of the river and therefore within the KRSMA park unit. However, all construction in this area would be within the existing highway right-of-way where it overlaps the river and would not be considered a use of Section 4(f) property. Construction at these locations is not expected to involve diverting water except perhaps at the very edge of the river or on sloughs; no impact to boating and no substantial impact to bank fishing opportunities are expected. The permanent impacts to those portions of the KRSMA outside the existing right-of-way would be substantially similar to impacts today, including views of cars and the highway embankment from some locations and the sounds of vehicles on the highway. Temporary impacts would include construction noise and, in a few locations, construction equipment working on the edge of the river.

The Cooper Creek Alternative would include similar river-edge impacts in two locations, approximately MP 53.3 and MP 54.6, as well. The MP 53.3 area would use a very small portion of the KRSMA along the edge of the Kenai River outside the existing right-of-way, and this is considered a Section 4(f) use. The MP 54.6 location would not involve incorporating park land into the transportation facility and so would not be considered a Section 4(f) impact.

De Minimis Impact. Based on consultation with the officials with jurisdiction, and the proposed measures to minimize harm (including the avoidance of specific features, mitigation, and/or enhancement), the FHWA believes the use of the property would result in a *de minimis* impact. The FHWA intends to make a *de minimis* impact finding; a preliminary finding appears in Appendix F.

4.5.2.2 Stetson Creek Trail

The Cooper Creek Alternative would cross the lower end of the Stetson Creek Trail at grade, severing it, and would parallel the trail over about 1,600 feet (see Map 4-8). The closest the

highway would come to the existing trail in this parallel section would be approximately 80 feet. The new highway would be benched into a hillside in this area, and the cut into the hillside above the new highway would eliminate the existing trail over a length of about 200 feet, requiring trail reconstruction or rerouting. Because the highway would be constructed on a cross slope in the area near the trail, a broad area would be cleared of trees, and the existing trail would be close to this cleared edge, likely providing a different visual experience for trail users. To avoid conflicts between trail users and highway vehicles, and at USFS recommendation to resolve a USFS management issue, the project as proposed would create a new pullout trailhead on the south side of the highway and extend the trail to it. This proposal is subject to agreement among Section 106 consulting parties, because this is an historic trail (see Section 4.6 for proposed mitigation).

Traffic noise would be audible to trail users. The Stetson Creek Trail typically is closed to motorized vehicles, but miners with claims are allowed access via all-terrain vehicles on the trail, so the expectation for quiet is not as high as on most other USFS recreational trails. The *Highway Traffic Noise Assessment* (Appendix D of this SEIS) (HDR 2014c) completed for this project assumed that undeveloped areas have an average noise level of 40 dBA, based on average noise levels measured at similar locations. Under the Cooper Creek Alternative, the new highway would cross the trail and would parallel its existing route across the hillside. In this area where the highway would parallel the trail, the noise study indicates a noise increase of 16 dBA from a mostly natural quiet background of 40 dBA today to 56 dBA average sound level in 2043. This substantial noise increase is considered an impact under DOT&PF/FHWA noise abatement criteria. It is expected that in excess of 2,000 feet of today's trail would be affected by highway noise. A second noise modeling location farther up the trail (about 3,500 feet from the existing campground trailhead) indicated an increase of 6 dBA—distinctly noticeable but not exceeding the noise abatement criteria and not a "substantial noise increase." Even farther up the trail, noise levels likely would be similar to today's levels.

While forest cover limits expansive views from the existing trail, particularly at its lower elevations near the proposed highway bridge site, the new bridge may be visible from some points along the trail upstream of the bridge where views are now more natural. Trail users temporarily would experience construction noise and dust and short-term trail closure while the new trail segment and new highway were under construction. Besides short closures, the contractor would be required to maintain trail access (see Section 4.6 for mitigation). Access for construction of the new Cooper Creek Bridge could use an alternative trail access route that begins on USFS land and crosses Borough land; construction vehicles could skirt the Cooper Creek Campground via this route but cross the existing Stetson Creek Trail. Should this occur, heavy equipment would be expected to cross occasionally and standard vehicles to cross repeatedly over the course of construction during bridge construction, likely affecting three summer seasons, possibly four. Mitigation described in Section 4.6 would help minimize disruption of trail use.

4.5.2.3 USFS Kenai River Recreation Area

The existing highway right-of-way would be widened in some locations adjacent to the Kenai River Recreation Area to accommodate the wider, straighter alignment of the Cooper Creek Alternative (see Map 4-9). Table 4.5-1, above in Section 4.5.1, indicates acreage of impact. The recreation area was formed around the highway as a sort of buffer, providing for a natural corridor along the Kenai River and between the highway and the river. Although the Cooper

Creek Alternative has a greater acreage of impact to the Recreation Area than the G South Alternative (see Table 4.5-1, above), the effects on the functions of the recreation area are similar. None of the developed sites within the recreation area that have a recreation function (i.e., the K'Beq Footprints Heritage Site, the Resurrection Pass trailhead, and the entrance and overflow parking area for the Russian River campground) would be permanently affected. Trees and vegetation would be cleared to establish the required clear zone for the wider highway, and clearing would permanently reduce wildlife habitat in a narrow strip along the highway. Average hourly traffic noise in the recreation area would be similar to noise levels today.

Three locations within the recreation withdrawal were modeled at various distances from the highway. Two showed increases of 1 dBA in average sound levels (not considered perceptible) and one showed an increase of 6 dBA in average sound levels (distinctly noticeable) by 2043. At the site closest to the highway, the location of the parking area and trailhead for the old Beginnings Heritage Site interpretive trail within the recreation area, the change in average sound level would rise from 67 dBA to 68 dBA. While this would be only a 1-dBA increase from existing levels, DOT&PF Noise Policy defines this as a traffic noise impact. The Noise Policy defines an impact as sound that approaches within 1 dBA or exceeds the FHWA noise abatement criteria of 67 dBA. Traffic noise at the site today (66 dBA) meets the definition of impact. The No Build Alternative's predicted noise level (68 dBA at the site closest to the highway) showed the same impact. This site is not used much, but is an access site for the recreation area. Otherwise, it is indicative of near-highway noise levels at the boundary of the recreation area and the highway right-of-way.

During construction, noise, dust, and the visual clutter of construction equipment and freshly cut earth would be impacts to those passing through the recreation area on the highway, and construction noise likely would carry to the trailheads, parking areas, and heritage site developments. Construction activity would be visually screened from all these sites by trees, except at the former Beginnings Heritage Site, where the existing parking and trailhead are located immediately adjacent to the highway. Temporary traffic delays, closures, and detours would occur (see Section 4.6 for mitigation). The contractor would be required to maintain access to these sites during construction, except the Beginnings Heritage Site, which is now closed as a public interpretive site and is used only as an ancillary, informal river access point.

Based on consultation with the officials with jurisdiction, and the proposed measures to minimize harm (including the avoidance of specific features, mitigation, and/or enhancement), the FHWA believes the use of the property will result in a *de minimis* impact. The FHWA intends to make a *de minimis* impact finding; a preliminary finding appears in Appendix F.

Some of the contributing historic properties from the Sqilantnu Archaeological District and the Charles G. Hubbard Mining Claims Historic District are within the boundaries of the Kenai River Recreation Area. Impacts to historic properties are addressed below.

4.5.2.4 Cooper Landing Boat Launch and Day Use Area

The Cooper Creek Alternative includes replacing the Cooper Landing Bridge with a new, wider bridge on a slightly different alignment. The boat launch ramp is built within the existing Sterling Highway right-of-way immediately adjacent to the existing bridge abutment (see Map 4-11). No permanent effect on the boat launch and day use area is anticipated. The recreation facilities are presently located immediately adjacent to the highway. During construction, the new, wider portion of the bridge would be built on the upstream side of the existing bridge (the

opposite side from the boat launch). Through-traffic on the highway and access to the boat launch would be maintained via an upstream temporary bridge while the new, wider bridge was built.

During construction of the retaining wall that would be part of the proposed new bridge abutment, the contractor is likely to need to use the boat launch ramp while excavating the edge of the existing highway embankment and to park equipment while building the wall. This may require a temporary construction permit for access through the day use site, but the actual work would take place within the existing highway right-of-way on the boat launch ramp. The ramp would be closed to public use at that time. Closure of the boat launch ramp also may result over the course of several days during pile driving.

Except for these temporary impacts to the use of the boat launch ramp for construction staging and work immediately adjacent to the ramp, blocking the boat launch ramp for construction would be prohibited; the construction contractor would be required to maintain public access to the ramp. Although these uses would be temporary, and although there would be no physical change to the boat launch ramp, recreational activities such as boat launching may be hindered by noise of pile driving nearby on the Kenai River, even deemed far enough away to be safe. General construction noise nearby (heavy equipment operation; pile driving for bridge piers) also may hinder use of the boat launch and day use area over a longer period, as the site may not be desirable for activities such as picnicking, when noisy. The impacts, while temporary and relatively minor, would amount to a use of recreation property under Section 4(f) because the impacts likely would interfere with the normal recreational activities of the facility. However, there would be no permanent impacts to the boat ramp. The new highway would be immediately adjacent to the ramp, as the existing highway is today.

4.5.2.5 Sqilantnu Archaeological District

The build alternatives would impact the Sqilantnu Archaeological District, although in somewhat different ways. Total acreages of use of the district by the Cooper Creek Alternative are shown in Table 4.5-1. However, acreage itself is only a partial measure of impact. The Cooper Creek Alternative would use land from 27 historic properties that contribute to the district by partially or completely eliminating them, or by burying them with highway embankment material. A few of the sites affected already lie partially under the existing highway embankment. Among the 27 sites, the Cooper Creek Alternative would use land from historic properties associated with the Beginnings Heritage Site (use would be identical to that of the G South Alternative). The Cooper Creek Alternative also would affect the contributing Confluence TCP; see the discussion in the following paragraph. Mitigation is proposed, per a developing agreement among consulting parties (agencies and tribal entities; see Section 4.6).

4.5.2.6 Confluence Traditional Cultural Property – Impacts Common to Cooper Creek Alternative and G South Alternative

The Confluence TCP is wholly contained within the Sqilantnu Archaeological District and is a contributing element of the district; therefore, impacts discussed here are a subset of the impacts discussed above for the broader district. The Cooper Creek Alternative (along with the G South Alternative) would follow the existing road alignment through the TCP and would expand the existing right-of-way and pavement width to accommodate a straighter alignment and shoulders, lane widths, and clear zones that meet current standards. The widening and straightening would impact archaeological sites and would have the following impacts to sites within the Confluence

TCP noted by consulting parties as having particular importance in the tradition and culture of the Kenaitze Indian Tribe:

- **K'Beq Heritage Site and CIRI Tract B**. The highway would remain parallel to the K'Beq site. Ingress and egress to the site would be improved with turning lanes or acceleration lanes. The new highway right-of-way would use a narrow sliver of the CIRI Tract B parcel. Future access to CIRI Tract B would be through the K'Beq driveway. No delineated archaeological sites would be affected in this area.
- **Beginnings Heritage Site**. Widening of the highway would use portions of archaeological historic properties formerly used for cultural interpretation. The highway would pass through the length of the Beginnings site as it does today. The small parking area at Beginnings would remain.
- **CIRI Tract A**. The widened highway would not require acquisition of land from CIRI Tract A. Future access to Tract A would be possible from the upgraded "old" highway at approximately the location agreed upon by CIRI and USFS near MP 54; DOT&PF may require that it be combined with a private driveway in that area.

The setting, feeling, and association of the TCP would be slightly altered in this area, because the highway would be wider and straighter, and average traffic speeds would be somewhat higher on the better road. The road would feel more like a highway and would have a more engineered and formal feel. It would be less like a winding rural road. This would somewhat alter the character of the TCP and take it a step further from its pre-road condition of river, trails, and forest, and thereby further reduce the association of the current environment with the traditional Dena'ina culture in this area. Because the existing highway presently passes through the TCP, the changes would be incremental—a small change in character.

4.5.2.7 Charles G. Hubbard Mining Claims Historic District

FHWA has determined that widening of the existing highway under both the Cooper Creek and G South alternatives would result in similar impacts to several historic features within the district:

- Ace and Ada mining claims: of 11 mining trenches and 6 prospect pits, 2 mining trenches would be within the proposed new right-of-way and likely would be fully or partially eliminated by construction.
- Alpha mining claim: 2 prospect pits would be fully or partially eliminated by construction.
- Fern and Robin mining claims: of 3 trenches and 2 prospect pits, 2 sites likely would be fully or partially eliminated by construction.

Full and partial elimination of these sites constitute a "use" of the district under Section 4(f). Acreage of use of the district as a whole is shown in Table 4.5-1, above in Section 4.5.1. Impacts to the individual contributing features amount to a large percentage of the known features within the district, but most features are holes and trenches in the earth (not designed and constructed structures). Because none of the features are frequented by the public, noise and other construction effects would not affect public use of these sites. Impacts to prospect pits on the Charles G. Hubbard Claims Historic District would be mitigated as discussed in Section 4.6.

4.5.2.8 Kenai Mining and Milling Company Historic District

This historic district, located near the Cooper Creek Campground (Map 4-8), would be affected by construction of the proposed Cooper Creek Bridge and the western approach to the bridge. Acreage of use of district land is presented in Table 4.5-1, above in Section 4.5.1. Partial or complete elimination of contributing historic properties would be a "use" of the district under Section 4(f). FHWA has determined that there would be an impact on an historic flume and on a short historic trail, now overgrown, that once linked the creek area or valley bottom with the Stetson Creek Trail higher on the hillside. The trail would be wholly eliminated by earth moving during construction, and the flume and associated old road may be partially eliminated during bridge construction (the flume is located under the proposed bridge site). Mitigation for impacts to the Stetson Creek Trail under this alternative would create some new trail within this historic district. The trail would be routed to avoid known contributing features. It is possible that bridge construction and material hauling in the valley bottom during the construction phase could eliminate other known features of the district, but mitigation measures, such as marking areas to avoid, would minimize the risk. Because none of the features are well known to the public, and because public use is low, noise and other construction effects would not affect public use of these sites (see Section 4.6 for discussion of mitigation).

4.5.3 Impacts of the G South Alternative

The G South Alternative would use land from several Section 4(f) properties. Table 4.5-1, above in Section 4.5.1, indicates acreage of impact. The properties are:

- KRSMA
- Bean Creek Trail
- USFS Kenai River Recreation Area
- Sqilantnu Archaeological District
- Confluence Traditional Cultural Property
- Charles G. Hubbard Mining Claims Historic District

4.5.3.1 KRSMA

The G South Alternative includes a new bridge over the KRSMA west of the Kenai Princess Lodge in an area without any existing bridge (see Map 4-1 and inset 2 on Map 4-2). This alternative also includes a replacement bridge across the Kenai River near Schooner Bend, adjacent to the existing bridge but on a slightly different alignment (inset 1 on Map 4-2).

The new bridge would add a third Kenai River bridge in the project area, a substantial visual impact at that particular point in the river and an intrusion of an engineered structure on a river corridor valued for its mountain and forest scenery.

Also, people recreating on the Kenai River would hear traffic noise as they approached and passed the bridge. The character of the sound would be similar to road noise today for people using the river near the existing two bridges and at other locations where the highway is immediately adjacent to the river. Two noise modeling locations were located in the Kenai River, one near the Russian River confluence and one near the Juneau Creek confluence (and near G South Alternative's proposed bridge). The downstream site indicated a 1-dBA increase in

average sound level in 2043 from existing 2012 sound levels, identical to predicted noise levels for the No Build Alternative. This increase in average noise level is not expected to be perceptible. The upstream site near the proposed new G South Alternative bridge indicated a 5-dBA change, from 49 dBA to 54 dBA, an increase that would be readily noticeable by people on the river. However, it would not approach or exceed FHWA noise abatement criteria and would be similar to the experience at the river's other two existing highway bridges. This would be a permanent new impact to the river users in a new location. In general, the river parallels the existing highway and proposed highway alignment closely. Under the G South Alternative, highway traffic would be readily audible in some locations, as it is today.

In addition to noise, proximity to the river would continue visual effects similar to those today, and proximity of all traffic to KRSMA would retain risks that a spill on the highway would pollute the river. Thirty-three percent of the alignment would remain within 300 feet of Tier 1 streams (Section 3.17, Hazardous Waste Sites and Spills, further explains this issue).The bridge abutments and piers would use portions of the KRSMA. Boaters in this corridor are aware today that they are not on a pristine wilderness river but are paralleling a highway, but a new bridge would increase awareness of the development in the valley. At the Schooner Bend replacement bridge, the resulting impact would be much the same as existing effects of the highway crossing the Kenai River. The bridge would be wider than the existing bridge, but likely there would be fewer piers in the river, and certainly no more piers than exist today. The existing bridge would be removed, including all piers and abutments.

The new highway would provide 8-foot shoulders, and near Sportsman's Landing and Russian River Ferry—prime river access points—the shoulder could tempt the public to park outside these access point parking lots, which charge a fee and often can be full during prime fishing season. Left unmanaged, this additional informal parking could lead to more people in already crowded areas near the confluence of the Russian River and Kenai River and increase the need for management by USFWS (manager of Sportsman's Landing and Russian River Ferry), DPOR, ADF&G, and USFS. Enforceable No Parking signs would be posted to mitigate such issues.

During construction of both bridges, in-water work would be necessary to establish new piers. The construction process would require a temporary construction bridge built on multiple pilings at close spacing as a platform for construction of the new highway bridge. A pile driver would drive the many pilings to support the temporary bridge (these would be removed before completion of construction), and would drive the larger pilings under the permanent bridge. No de-watering is anticipated. Temporary reduction in water quality would result from the driving and removal of pilings as bottom sediments were dislodged. Mitigation measures would minimize the risk of fuel spills and dropping of any material into the Kenai River, but spills, leaks, and minor loss of construction material or tools into the river are possible and could further reduce water quality. In addition, construction would result in the noise of construction equipment, particularly during pile driving, and would result in closure of the river at the bridge location to boats and fishing when cranes were lifting bridge girders into place and during pile driving near the middle of the river. Pile driving near the edges of the river would allow sufficient space so that boats could safely pass on the opposite side of the river. Section 4.6 discusses mitigation measures related to bridge construction to minimize impacts to the river flow, fish habitat, fishing, and boating.

Besides the bridges, and besides the retaining walls and riprap noted as a visual impact under all build alternatives, the G South Alternative would include a road cut 55 feet high and 350 feet long on the uphill side of the new highway just east of the Russian River Campground entrance. This cut would be easily visible to boaters on the Kenai River for perhaps a mile. The highway in this area would be located up to about 80 feet farther from the Kenai River and at slightly higher elevation than the existing highway alignment.

Other KRSMA impacts common to the G South and other build alternatives. Under all four build alternatives, in the MP 56 to 58 area, boaters and sport fishers on the Kenai River likely may be more aware of the highway presence following construction than they are today. All build alternatives include retaining walls or riprap erosion protection at several locations along the river west of Sportsman's Landing (about MP 55). The existing highway is near the river at these same locations, but additional riprap or walls could add an engineered look to those viewing the river banks. It is likely that some of these riprap or retaining wall areas would be built within the edge of the river and therefore within the KRSMA park unit. However, all construction in this area would be within the existing highway right-of-way where it overlaps the river and would not be considered a use of Section 4(f) property. Construction at these locations is not expected to involve diverting water except perhaps at the very edge of the river or on sloughs; no impact to boating and no substantial impact to bank fishing opportunities is expected. The permanent impacts to those portions of the KRSMA outside the existing right-of-way would be substantially similar to the types of impacts today, including views of cars and the highway embankment from some locations and the sounds of vehicles on the highway. Temporary impacts would include construction noise and, in a few locations, construction equipment working on the edge of the river.

The G South Alternative includes similar river-edge impacts in two locations in the MP 53.3 and MP 54.6 areas as well (identical to the Cooper Creek Alternative). The alternative, in the MP 53.3 area, would use a very small portion of the KRSMA along the edge of the Kenai River outside the existing right-of-way, and this is considered a Section 4(f) use. The MP 54.6 location would not involve incorporating new park land into the transportation facility and would not be considered a Section 4(f) impact.

4.5.3.2 Bean Creek Trail

In the area where the newer, non-historic portion of Bean Creek Trail would cross Bean Creek, the G South Alternative would cross the trail twice and the historic alignment once, resulting in a Section 4(f) "use" (see Map 4-6 and Map 4-7). The highway crossing of the non-historic trail near its trailhead would create a substantial interruption to recreational trail use and to the trailhead area. However, the alternative would create a new summer trailhead north of the highway, would reroute the trail in a tunnel beneath the new highway and across Bean Creek north of the highway, and would also reroute the historic spur beneath the highway at Bean Creek, to maintain continuity. At USFS request, DOT&PF also proposes to add a pullout in this area that would serve winter users of the Bean Creek Trail. Without these measures, crossing of the new highway could be dangerous both to trail users and to drivers on the highway (see Section 4.6 for complete discussion of measures to minimize harm).

The result would be a culvert under the highway that would allow passage by horseback riders, snowmobilers, and hikers. Snowmobilers and other winter recreationists use this route and would be able to continue their use without crossing the highway at grade. However, any passage

beneath the highway would mean little or no snow. Snowmobiles can operate on "dry" ground, but a snowless stretch would change the experience slightly. Skiers on this route would need to take off skis and walk through the tunnel.

The Bean Creek Trail currently has no formal trailhead and parking area, and three agencies (USFS, State of Alaska, and Kenai Peninsula Borough) own and manage land on the approach to the trail and at the lower end of the trail. Creating a trailhead for the Bean Creek Trail would resolve a long-standing issue for the trail and formalize it as a USFS trail. However, because it would start at somewhat higher elevation than the existing trailhead for Resurrection Pass Trail, and because it would provide shorter access to higher elevations, open views, lakes, and USFS recreational cabins, it is possible that it would become the favored access point for the entire Resurrection Pass Trail, which could require management changes by the USFS. See also mitigation discussion for this trail in Sections 4.6.4 (with Resurrection Pass Trail) and 4.6.5.

The *Highway Traffic Noise Assessment* (Appendix D of this SEIS) completed for this project modeled a site along the Bean Creek Trail near the proposed crossing of the G South Alternative. The Bean Creek Trail crossing area is undeveloped except for the old logging road, and Bean Creek is not a fast-running stream (which would add noise), so the noise model assumes background noise levels of 40 dBA, as measured at a similar undeveloped location. With the curving alignment of the trail, the road would cross the existing trail three times, and users of nearly 3,500 feet of the existing trail would be quite noticeably affected by road noise. The modeled change, from 40 to 61 dBA, would be a substantial increase resulting in a noise impact (an increase in average sound level of 21 dBA at the edge of the highway right-of-way). Because of nearby private property, the creek, and topography, it is likely that any rerouted trail segment from the neighborhood to the main trail also would lie close enough to the highway to be affected, although likely at slightly lower noise levels. At the undercrossing itself, the noise level would be reduced because the trail tunnel would insulate trail users from traffic noise. In general, however, users of the lower end of the trail would experience these substantial noise increases compared to today's noise levels. Except for rerouting the trail, no noise abatement measures were considered practical in this location, and none are proposed. During construction, the noise and dust of construction equipment would impact trail users. Mitigation includes measures to maintain trail user access across the construction area while the new trail is being built (see Section 4.6).

4.5.3.3 USFS Kenai River Recreation Area

The existing highway right-of-way would be widened in some locations adjacent to the Kenai River Recreation Area (Map 4-9) to accommodate the wider, straighter alignment of the G South Alternative. The recreation area was formed around the highway as a sort of buffer, providing for a natural corridor along the Kenai River and between the highway and the river. Although the G South Alternative has a lower acreage of impact than the Cooper Creek Alternative (see Table 4.5-1), the effects on the functions of the recreation area are similar. None of the developed sites within the recreation area that have a recreation function (i.e., the K'Beq Footprints Heritage Site, the Resurrection Pass Trail trailhead, and the entrance and overflow parking area for the Russian River Campground) would be affected. Trees and vegetation would be cleared to establish the required clear zone for the wider highway, and clearing would permanently reduce wildlife habitat in a narrow strip along the highway. Average hourly traffic noise in the recreation area would be similar to noise levels today.

Three locations within the recreation area were modeled at various distances from the highway. Two showed increases of 1 dBA in average sound levels (not likely perceptible) and one showed an increase of 6 dBA in average sound levels (distinctly noticeable) by 2043. At the site closest to the highway, at the location of the parking and trailhead for the old Beginnings Heritage Site interpretive trail within the recreation area, the change in average sound levels would increase from 67 dBA to 68 dBA by 2043. While this would be only a 1-dBA increase from existing levels, DOT&PF Noise Policy defines this as a traffic noise impact. The Noise Policy states that a sound level that approaches within 1 dBA or exceeds the FHWA noise abatement criteria of 67 dBA is an impact. The site today (66 dBA) is impacted. The No Build Alternative's predicted noise level (68 dBA at the site closest to the highway) showed the same impact. This site is not well used, but is an access site for the recreation area. Otherwise, it is indicative of near-highway noise levels at the boundary of the recreation area and the highway right-of-way.

During construction, noise, dust, and the visual clutter of construction equipment and freshly cut earth would impact those passing through the recreation area on the highway, and construction noise likely would carry to the trailheads, parking areas, and heritage site developments. Construction activity would be visually screened from all these sites by trees, except at the former Beginnings Heritage Site, where the existing parking and trailhead are located immediately adjacent to the highway. Temporary traffic delays, closures, and detours would occur (see Section 4.6 for mitigation). The construction contractor would be required to maintain access to these sites during construction, except the Beginnings Heritage Site, which is now closed as a public interpretive site and is used only as an ancillary, informal river access point.

Based on consultation with the officials with jurisdiction, and the proposed measures to minimize harm (including the avoidance of specific features, mitigation, and/or enhancement), the FHWA believes the use of the property will result in a *de minimis* impact. The FHWA intends to make a *de minimis* impact finding; a preliminary finding appears in Appendix F.

Some of the historic properties from the Sqilantnu Archaeological District and the Charles G. Hubbard Mining Claims Historic District lie within the boundaries of the Kenai River Recreation Area. Impacts to cultural sites are addressed below.

4.5.3.4 Sqilantnu Archaeological District

The build alternatives all would use land from the Sqilantnu Archaeological District and its contributing properties, although in somewhat different ways. Total acreage of impact to sites protected by Section 4(f) is shown in Table 4.5-1. However, acreage is only a partial indicator of impact. The G South Alternative would impact 25 archaeological historic properties by partially or completely eliminating them, or by burying them with highway embankment material. A few of these sites already are partly located under the existing highway. The G South Alternative would impact contributing historic properties associated with the Beginnings Heritage Site (impacts would be identical to those from the Cooper Creek Alternative). The G South Alternative also would impact the Confluence TCP (same as Cooper Creek Alternative), which contributes to the Sqilantnu District; see further discussion in the following paragraphs. Mitigation specifics will be documented in an agreement that will be developed between FHWA and consulting parties (agencies and Tribes; see Section 4.6).

4.5.3.5 Confluence Traditional Cultural Property

The Confluence TCP is wholly contained within the Sqilantnu Archaeological District and is a contributing element of the district; therefore, its impacts are a subset of the impacts discussed above for the broader district. The impacts of the G South Alternative to the Confluence TCP would be identical to those described more fully above for the Cooper Creek Alternative.

4.5.3.6 Charles G. Hubbard Mining Claims Historic District

FHWA has determined that widening of the existing highway under the G South Alternative would impact several historic features within the district:

- Alpha mining claim: two prospect pits would be fully or partially eliminated by construction.
- Fern and Robin mining claims: of three trenches, two prospect pits, and an old road on the site, two sites likely would be fully or partially eliminated by construction.

Partial or complete elimination of these sites constitutes a Section 4(f) use of the sites. Acreage of use of the district as a whole is shown in Table 4.5-1. Most of the district's features are mining prospect pits (holes and trenches in the earth) that are important for the information contained in their location and distribution pattern and their association with gold mining. Because none of the features is well known to the public, noise and other construction effects would not affect public use of these sites. Impacts to prospect pits on the Charles G. Hubbard Mining Claims Historic District would be mitigated (see Section 4.6).

4.5.4 Impacts of the Juneau Creek Alternative and Juneau Creek Variant Alternative

The Juneau Creek and Juneau Creek Variant alternatives are identical over most of their length, but diverge in the area of Sportsman's Landing. The two are discussed together. Where differences occur, those differences are highlighted with a text box.

Both of these alternatives would use land from several Section 4(f) properties. Table 4.5-1 indicates acreage of impact. These alternatives would use land from properties, some in common and some not, as indicated in Table 4.5-2.

Each of the Juneau Creek alternatives would use land from six Section 4(f) properties. The impacts to each Section 4(f) property are discussed in turn below.

Differences between the Juneau Creek Alternative and Juneau Creek Variant Alternative: The Juneau Creek Alternative would use land from a corner of the KNWR in an area designated as Federal Wilderness. The Juneau Creek Variant Alternative would not use land from the KNWR outside the existing highway right-of-way and therefore would have no Section 4(f) use of the KNWR.

Table 4.5-2. Section 4(f) use and the Juneau Creek alternatives

Section 4(f) Property	Juneau Creek Alternative	Juneau Creek Variant Alternative
Kenai National Wildlife Refuge	Yes	No
Resurrection Pass Trail	Yes	Yes
Bean Creek Trail	Yes	Yes
USFS Kenai River Recreation Area	No	Yes
Juneau Falls Recreation Area	Yes	Yes
Sqilantnu Archaeological District	Yes	Yes
Confluence Traditional Cultural Property (*discussed with Sqilantnu*)	Yes	Yes

4.5.4.1 Kenai National Wildlife Refuge—Impacts specific to the Juneau Creek Alternative

The four build alternatives share a common alignment through KNWR from approximately MP 56 to the end of the project near MP 58.5 (see Map 4-1 and Map 4-3). There is no Section 4(f) use of land associated with this common alignment because all alternatives remain within the existing Sterling Highway right-of-way. No impact is anticipated to KNWR facilities located within the right-of-way: the parking area and trailhead for the Fuller Lakes Trail, and the parking area for the visitor contact station. The Juneau Creek Alternative, however, uses land from KNWR in the area immediately east of MP 56. Under the Juneau Creek Alternative, the new highway would deviate from the existing highway right-of-way for about 2,500 linear feet within KNWR, and a new connection to the existing highway would further use KNWR land (see Map 4-1 and Map 4-3). The acreage of KNWR land used by the alternative outside the existing right-of-way is shown in Table 4.5-1, above in Section 4.5.1. About half of this acreage would be cleared of forest vegetation and would be effectively lost as wildlife habitat. The entire acreage would be incorporated into the transportation facility—a Section 4(f) use.

Much of the acreage in question is designated by Congress as Wilderness, which is an attribute of KNWR in this area. Designation as Wilderness means the USFWS manages this area so that natural processes dominate and the "imprint of man's work [is] substantially unnoticeable" (Wilderness Act, 16 USC 23). Mechanized tools, buildings, and roads typically are forbidden. Wilderness is an important and sensitive concept among many in the public. Federal Wilderness status is subject to protections under the Wilderness Act and under ANILCA. For purposes of this Section 4(f) evaluation, it is important to note what is protected under Section 4(f) of the Department of Transportation Act. Section 4(f) does not apply to Wilderness areas *per se*. Areas designated as Wilderness are subject to Section 4(f) protection only if they happen to be part of a significant, publicly owned, public park, recreation area, or wildlife or waterfowl refuge. In this case, it is KNWR's status as a significant wildlife refuge that is publicly owned that qualifies it for Section 4(f) protection (23 USC 138[a]). If Congress eliminated the specific designation of the Mystery Creek Wilderness, the area would no longer be considered Wilderness, but Section 4(f) still would apply to these lands because they are lands of a wildlife or waterfowl refuge. Further discussion of KNWR Wilderness impact appears in Sections 3.2, Land Use Plans and Policies, and 3.8, Park and Recreation Resources.

The affected portion of KNWR sees relatively little human use because of dense vegetation, relatively steep cross-slope, and proximity to the existing highway and other development; there are no recreational trails in this area. The area provides important cover for brown bears that also use the nearby Kenai River for fishing (USFWS 2009).

The Juneau Creek Alternative would use a total of 33.4 acres of land out of 1.94 million total KNWR acres (19.2 acres of Wilderness out of a KNWR total of 1.32 million acres of Wilderness within KNWR). Within the area that would be incorporated into the new highway right-of-way, cover for brown bears and other wildlife would be reduced and habitat permanently lost. Wildlife movement would be inhibited because there would be two roads to cross, the existing and the new highways, and animal mortality from vehicle collisions could increase. Highway noise would be similar to the current character, but would be spread over a larger portion of this corner of KNWR.

The Russian River Land Act of 2002 (Public Law 107-362) resulted in the transfer in 2012 of 42 acres of USFS land near the KNWR boundary and Sportsman's Landing to CIRI, the regional Native corporation. The Act ratified an agreement that also authorized a land exchange on KNWR lands in this area that would allow the USFWS to secure new and desirable land near the Killey River and allow CIRI to secure land north of the existing highway near the KNWR eastern boundary, which has been identified as culturally valuable to CIRI and the Kenaitze Indian Tribe. It is possible that CIRI and the USFWS would agree on a land exchange that would change the Wilderness status in this area before project construction. Such an exchange could change the Section 4(f) status, as this portion of KNWR might no longer be public refuge property. Based on existing conditions, the Juneau Creek Variant Alternative was created specifically to avoid impacts to KNWR and its Wilderness area. See further explanation in Section 2.4.2.2.

Besides the wildlife impacts in the immediate area of the new highway right-of-way, there are other impacts to KNWR wildlife that cross back and forth between KNWR and CNF, particularly to bears traveling between salmon fishing areas in the project area (lower Juneau Creek on CNF lands, and the Kenai River-Russian River confluence area on CNF and KNWR lands) and tributaries of the Chickaloon River such as Thurman Creek (KNWR, well to the north of the project area). The long segment built on a new alignment under this alternative would fragment bear habitat and has potential to create a substantial barrier to bear movement. The same is true of moose movement through the topographic bench areas on either side of Juneau Creek that have seen forest treatments by CNF to reduce wildfire fuels and enhance moose habitat. These impacts are common to the Juneau Creek and Juneau Creek Variant alternatives and similar to G South Alternative impacts. These are discussed also in Section 3.22, Wildlife.

The Juneau Creek Bridge located in CNF would include abutments set about 200 feet from the edges of Juneau Creek Canyon. The space along the rim of the canyon under the bridge is important wildlife movement habitat, and the bridge would be designed to allow for ample clearance for wildlife movement from the bear concentration areas downstream to other habitat outside the project area and in KNWR. The width beneath the bridge would be enough to allow for wildlife and for the trails that would be routed near the bridge abutments. The base of the canyon, where bears may pursue salmon, would not be affected by bridge construction. Two crossings of the highway at USFS roads west of the canyon, while not meant exclusively as wildlife crossings, also would serve as ways bears could avoid traffic and still cross the Juneau Creek Alternative when passing between KNWR habitats and CNF habitats.

The Juneau Creek Alternative would create a new cleared swath of land through forest, mostly on CNF land but for some distance on KNWR land. This swath would appear as an engineered line in a largely natural landscape, and it likely would be visible from portions of the Andrew Simons Wilderness south of the Kenai River. The Surprise Creek Trail begins across the Kenai River from Jim's Landing and provides access up Surprise Creek through forest to alpine terrain above treeline (and outside the project area). Russian Mountain, at an elevation of about 3,500 feet, would block views from the trail, but anybody who ventured across country to the north side of Russian Mountain or to its summit would be able to view the Kenai River valley, including existing highway and power transmission line cuts, Sportsman's Landing and Russian River Ferry parking areas, the USFS Russian River Campground, and the new highway. The new highway would be an additional and permanent engineered element to the view, and it would detract from the sense of wilderness and isolation in this designated Wilderness area. However, because other development already exists in the view, the character of the view would change incrementally but would not be a dramatic change. Also, because Surprise Creek Trail requires boating across the Kenai River, with risk of entering rapids downstream, and because of the distance and elevation gain required to reach the alpine ridges from which these views would be visible, relatively few people access these views. It is anticipated that the change in the view would affect few individuals.

4.5.4.2 Resurrection Pass Trail

The Juneau Creek Alternative and Juneau Creek Variant Alternative would cross the Resurrection Pass National Recreation Trail near Juneau Creek Falls (see Map 4-5 and Map 4-10 and the Figure 4.5-1 photo simulation). The impact would be identical under both alternatives. The recreation resource associated with the trail is considered to be a corridor 1,000 feet wide. Table 4.5-1 reports the acreage of use within this corridor. The highway would cross over the trail (typically about 3 feet wide) on a proposed new bridge. It is likely that there would be 15 feet or more of clearance beneath the bridge. Depending on the ultimate bridge design, there may or may not be piling supports between the trail and the canyon rim. Where the trail crossed the new highway, it would lie within the new highway right-of-way (crossing under the highway bridge at a right angle), but there would be no permanent physical use of the trail. It is anticipated the USFS would retain a trail easement 100 feet wide up to perhaps 1,000 feet wide.

As discussed below under Section 4.5.4.5 (Juneau Falls Recreation Area), there would be temporary impacts to the trail during construction. Trees along the trail directly under the bridge would be felled with hand tools and removed carefully to retain understory vegetation as much as possible, to preserve the natural corridor to the extent possible. Bridge construction activities and associated noise, dust, and visual impacts of disturbed earth could last up to 5 years (HDR 2006e), but more likely would take 3 to 4 years, before the highway opened to traffic.

The highway would cross the trail 3.4 miles northeast of the trail's existing Sterling Highway trailhead via the bridge that would also span the Juneau Creek Canyon. Once the bridge was complete, trail users could continue to use the trail without crossing the highway at-grade. Because of the curving alignments of the trail and also of the proposed highway, the highway west of the trail crossing would roughly parallel the trail over most of the 3.4-mile segment leading up to the crossing (see Map 4-5). While background sound level in these undeveloped areas was measured at a low average sound level (40 dBA), there is sufficient distance—2,200 to 4,200 feet—between the trail and highway that noise and visual impacts associated with the highway would be negligible compared to current conditions, once the distance between the highway and trail was greater than several hundred feet.

Figure 4.5-1. Simulated before (top) and after (bottom) views of proposed bridge crossing site of Juneau Creek Canyon, as it might be seen from the Resurrection Pass Trail as the trail passed beneath the bridge

Snowmobilers use old logging roads (West Juneau Road) that cross the proposed highway alignment as alternate routes because the main Resurrection Pass Trail often is less suitable for winter travel. Use of these alternate routes would be changed by the new highway, and it is possible that parking on the highway shoulder would occur at these locations. For these reasons, trailhead and underpass mitigation is proposed; see Section 4.6.4. It is likely that trail users, whether bound for the far end of the trail at Hope or for shorter trips to public use cabins, lakes, or the crest of Resurrection Pass, would use the new trail crossing location along the highway alignment for access and would create a new *de facto* trailhead if a formal trailhead were not provided. This could result in many cars and snowmobile trailers parking along the highway shoulder during popular periods, a potential safety issue for highway users and the hikers and snowmobilers parking there. As a result, mitigation is proposed as described in Section 4.6.4.

There is a Section 4(f) use of the trail corridor and other associated impacts that affect the entire trail. The use occurs in the immediate vicinity of the new highway crossing of the trail. The broader impacts are effects to the 3.4 miles downhill from the crossing site and to the remainder of the trail north of the crossing, especially the additional mile to the Bean Creek Trail junction and also the 9 miles of the upper Juneau Creek valley. There are several interrelated impacts of crossing the trail:

- Placing a planned trailhead on the new highway corridor, 3.4 miles uphill from the existing trailhead, would effectively reduce the overall trail trip length by 9 percent for those using the entire trail, most of whom would no longer start at the existing, lower

trailhead if a new trail access point were available. Those who desired still could use the entire trail.

- The 3.4-mile length is approximately half of a typical moderate hike that might be attractive to average hikers.[9] The existing 7- to 8-mile round-trip hike to the Juneau Creek Falls area from the Sterling Highway trailhead would remain but likely would not be used, as a practical matter for many hikers, because the falls would be effectively road accessible, with a walk of one-half mile or less, round-trip.
- The trail over its lower 3.4 miles would remain, but use likely would change substantially. Use of the lower trail would be more incidental and no longer particularly relevant as part of a longer journey along the Resurrection Pass Trail for most users. It is possible that mountain bikers would use this trail segment along with old logging roads (accessible at the existing Resurrection Pass trailhead) to form a loop route, possibly including the new highway as a link, or that people staying in the area would drive to the top and hike down, to be picked up at the existing trailhead.
- The trail portion north of the new highway would become much more accessible. The highway would cross the Resurrection Pass Trail at approximately elevation 1,100 feet, in the Juneau Falls area. The existing trailhead on the existing Sterling Highway is at approximately 390 feet. North of the Juneau Falls area, the Resurrection Pass Trail is relatively level for another 9 miles to the Swan Lake area (elevation 1,400 feet). Eliminating the 700-foot climb in the first 3.4 miles of trail would provide direct and easier access to a semi-level trail in relatively open and very scenic terrain. Trout Lake would be 4.4 miles from the new trailhead instead of 7.75 miles from the existing trailhead. Romig Cabin would be 5 miles instead of 8.75 miles. Juneau Lake Cabin would be 5.9 miles instead of 9.25 miles. Swan Lake Cabin would be 9.6 miles instead of 13 miles. All four of these cabins and all three lakes would be within a day's hike for average hikers, instead of just one cabin and lake. For mountain bikers and snowmobilers, all these cabins and lakes would be much more accessible for an out-and-back day trip. Competition for the cabins and camp sites, and general use of the area, likely would increase. The increased accessibility would be a beneficial impact to some individual users who otherwise might be inhibited from using the forested and steeper first 3.4 miles of trail. However, effectively reducing the long-distance trail experience by 9 percent would be an adverse impact to other users for whom the Resurrection Pass Trail is one of few accessible, point-to-point, long-distance trails in Alaska and to those who value the backcountry camping and cabins experience in the upper Juneau Creek valley precisely because of the effort it takes to reach the area. The backcountry recreation experience overall would be reduced, with more "front country" uses expected. That is, because the trail would be relatively flat and destinations closer, more casual uses are likely—a higher percentage of larger groups, tour groups, and day hikers, and a lower percentage of overnight backpackers. This would likely result in a somewhat greater

[9] The Appalachian Mountain Club (www.outdoors.org/lodging/whitemountains) located eight huts for "novice and experienced hikers…, each a day's hike apart along the Appalachian Trail in New Hampshire's White Mountains" (White Mountains National Forest). The spacing between these backcountry overnight lodgings ranges from 4.8 mi. to 8.0 mi., with an average of 6.7 mi. This range correlates with trip lengths noted as good for short day hikes to long day hikes in *55 Ways to the Wilderness in Southcentral Alaska* (Nienhueser and Wolfe 2008).

likelihood of fires outside designated fire rings, litter, underage drinking, and other less-desirable activities. The area would likely require greater management by the USFS (2009).

- The long-distance trail experience, at 34.6 miles instead of 38 miles, and without the hill at the Cooper Landing end, would be more achievable to more people. Because it already is popular, and because cabins already are booked solid virtually all summer and much of the winter, the decreased length and decreased difficulty would likely increase pressure on the entire trail.
- The new highway alignment would introduce new highway traffic noise, particularly near the point that the highway crossed the Resurrection Pass Trail. A highway traffic noise study completed for this project in 2014 indicated that the average noise level on the trail would increase 12 dBA at a distance of greater than 200 feet from the highway centerline, from 40 dBA to 52 dBA. This would be a change, but would not approach or exceed the FHWA noise abatement criteria and therefore would not result in a traffic noise impact. Users accustomed to average background noise levels of around 40 dBA would be subject to higher noise levels as they approached closer to the highway. Traffic noise would diminish with greater distance and would diminish beneath the bridge. The bridge would be at least 55 feet wide and would shield trail users from the highest noise levels as they passed beneath it (see the discussion below of noise in Section 4.5.4.5 for further detail on noise modeling for this project). Changes to the visual environment coupled with changes in the type and volume of sound at the Juneau Creek Bridge crossing over the Resurrection Pass Trail would change a quiet natural experience to a near-urban underpass environment for a short stretch.
- Even farther from the highway, new traffic noise effects likely would occur. The NPS, USFWS (including KNWR), and others have studied human-generated noise in natural settings and documented that sound can be audible over many hundreds of yards and up to several miles (Horonjeff and Anderson 2005, Morton 2008). Because the highway would reach the same elevation as the upper Juneau Creek Valley without topographic constraint to block noise, some short-duration loud noises likely would carry well north into upper Juneau Creek Valley—perhaps 1 to 2 miles or more, particularly under certain still conditions. (As an example, per Morton (2008), maximum short-duration sound levels of 120 dBA were measured along the edge of the Sterling Highway in parts of KNWR.) Even though the valley is open to winter snowmobile use in alternating winters, faint highway noise would reduce the sense of a natural or backcountry type environment, particularly in summer and in winters during which the trail was closed to snowmobiles, when the expectation for natural quiet would be highest.
- The concentration of people at a new trailhead, walking to viewpoints of the falls or for a short stroll out the trail, would likely lead to greater littering and vegetation impacts in the falls area. The USFS considers the likelihood of meeting other parties and group size to be important parts of its assessment of backcountry recreation impacts and important considerations in its nationwide Leave No Trace backcountry ethics program. Thus, the additional people, particularly those on short, scenic viewing excursions, would constitute an important visual and noise change, compared to current conditions.

Despite these changes in use and resulting impacts, the increase in access, the elimination of the 3.4-mile up-grade from the existing Cooper Landing trailhead, and the proximity of the falls to the highway would provide a taste of this particular National Recreation Trail experience to a greater number of people and to people with a greater cross-section of ages and abilities. Based on consultation with the USFS, it is not anticipated that the adverse effects would be so severe that the entire trail would lose its National Recreation Trail status or that the USFS would need to close or restrict use on any part of it. The trail is likely to continue to be popular and heavily used, although the use pattern and types of users likely would be different (e.g., trips would be more likely to start at Juneau Falls).

4.5.4.3 Bean Creek Trail

The Juneau Creek and Juneau Creek Variant alternatives would cross the Bean Creek Trail, resulting in a use under Section 4(f) (see Map 4-6 and Map 4-7). The impact would be identical under both alternatives. The trail crossing would be located about 2,000 feet south of the junction of the Bean Creek and Resurrection Pass trails. The highway would cross the trail about 1.75 miles from the existing Bean Creek trailhead (the end of Slaughter Ridge Road). To keep trail users separate from vehicles on the highway, the project would reroute the trail so that it would pass under the new highway bridge at the eastern edge of Juneau Creek Canyon. About 2,900 feet of trail would be rerouted as shown on Map 4-6 (see Section 4.6 for details regarding mitigation of trail impacts). For trail users, the bridge would introduce a massive engineered structure in what had been a natural environment.

With the severing of the historic alignment and rerouting of the trail, the bypassed segment of the historic alignment could fall into disuse and might be lost over time as an identifiable trail. Use of the rerouted segment, however, would ensure that the trail continued to function well for recreation.

The highway would pass within 950 feet of the Bean Creek trailhead at Slaughter Ridge Road and then roughly parallel the Bean Creek Trail at distances of approximately 1,800 feet (closing gradually to zero as the highway approached the trail crossing). The trail is used particularly in winter as alternate access to the Resurrection Pass Trail and upper Juneau Creek drainage (O'Leary, personal communication 2006). It is anticipated that virtually all users from outside the local area would gravitate to the Resurrection Pass Trail, and that trail would get the most use for access up the valley if a new trailhead were in place. The lower 1.75 miles of the Bean Creek Trail would remain useful primarily for local traffic.

The *Highway Traffic Noise Assessment* (Appendix D of this SEIS) completed for this project modeled a site along the Bean Creek Trail near the area where the proposed highway alignment would cross the trail. The Bean Creek Trail crossing area currently is undeveloped, so the noise report indicates background noise levels should be assumed to be 40 dBA, as measured at a similar undeveloped location. The modeled noise level for 2043 was 61 dBA, an estimated increase of 21 dBA from existing and from the No Build Alternative. A noise increase of 15 dBA or more is considered a substantial noise increase by DOT&PF. The trail would be rerouted to pass under the highway at the Juneau Creek Bridge, and beneath the bridge traffic noise levels would be reduced somewhat because the bridge deck would shield trail users from some traffic noise. However, trail users still would approach and cross the alignment, and highway noise would be unavoidable.

Finally, the Juneau Creek and Juneau Creek Variant alternatives include a gravel extraction area and an overburden disposal area west of the existing trailhead for Bean Creek Trail. The portion of the trail that crosses Bean Creek and a portion of the historic/recreation route immediately west of this crossing are the most likely routes to be used for truck access from the proposed highway alignment to these areas. The proposed hauling route and the trail would overlap for about 1,600 lineal feet (about 3 acres of the 100-foot-wide trail corridor would be affected, based on the 80-foot hauling route width mapped for this SEIS; it is likely that the footprint of the temporary road actually would be substantially narrower). Trail users would encounter the temporary haul road within about 1,200 feet of the existing trailhead. Without mitigation, trucks and pedestrians would share the route for most of the project construction period—with most activity in summer over at least two summers, and possibly up to five. Winter construction activity on the road also is possible, although likely at reduced activity levels and intermittently. The trail crossing of the creek is currently on an old logging road, and upgrading this route for truck traffic ultimately would improve the existing soft trail with an embankment and replace a rough log bridge with a new bridge. Section 4.6 provides a discussion of proposed mitigation, including temporarily re-routing the trail).

4.5.4.4 USFS Kenai River Recreation Area—Impacts Specific to the Juneau Creek Variant Alternative

Differences between the Juneau Creek Alternative and Juneau Creek Variant Alternative: The Juneau Creek Variant Alternative would use land from the Kenai River Recreation Area in Chugach National Forest. The Juneau Creek Alternative would not.

The Juneau Creek Variant Alternative's western junction with the existing Sterling Highway right-of-way would occur just east of KNWR/CNF boundary at MP 55 (Map 4-1 and Map 4-9 provide an overview; Map 4-4 shows detail). At the junction, the Juneau Creek Variant Alternative would cross about 300 feet of the Kenai River Recreation Area, and a highway overpass would be placed in this location. The existing Sterling Highway would be routed under the overpass to connect with the new alignment. This would be necessary to accommodate the Sportsman's Landing-Russian River Ferry entrance, separating the entrance from the main highway. The total acreage of use of Kenai River Recreation Area is reported in Table 4.5-1. None of the developed features of the recreation area would be affected. The area used would be north of the existing highway, where the ground is principally steep and forested. No substantial dispersed recreation use of this area is known to occur. With minimal recreation use, the primary impact would be loss of wildlife habitat and natural forest foreground views as seen from the Kenai River and the existing highway. These impacts would not occur under the Juneau Creek Alternative.

Based on consultation with the officials with jurisdiction and the proposed measures to minimize harm (including the avoidance of specific features, mitigation, and/or enhancement), the FHWA believes the use of the property will result in a *de minimis* impact. The FHWA intends to make a *de minimis* impact finding; a preliminary finding appears in Appendix F.

4.5.4.5 Juneau Falls Recreation Area

The Juneau Creek Alternative and Juneau Creek Variant Alternative would use a portion of the Juneau Falls Recreation Area (Map 4-10). The impact would be identical for both alternatives. The acreage of use, as reported in Table 4.5-1 above in Section 4.5.1, represents the full highway right-of-way width across the entire recreation area. However, as indicated in the Table 4.5-1 footnote, several acres would be under a clear-span bridge over Juneau Creek Canyon. The

Recreation Area is not heavily developed for recreational purposes, but does contain portions of the Resurrection Pass Trail and Bean Creek Trail, informal viewpoints, and a designated backcountry campsite associated with the Resurrection Pass Trail. Because most of the impacts to the area are trail-related, there is a great deal of overlap between this discussion and the discussions of the Resurrection Pass Trail and Bean Creek Trail, reported in detail above.

The USFS places particularly high value on the Juneau Falls Recreation Area because it surrounds a scenic waterfall. The USFS has greater concern about overall impacts to this recreation area than impacts of crossing the Resurrection Pass Trail (Vaughan, personal communication 2006b). The highway would cross the canyon about 1,300 feet downstream of the waterfall and would be a substantial new structural presence in an otherwise natural environment—introducing both visual and auditory changes, as further described in the paragraphs below and in Section 4.5.4.2, above. The Juneau Falls Recreation Area impacts would primarily be the visual impacts of placing a bridge in the down-valley view from the edge of the gorge (see Figure 4.5-1) and the impact of changing the character and use of the area, as further described in the paragraphs below. The bridge is not expected to provide a direct view of the Juneau Creek Falls. However, the potential for views from the bridge is likely to attract pedestrians to the bridge; the attraction of views could create a hazard to pedestrians and motorists. These issues are considered further in the trails discussions above and under mitigation in Section 4.6.

An area approximately 140 feet wide would be cleared of forest to make way for the highway west of the canyon, permanently altering wildlife habitat. East of the canyon, because of topography, the cleared area would vary from about 100 feet wide to about 280 feet wide, and earth would be removed from a hillside, leaving a cut about 45 feet high.

There would be no impacts below elevation 1,060 feet, approximating the rim of the canyon. Several bridge styles and construction techniques were recommended in a project bridge study (HDR 2006e), all of which are capable of being constructed without access below this elevation (some bridge types would require a bridge support anchored into a notch right at the canyon rim, and some bridge types would have abutments set approximately 200 feet back from the canyon rim with no intermediate support). DOT&PF has committed to construction techniques that would not require construction of temporary roads or trails in the canyon.

The only developed campsite in the recreation area, located on the east side of the creek immediately upstream of the falls, would be approximately 2,000 feet from the proposed highway (see Map 4-10). Portions of the new bridge may be visible downstream from view points on the canyon edge, but not likely from the campsite area. Where visible, the bridge would be a substantial new, engineered element in the view. Figure 4.5-2 and the project's visual assessment (HDR and USKH 2012) provide a simulation of the bridge appearance.

The *Highway Traffic Noise Assessment* (Appendix D of this SEIS) completed for this project measured sound levels at the Resurrection Pass Trail footbridge over Juneau Creek (near the center of the Juneau Falls Recreation Area) at 65 dBA, with substantial influence from the sound of fast-running water. The study assumed 40 dBA as the average sound level for undeveloped areas not adjacent to running water, based on the level measured in an example area farther west.

Figure 4.5-2. Simulated view of proposed bridge crossing of Juneau Creek Canyon, as seen from the existing informal Juneau Falls overlook area. From this location, the view of the falls is upstream, and the view of the bridge would be downstream.

The noise study modeled three sites within the Juneau Falls Recreation Area: the backcountry camp site, the Resurrection Pass Trail near the proposed highway crossing of the trail, and the Bean Creek Trail near the proposed crossing. The projected traffic noise levels are reported above under trail headings (see also Appendix D). The campsite lies centrally in the recreation area off the main trails and away from the canyon and creek. The predicted average hourly noise level in 2043 indicates no change from existing noise levels. Highway traffic from individual vehicles may still be audible from the site, but average hourly noise levels generally would be the same as they are today. This is likely to be the case over much of the recreation area. Some of the recreation area, including the trails, would be located beneath the new highway bridge. Those portions of the recreation area within the canyon would be separated by up to 250 vertical feet from the noise source on the bridge overhead, and the bridge itself would insulate areas under it from much of the automobile noise. Areas near fast-running water of the creek and falls, where the natural sound level is expected to be 65 dBA, may be minimally affected because the water noise would help mask highway noise. The model identifies a traffic noise impact (61 dBA, representing a 21-dBA increase) at the Bean Creek Trail crossing, which is a representative location near the highway in this section of the project area. It is reasonable to assume that any point in the recreation area at similar proximity to the highway would experience noise increases and that the types of sounds heard even at greater distances would be a change from existing conditions. No mitigation is recommended at the Bean Creek Trail crossing consistent with DOT&PF Noise Policy, as noise abatement measures cannot be provided in a cost-effective manner (see Appendix D). Changes in sound level or quality are not expected to prevent use of the campsite for sleeping. Recreationists in the area would hear the new highway, and trail users would hear it more strongly when closest to or crossing the highway.

During construction, noise and dust from operation of heavy equipment, chainsaws, pile drivers or rock drilling equipment, and rock blasting equipment are likely. Bridge construction is anticipated to take four construction seasons, though it may require as few as three seasons or as many as five. The trail and camp sites are expected to remain open for use during the construction period, but the trails would be closed for safety when construction of that portion of the bridge directly over the trail was underway. When the Resurrection Pass Trail was closed, the

camp sites would be accessible via a trail detour and via the Bean Creek Trail. Construction noise and activity may reduce the desirability of the campsites during some periods. Trail closures could last multiple days, and trail users would be diverted to a detour or to the Bean Creek Trail (see Section 4.6 for discussion of mitigation and see further discussion of trail impacts under Section 4.5.4.2 above). These construction impacts would be temporary but would be substantial to trail users and those intending to camp at the camp sites during portions of the construction period.

Because the Juneau Falls Recreation Area as a whole is not managed differently for recreation than the USFS land around it (see Section 4.2.8), the permanent impacts are primarily to the intrinsic value of the location. The opportunity to experience the area as an almost entirely natural area would be lost (see also Resurrection Pass Trail, Section 4.2.4).

Also related to the trail discussions above is a probable changed use pattern involving the Resurrection Pass Trail, the Bean Creek Trail, and the new highway bridge over the canyon. The USFS has indicated that recreationists are likely to use the new highway bridge (HDR 2009c). The USFS has suggested that the two trails, linked by the bridge, would make a hiking loop (approximately 1.8 miles), and that it would attract the recreating public. Walkers could be on the highway shoulders to make the connection from one trail to the other. It is difficult to estimate the numbers of people who might make use of the bridge for viewing or make the trail loop connection. However, currently 5,000 users are estimated to use the southern end of the Resurrection Pass Trail each year. It is reasonable to assume that this number would be supplemented by new users attracted to the views and the short trail opportunity, and by normal users of the Bean Creek Trail. A portion of these users likely would hike the loop or venture onto the bridge, perhaps amounting to several hundred people each summer. Such a concentrated use could pose a greater risk of collision to recreational hikers and viewers, and to drivers, than most segments of rural highway. To mitigate the concern, the highway and bridge would include a pedestrian walkway, parking east and west of the bridge, connecting trails, and signs and fences to promote safe use of the bridge area by pedestrians (see Section 4.6 for further mitigation information).

4.5.4.6 Sqilantnu Archaeological District and Confluence TCP

Differences between the Juneau Creek Alternative and Juneau Creek Variant Alternative: The Juneau Creek Variant Alternative would affect a portion of an important archaeological site; part of the site contains prehistoric and repatriated human burials. The graves area, however, would not be affected. The Juneau Creek Alternative would not use land from this archaeological site. The acreages of overall use also differ. See also discussion of the Confluence Traditional Cultural Property.

The build alternatives all would impact the Sqilantnu Archaeological District and Confluence TCP, although in somewhat different ways. Acreages of highway footprint impacts within the district and TCP boundaries are shown in Table 4.5-1 (above in Section 4.5.1). However, acreage is only a partial measure of impact.

The Juneau Creek and Juneau Creek Variant alternatives would have similar types of impacts to the district and TCP, including use of land from 13 contributing archaeological historic properties by the Juneau Creek Alternative and use of 22 contributing archaeological historic properties by the Juneau Creek Variant Alternative and use of land within the Confluence TCP. The project would impact these contributing properties by partially or completely eliminating them, or by burying them with highway embankment material.

The Juneau Creek Variant Alternative would use land from the northern portion of an archaeological site associated with human burials and located within the Confluence TCP. The site in total amounts to 1.6 acres; 0.6 acre would be impacted. The burial area within this 1.6-acre area would not be affected, but a portion of the site would be affected, and possibly nonburial features would be eliminated or buried. The Juneau Creek Alternative would not impact this contributing property.

4.5.4.7 Confluence Traditional Cultural Property

The Confluence TCP is wholly contained within the Sqilantnu Archaeological District and is a contributing element of the district; therefore, impacts discussed here are a subset of the impacts discussed above for the broader district. Within the Confluence TCP, each of the Juneau Creek alternatives would impact several contributing archaeological historic properties. In addition, the Juneau Creek Variant Alternative would impact CIRI Tract A, using a strip of land from the parcel and bisecting the 42-acre parcel from northeast to southwest.

4.6 Individual Section 4(f) Resource Avoidance and Minimization Options (greater than *de minimis* use)

4.6.1 Introduction

4.6.1.1 Minimizing Harm

"All possible planning" to minimize harm to Section 4(f) properties is defined in FHWA regulations 23 CFR 774.17:

> All possible planning means that all reasonable measures identified in the Section 4(f) evaluation to minimize harm or mitigate for adverse impacts and effects must be included in the project.
>
> (1) With regard to public parks, recreation areas, and wildlife and waterfowl refuges, the measures may include (but are not limited to): design modifications or design goals (sic); replacement of land or facilities or comparable value and function; or monetary compensation to enhance the remaining property or to mitigate the adverse impacts of the project in other ways.
>
> (2) With regard to historic sites, the measure normally serve to preserve the historic activities, features, or attributes of the site as agreed by the Administration and the official(s) with jurisdiction over the Section 4(f) resource in accordance with the consultation process under 36 CFR Part 800.

Process used in this Section 4(f) Evaluation

The process outline, with the current step in bold, is as follows:

1. Identify Section 4(f) properties.
2. Evaluate whether any impact is likely to be a *de minimis* impact.
3. Identify any alternatives that would avoid all Section 4(f) properties.
4. Present the impacts of proposed alternatives on Section 4(f) properties.
5. **Identify alignment shifts that could avoid individual Section 4(f) properties or minimize harm to individual properties, and identify other measures to minimize harm.**
6. Evaluate least overall harm (preliminary evaluation).

This section addresses measures to minimize harm to Section 4(f) properties in two different ways (see adjacent "Process" box):

- "Measures to Minimize Harm—Alignment Options": Subsections under this heading present analysis of the potential to shift the alignment in ways that would route the highway around individual Section 4(f) properties or otherwise minimize harm to individual Section 4(f) properties (see also discussion of avoidance in Section 4.4).
- "Measures to Minimize Harm—Design and Construction": Subsections under this heading describe other proposed mitigation measures for the alternative. If DOT&PF and FHWA were to select the alternative listed, these are environmental commitments proposed to be presented in the Record of Decision.

The project team was aware of the profusion of Section 4(f) properties from the beginning of the development of the SEIS and designed alternatives with the intent of avoiding Section 4(f) properties. For that reason, the analysis that follows is often an explanation of previous design decisions and alignment selections.

FHWA regulations indicate criteria for determining whether measures to minimize harm are reasonable:

> (FHWA) will consider the preservation purpose of the statute and:
>
> (i) The views of the official(s) with jurisdiction over the Section 4(f) property;
>
> (ii) Whether the cost of the measures is a reasonable public expenditure in light of the adverse impacts of the project on the 4(f) property and the benefits of the measure to the property…; and
>
> (iii) Any impacts or benefits of the measures to communities or environmental resources outside of the Section 4(f) property.
>
> 23 CFR 774.17 Definitions ("all possible planning")

References to consultation and the views of officials with jurisdiction (i), costs (ii), and the impacts or benefits outside of the individual Section 4(f) property (iii), including both other Section 4(f) properties and non-4(f) resources, appear in the numbered subsections that follow. Views of officials with jurisdiction (i) will be further incorporated if necessary, following the agencies' opportunity to comment on this document. In addition to these three elements, this analysis considers the following to be not reasonable mitigation measures: alignments that would not satisfy the project purpose and need.

4.6.1.2 Russian River Alternative and Extension of the G South Alternative

The following "Alignment Options" subsections make repeated references to two alignments that have been examined for this project as potential ways of avoiding certain Section 4(f) properties. They are described here in a single place, for reference.

The Russian River Alternative was evaluated during the development of alternatives in 2003 and is discussed in Chapter 2. Like the Cooper Creek Alternative, it was routed around Cooper Landing on the south side of the Kenai River Valley. It was identical to the Cooper Creek Alternative from MP 45 to the proposed new Cooper Creek Bridge (near MP 51). While the Cooper Creek Alternative returned to the existing alignment and crossed back to the north side of the Kenai River, the Russian River Alternative continued westward across high bench lands until it descended on a long crossing of the Russian River. The alignment passed south of the Russian River Campground, traversed the KNWR, crossed to the north side of the Kenai River on a new

bridge located downstream of the Russian River Ferry, and rejoined the existing alignment near MP 56. The alternative was found to be not reasonable because of high life-cycle costs, potential impacts to the Kenai River, Russian River, and Cooper Creek, and to recreational uses, particularly the Russian River Campground and fishing in the Sportsman's Landing area. It also would have resulted in substantial impacts to cultural resources. In addition, the alternative lacked any public or agency support (HDR 2003d).

An extension of the G South Alternative was examined originally in 2001 (R&M Consultants 2001a) and again for this Section 4(f) Evaluation (HDR 2008c). For Section 4(f) purposes, the alignment was conceived as a way to avoid crossings of the Kenai River (KRSMA). It was identical to the G South Alternative from MP 45 to Juneau Creek. Instead of proceeding to a crossing of the Kenai River, the alternative cut across the steep slopes and remained north of the Kenai River near the base of high steep bluffs. It rejoined the existing alignment around MP 53.5, one-half mile west of the existing Schooner Bend Bridge. It then followed this alignment (the same as the G South Alternative) to MP 60. About 4,000 feet of the highway along the north bank of the river would have been built on pilings (viaduct), and there would have been an estimated 8,000 lineal feet of retaining walls, together amounting to a cost of $93.8 million (in 2008 dollars) for these structural elements. It was not clear that complete avoidance of the KRSMA was possible, and the visual impact of the long segments of walls, high cuts, and highway on piers would have been a greater visual impact for the Kenai River than a single direct bridge crossing. For all these reasons, this extension of the G South Alternative north of the river was considered to have risks and disadvantages, including high construction costs, that would have outweighed any advantage of avoiding the KRSMA (HDR 2008d). It also would have used land from the Resurrection Pass Trail. All of these reasons make this alignment not a reasonable measure to minimize harm to Section 4(f) properties.

4.6.1.3 Reducing Impacts to Historic Properties, Applicable to Multiple Alternatives

All build alternatives would pass through the Sqilantnu Archaeological District and the Confluence TCP, and would use land from historic trails. The G South and Cooper Creek alternatives, in addition, would use land within historic mining districts. This section explains the general process used to develop mitigation measures for historic properties. This discussion is applicable to the "Design and Construction" subsections that follow.

Before the Final SEIS is published, DOT&PF and FHWA, in consultation with SHPO, tribal entities, the USFWS, the USFS, and other consulting parties, will develop a Section 106 mitigation agreement to resolve adverse effects. The consultation to develop such an agreement is ongoing and is not complete. The following discussion is therefore preliminary, is for Section 4(f) purposes only, and is not meant to suggest any endorsement by Section 106 consulting parties. Rather, this section is intended to acknowledge that FHWA and DOT&PF intend to mitigate impacts to cultural resources and indicates specifics only to present a range of possibilities.

The agreement will address all build alternatives. The agreement is likely to contain commitments such as: DOT&PF will identify and evaluate any individual historic property that has not been evaluated previously, confirm the status of evaluated properties regarding their potential contribution to an historic or archaeological district, recover data at some of the adversely affected archaeological properties prior to highway construction, address the continued use of historic trails, and provide for public interpretation of the area's history (e.g., through

permanent interpretive signs with illustrations and text). In addition, it is likely that the agreement would provide for development of a Sqilantnu Archaeological District/Confluence TCP management plan. The agreement is expected to address all historic properties affected by the build alternatives. The examples above are based on the types of mitigation that have been found effective on previous projects.

For Section 4(f) purposes, the types of mitigation measures anticipated to be included in the Section 106 agreement are included here as Section 4(f) measures to minimize harm and are assumed to apply under any of the build alternatives. Further detail and description are provided in the following "Design and Construction" subsections. These measures, like all measures to minimize harm, are subject to modification based on further consultation before a Final Section 4(f) Evaluation and Record of Decision are published.

4.6.2 Kenai River Special Management Area

4.6.2.1 G South Alternative

Anticipated Use

The G South Alternative would create a new bridge over the Kenai River and replace the Schooner Bend Bridge on a slightly different alignment. Both would require use of the submerged lands of the Kenai River (KRSMA lands), as described in Section 4.5.

Avoidance Options

Because the affected portion of the KRSMA occurs within the larger Sqilantnu Archaeological District, any attempt to avoid this resource would result in Section 4(f) impacts to the Sqilantnu District. See Section 4.4.3.

Measures to Minimize Harm—Alignment Options

Minimizing harm to KRSMA through design changes could mean (a) creating clear-span bridges with no piers in the river, (b) using longer spans to minimize the number of piers in the river, or (c) routing the alignment so that it stayed north of the river throughout. See Map 4-1, Map 4-2, and Map 4-11 for reference.

> **Summary:** For KRSMA/G South Alternative, the minimization options presented here are not considered reasonable. Therefore, no minimization measure is proposed.

Option (a), creating clear-span bridges, is not considered a reasonable mitigation measure because of cost (ii) and impact (iii). The Schooner Bend Bridge would be 325 feet long and the new Kenai River Bridge would be 486 feet long. Bridges more than 300 feet long are beyond the limits for use of single-span standard girders and would require a tall superstructure or deep substructure at greater expense, combined with visual impacts to KRSMA and the community. The costs differences between the two bridge types are estimated at $800/square foot (sq. ft.) versus $450/sq. ft., or 78 percent higher (HDR 2011b). As a general rule, the height of a steel truss that would support the bridge deck in place of piers can be estimated at one-fifth the length of the span (HDR 2011b), so for the G South Alternative's new bridge over the Kenai River, the height would be about 97 feet, the height of a 10-story office building, and the Schooner Bend replacement bridge would be 65 feet tall in an area where mature trees may reach 50–70 feet tall. In addition, a "tied arch" bridge might be the most likely type of clear-span bridge, and it is considered a "fracture-critical" structure type, meaning that if one part of the bridge were to break, the entire bridge would be subject to failure. Such bridges are built, but have much greater

inspection requirements and operations and maintenance costs, so they are built only when there is a particularly compelling need.

At the Schooner Bend Bridge location, a bridge with piers has existed for decades, and river, habitat, and park functions have not been unduly compromised. For these reasons, the increased construction and operating costs and the visual impacts of a tall structure outweigh any benefit of eliminating the piers, and therefore a clear-span bridge is not considered reasonable. At the new bridge location, there are no existing piers, but a visually low-profile bridge at lower cost appears to be the most reasonable balance of expenditure and impact (lower visual impact combined with minimum in-water piers that would have minor effects to navigation, river hydrology, and fish movement).

Option (b), limiting the number of piers by using steel girders, is not considered a reasonable mitigation measure because of cost (ii) and also because of relative lack of impact (iii). This option would mean longer span lengths and greater girder depths. The increased cost, estimated at $625/sq. ft. versus $450/sq. ft. (39 percent increase; (HDR 2011b)), is not considered a reasonable method of reducing impact from three in-water piers to two, especially for the replacement bridge where piers already exist.

Option (c), routing north of the river (no bridges), is not considered a reasonable minimization measure because of cost (ii) and impact (iii). This option is represented by the two Juneau Creek alternatives, which would not affect KRSMA but would impact other Section 4(f) properties. It is also represented by a potential extension of the G South Alternative that would stay immediately north of the Kenai River. It is discussed above in Section 4.6.1.2. This alignment would have a greater visual impact to KRSMA than a direct crossing, would have high costs outlined in Section 4.6.1.2 because of long retaining walls and elevated highway segments, and would use land from the Resurrection Pass Trail (estimated minimum 10 acres), which the G South Alternative was designed to avoid. For all these reasons, the extension of the G South Alternative is not considered a reasonable measure for minimizing harm to KRSMA.

Measures to Minimize Harm—Design and Construction

The one replacement bridge and one new bridge over the Kenai River would be designed with aesthetics from the river and its banks in mind, and would be designed to minimize permanent impact to river hydraulics, fish passage, and navigability. In part, this would be accomplished by minimizing the number of in-water piers. Pile driving, would be limited to daytime hours at the new Kenai River bridge (downstream of the Cooper Landing community and near the Cooper Creek campground) to avoid disrupting residents and campers at night. River-closing activities, such as moving girders into place, would be the minimum necessary and outside peak river use periods to the greatest extent possible and would be coordinated with KRSMA managers and area land management agencies. Notice of intent to close the river would be given to permitted river guides and area land managers well ahead of actual closure; would be published in Anchorage and Kenai Peninsula newspapers; and would be posted on changeable signs in the project area and at area campgrounds, boat ramps, and public buildings as appropriate. The replaced bridge, and any temporary construction or detour bridges at both sites, would be removed from the river if not used in a new bridge at the same site.

In support of a USCG Section 9 permit, a navigation plan would be written and followed, incorporating such measures as:

- Closing only one side of the Kenai River at a time, using a buoy line with information posted on the buoys and at boat launch ramps, whenever partial closing was possible
- Limiting complete closures of Kenai River navigation to fall-winter-spring, approximately August 15 to June 15, whenever possible, and to nighttime hours in summer
- Ensuring a motorized emergency response boat, with qualified operators, would be available on site at all times during active construction to inform Kenai River users of emergency closures and assist boaters to shore, if necessary

The Kenai River navigation plan and anticipated closure schedule would be developed a year in advance of implementation, to give notice to commercial river guides for planning the following season. The public would be given an opportunity to comment on the navigation plan. The pilings for the spans of temporary construction bridges would be placed to allow for continued navigation of the river, and sufficient vertical clearance would be provided on the temporary bridge and the permanent bridge for ease of navigation. Navigation clearances for the permanent bridges would be the same as or greater than the existing bridges.

Enforceable No Parking on Shoulder signs would be posted near Sportsman's Landing to keep the new highway shoulders from becoming additional parking and therefore to keep numbers of people accessing the Kenai River through the Sportsman's entrance at manageable levels.

In addition, standard best practices and permit stipulations would be followed to prevent stream bank erosion, siltation or pollution of water, and disruption of Kenai River recreation. These would include measures such as:

- Keeping tracked or wheeled equipment out of the Kenai River
- Stabilizing exposed earthwork during construction, protecting vegetation to the extent possible, and revegetating exposed or damaged areas following construction
- Ensuring that any imported rock material for placement in and along the Kenai River was clean
- Fueling and servicing equipment only at distances of more than 100 feet from wetlands and waters, except for low-mobility equipment such as pile drivers, and specifying detailed fueling and fuel spill contingency plans
- Retaining adequate spill containment and cleanup equipment and supplies on site
- Avoiding use of preservatives or chemicals in bridge construction that could pollute the Kenai River
- Using vegetated riprap where practicable

4.6.3 Kenai National Wildlife Refuge

4.6.3.1 Juneau Creek Alternative

Anticipated Use

The Juneau Creek Alternative would use KNWR lands near the KNWR boundary with CNF, as described in Section 4.5.

Avoidance Options

Because the affected portion of KNWR occurs within the overlapping Sqilantnu Archaeological District, any attempt to avoid this resource would result in Section 4(f) impacts to the Sqilantnu District. The KNWR is vast, and any other alignment option that attempted to avoid the KNWR would be an all-new highway outside the project area and not address the project's purpose and need. See the discussion of overall avoidance alternatives (Section 4.4) and Map 4-14. See also Section 4.4.3.

Measures to Minimize Harm—Alignment Options

Summary: For KNWR/Juneau Creek Alternative, minimization option (a) is considered reasonable but is represented in another alternative. Option (b) alignment shifts are not considered a reasonable measure to minimize harm. However, changes in design to minimize the project footprint will be considered during final design.

Minimizing harm to KNWR through design changes could mean (a) routing the Juneau Creek Alternative onto the existing highway right-of-way through the KNWR, or (b) making minor changes to reduce the footprint of the alternative within the refuge. See Map 4-1 and Map 4-3 for reference.

Option (a) is represented by the Juneau Creek Variant Alternative. Such use of the existing right-of-way would eliminate Section 4(f) use of KNWR lands, but at the expense of greater impact to the Sqilantnu Archaeological District and Confluence TCP, as further described in the least overall harm analysis (Section 4.8).

Option (b), altering the footprint within KNWR, is not considered a reasonable mitigation measure because impact (iii) to KNWR refuge land and its designated Wilderness would remain. There are theoretically infinite small differences in alignment that could be created between the proposed Juneau Creek Alternative and the proposed Juneau Creek Variant Alternative. However, these two alternatives lie quite close to each other, and the only truly substantial difference in impact is whether or not there are impacts to KNWR lands and designated Wilderness lands. Incrementally shifting the Juneau Creek alignment southward toward the Juneau Creek Variant alignment could incrementally reduce the acreage of impact, but not until reaching the alignment of the Juneau Creek Variant Alternative would the impact be eliminated. The cost (ii) of any minor alignment shift is likely to be very similar to the Juneau Creek and Juneau Creek Variant alignments in this area and was therefore not calculated separately. There is little that alignment shifts could accomplish to minimize the type and quality of impact to KNWR and its Wilderness area without shifting to the Juneau Creek Variant alignment, which is the closest possible alignment that would eliminate impact to designated Wilderness. Therefore no alignment shift is proposed.

In final design, it may be possible to alter how the new highway and old highway would connect to reduce or eliminate a loop south of the existing highway on KNWR lands where valued habitat exists, thereby minimizing harm. The Juneau Creek Variant Alternative was created as an option that would eliminate the use of refuge lands and minimize harm to the refuge.

The **Juneau Creek Alternative and the Juneau Creek Variant Alternative** differ in that the Juneau Creek Alternative has a Section 4(f) use of KNWR lands and the Juneau Creek Variant Alternative does not. However, the same general measures to reduce harm to wildlife movement and KNWR facilities are proposed under both alternatives. See Section 3.22, Wildlife, for discussion of other alternatives.

Measures to Minimize Harm—Design and Construction

Only the Juneau Creek Alternative would have a Section 4(f) use of KNWR lands.

The ANILCA Title XI process spells out a specific course of action of acquiring road rights of way across the KNWR and Wilderness, so no mitigation is proposed for the land use impact.

DOT&PF would continue to coordinate closely with the USFWS during the design phase to ensure access and use of KNWR facilities in the project area during construction. These facilities are: Sportsman's Landing-Russian River Ferry, the visitor contact station, the Fuller Lakes Trailhead, and Jim's Landing. To the extent possible, construction activities that would conflict with access would be scheduled outside high-use summer periods. Access to these facilities would be maintained, especially during the primary public use period. During summer, any short closures (e.g., for paving at the entrance) would be at night unless agreed to by the KNWR manager. Similarly, the construction contract would not allow construction staging and parking of construction-related vehicles at these facilities during the busy summer visitor season and not at other times unless agreed to by the KNWR manager.

Other measures such as steepening side slopes would be accomplished wherever practical, within the bounds of accepted engineering practice, to reduce the footprint impact of the alternative.

The following paragraphs reflect measures proposed to reduce impacts to wildlife movement in and out of KNWR, as described in Section 4.5.4.1. Similar language appears in Section 3.22 (Wildlife) for all other build alternatives, but such language in this Section 4(f) Evaluation is pertinent only under the Juneau Creek Alternative, because the Juneau Creek Alternative is the only one that would have a Section 4(f) use of KNWR lands. The long segment built on a new alignment under this alternative would fragment bear habitat and has potential to create a barrier to bear movement between feeding areas in the KNWR and outside the KNWR (e.g., lower Juneau Creek). The same is true of moose movement through topographic benches on either side of Juneau Creek that have seen forest treatments by CNF to reduce wildfire fuels and enhance moose habitat.

Measures to minimize harm to vegetated habitat (considered a proxy for wildlife habitat) are documented in Section 3.20. Timing windows for construction activities within the Kenai River (e.g., pile driving; see Section 3.21) would reduce temporary impacts to a brown bear food source. Additional avoidance and minimization measures to reduce impacts to brown bears and brown bear habitat would be pursued during the design phase, and in collaboration with the resource agencies.

To address the project's potential for impacting movement of wildlife (a feature or resource of KNWR) in and out of the KNWR, DOT&PF is sponsoring a wildlife study in collaboration with wildlife management agencies for both KNWR lands and non-KNWR lands. The scope of the study (the study plan) was developed in consultation with an interagency wildlife team (USFWS, USFS, and ADF&G). The study, which was initiated in 2014, is expected to quantify wildlife use of the habitat in the vicinity of proposed alternative alignments and the existing highway and to aid in the location and design of one or more wildlife crossings and other measures to accommodate wildlife movement for brown bear, black bear, moose, Dall sheep, wolverine, and lynx. The study focuses on locations where animals are likely to be at greatest risk (using the highway corridor either to move parallel to the highway or to cross the highway).

The study is designed to identify wildlife movement patterns while considering public and private land, with a goal of identifying locations for potential wildlife crossings that would be incorporated into the highway design and remain effective for wildlife movement over the long term. The wildlife study is progressing through a desktop modeling phase, and field verification of movement corridors is anticipated later in 2015 or 2016. The field verification effort uses existing tracking data and camera-capture technology to indicate travel corridors for the target species in the project area and where they are crossing the existing and proposed highway alignments. These data will be coupled with data from multiple other studies both within the project area and from other locations around the world. Data inputs will include, for example, bear and moose tracking studies using collars that transmit location and movement data, existing wildlife collision data for the project area, and data on wildlife movement habits from outside the project area. This information will help biologists predict wildlife concentration and movement areas.

The range of mitigation options includes, but is not limited to:

- Vegetated wildlife overpasses.
- Large mammal underpasses.
- Small mammal underpasses.
- Fencing/wildlife diversions.
- Vegetation planting or clearing to help direct wildlife movement.
- Terrain steps to prevent wildlife movement or to provide for one-way movement.
- One-way gates for large animals.
- Animal movement corridor protection (e.g., through land purchase, designation, or easement).
- Design of project bridges over rivers and streams to accommodate large mammals passing under the bridge along the riparian edge.
- Standard wildlife warning signs for drivers.
- Movement-activated electronic warning signs for drivers.

In addition, design and construction techniques for the Juneau Creek Bridge would leave adequate clearance for wildlife passage beneath the bridge along the canyon rims, and retaining vegetation to the extent possible as cover for wildlife.

The wildlife movement study is expected to suggest locations for wildlife crossing structures, potentially within the KNWR or outside it (for example, on CNF, State, or Borough lands), or both. DOT&PF, FHWA, and the wildlife agencies would agree on locations and design criteria for wildlife crossing structures. Criteria to be used in determining which mitigation measures to implement include:

- Expected effectiveness (or use by species).
- Concentration of use by multiple species/usefulness of the measure for multiple species.
- Technical feasibility and terrain.
- Current and projected land use and ownership.
- Cost and prudent expenditure of public funds.
- Input from the public.
- Input from wildlife agencies and other agencies.

The process to be used to make final wildlife mitigation decisions is anticipated to be a continuing cooperative effort and negotiation among ADF&G, USFWS, USFS, DOT&PF, and FHWA, principally within the NEPA process. The initial study results will be incorporated into the Final EIS along with refined mitigation measures based on these results and pertinent comments from the public or other agencies. Because the costs may be substantial and because this kind of mitigation is relatively new for Federally funded projects in Alaska, it is expected that senior agency decision makers are likely to be involved. The Final EIS will include as much detail as possible. Confirmation data from the wildlife study (e.g., field verification data) will be incorporated into the Record of Decision to the extent possible so that mitigation is identified as specifically as possible in the Record of Decision. A commitment to further refinement during project design may also be included.

While there is not yet any specific cost associated with wildlife mitigation, project construction cost estimates in Chapter 3.5.2.2 and 3.27.7.5 include contingency amounts, in part to cover anticipated costs such as those for wildlife mitigation.

Substantial agency coordination has taken place on the topic of brown bears (see Section 3.22, Wildlife, and Chapter 5, Comments and Coordination).

4.6.4 Resurrection Pass Trail

4.6.4.1 Juneau Creek and Juneau Creek Variant Alternatives

Anticipated Use

The Juneau Creek and Juneau Creek Variant alternatives would bridge over the trail itself but would use a portion of the 1,000-foot-wide corridor that surrounds the trail, as described in Section 4.5.

Avoidance Options

Because a segment of the Resurrection Pass Trail's 4(f) corridor (1,000 feet wide) occurs within a portion of the larger Sqilantnu Archaeological District and within a portion of the Juneau Falls Recreation Area, any attempt to avoid the trail corridor would result in Section 4(f) impacts to the other 4(f) resources. See Section 4.4.3.

Measures to Minimize Harm—Alignment Options

Minimizing harm through design changes could mean using the existing highway alignment or another alignment south of the southern end of the trail. See Map 4-5 for reference.

Summary: For Resurrection Pass Trail/Juneau Creek alternatives, alignment shifts are represented by other reasonable alternatives. The current design minimizes harm by bridging over the trail. No further alignment shifts or design changes are proposed.

These options are represented by the G South and Cooper Creek Alternatives, which avoid the trailhead to the south by using the existing alignment, and by the Russian River Alternative, which was located south of the Kenai River and therefore still farther south of the trailhead. While all of these alternatives would avoid the Resurrection Pass Trail, each would use multiple other 4(f) resources, including KRSMA (at bridges), the Kenai River Recreation Area, either the Stetson Creek Trail or the Bean Creek Trail, the Russian River Campground, and KNWR. These are not realistic alterations to either of the Juneau Creek alternatives; they are completely separate alternatives. The Russian River Alternative is discussed above in Section 4.6.1.2.

Measures to Minimize Harm—Design and Construction

The Resurrection Pass Trail, Bean Creek Trail, and Juneau Falls Recreation Area overlap, and impacts are concurrent or interrelated. This section presents all measures to minimize harm to all three properties.

Bean Creek Trail, Resurrection Pass Trail, and Juneau Falls Recreation Area. Several measures would be employed to reduce impacts to the Juneau Falls Recreation Area and to the Resurrection Pass and Bean Creek trails. The proposed mitigation, developed in consultation with the USFS, would apply equally to the Juneau Creek Alternative or the Juneau Creek Variant Alternative. Mitigation measures are depicted on Map 4-10 and Map 4-13 and include the following:

- The proposed highway bridge over the Juneau Creek Canyon would be designed to span completely over the Resurrection Pass Trail, although it would not span the entire 1,000-foot width of the recreation buffer associated with the trail. The western bridge abutment would be placed as far as practical from the existing trail. Bridge design features such as height above the trail and finished appearance would be reviewed with the USFS during the final design phase. These design features and related construction commitments for the area around the trail would minimize harm to the trail.
- The Bean Creek Trail would be rerouted about 450 feet to the west of its current location to pass under the Juneau Creek Bridge at its eastern abutment. The length of rerouted trail would be approximately 2,900 feet. Bridge design features such as height above the trail and finished appearance would be reviewed with the USFS during the final design phase. The rerouted trail alignment would be subject to an archaeological survey to ensure no archaeological sites would be impacted; if such sites were discovered, the trail would be routed to avoid them.
- A formal summer trailhead for Resurrection Pass Trail would be constructed on the north side of the highway west of the Juneau Creek Bridge. The USFS has stated that placement of the trailhead inside the Juneau Falls Recreation Area would cause less harm to the recreation area than placement outside the recreation area. A bridge construction staging area is proposed just outside the western edge of the Juneau Falls Recreation Area; based on direction from the USFS, this staging area would be co-located with the new Resurrection Pass trailhead site to minimize vegetation clearing and wetland impact in the area, and the staging area would be partially converted to a trailhead when staging was complete. The concept would be a trailhead built by DOT&PF but owned and operated by the USFS. It would have parking for 45 standard vehicles plus four pull-through spaces for buses or large campers and four spaces for vehicles with trailers, an improvement in capacity and layout over the trailhead on the existing Sterling Highway, which is designed for about 24 standard vehicles. Trailhead development would include a pit toilet and a kiosk for posting maps, trail information, and interpretive displays (see below). Associated development would include a walking trail and a horse trail, each connecting the parking area to the existing Resurrection Pass Trail. The trailhead parking area would not be plowed by DOT&PF in winter and is expected to be closed by USFS in winter.
- For skiers in winter, a long pullout would be located east of the new bridge within the highway right-of-way. It likely would be designed with distinct entry and exit points. It

would be plowed by DOT&PF road crews, and would be designed for efficient plowing. It would be located north of the highway to eliminate the need for skiers to pass under a bridge without snow cover. A simple connecting trail would be built to connect the pullout to the Bean Creek Trail in summer, but no formal trailhead sign or accommodations would be established on this side of the canyon, based on consultation with the USFS. Skiers would find their way to the trail. Snowmobilers would have the same access they have today, via the existing shared trailhead area for the Resurrection Pass Trail and West Juneau Road, an old logging road commonly used for winter access to the Resurrection Pass Trail. The access point is along the existing Sterling Highway just west of MP 53 (Schooner Bend Bridge). It is likely that some snowmobilers would use the new pullout east of Juneau Creek Bridge, and over time the pullout could become the favored winter access point for the Resurrection Pass Trail. Others might park on the highway shoulders farther west to access the old logging roads that provide alternate access to the Resurrection Pass Trail. For this reason, "No Parking" signs and signs directing such traffic to the established winter trailhead would be installed.

- To encourage use of the existing snowmobile access and parking area, the highway design would provide a tunnel or bridge at crossings of the new highway so that access could continue without need to cross the new highway at grade.
- To mitigate the potential impacts of pedestrians walking onto the highway bridge to see views from the bridge, to accommodate the public desire to view the falls, and to minimize pedestrians crossing the traffic lanes, a set of trails and viewing areas would be constructed. These would include:
  - A formalized canyon overlook constructed near the falls, with an Americans with Disabilities Act-accessible trail to connect the trailhead to the overlook. Safety features, as needed, would be incorporated in the overlook at the canyon edge. Signs would direct people to the viewpoint.
  - A separate horse trail from the trailhead to the Resurrection Pass Trail, connecting north of the falls overlook, to separate horses from the busiest pedestrian segment of trail.
  - A pedestrian walkway on the south side of the new highway bridge, connected to both the Resurrection Pass Trail and Bean Creek Trail to provide passage across the highway and beneath the bridge. A safety barrier would separate traffic from the pedestrian walkway.
  - Full highway shoulders to accommodate bicyclists on the bridge.
  - Signs posted to direct pedestrians to safely access the bridge walkway, to indicate Juneau Creek Falls viewing access via the trail and overlook, and to indicate that there is no view of falls from the bridge.
- Access for users of both trails would be maintained across the construction area along the continuing routes during construction.
- The Juneau Creek Bridge would be designed in consultation with landscape architects for aesthetics, with the views from both trails in mind. As a major element in the down-valley view from the falls area, the bridge would be designed to be aesthetically pleasing.

- A basic sign interpreting Bean Creek Trail and Resurrection Pass Trail history would be placed at the new trailhead or at the intersection of the Bean Creek Trail with the Resurrection Pass Trail, pending the terms of the project's Section 106 agreement. Mitigation measures formalized in a Section 106 agreement among consulting parties would be implemented for the historic trail (see Section 4.5.1).
- Bridge drainage design would direct storm water runoff beneath the bridge to the extent possible to promote retention of a natural vegetation buffer between the trails and the bridge abutments.

Construction Measures Common to Juneau Creek and Juneau Creek Variant Alternatives. The following measures to minimize harm would occur as part of the construction process:

- For some periods during construction of the bridge over Juneau Creek, when it would be necessary to close the trail for safety, trail users would be directed onto a detour trail that would cross the highway alignment to the west. The Bean Creek Trail would continue to follow its existing alignment, crossing the construction area at grade, until the bridge was complete enough for safe passage on the new trail alignment beneath the eastern end of the bridge. In both cases, a designated trail crossing site would be established across the construction zone near the point the highway crosses the existing trail, and construction vehicles would be required to yield to trail users at the crossing unless a flagger was posted at the crossing. Notice of the reroute and construction zone crossings would be provided to land managers and trail users and posted well in advance at trailheads for the Resurrection Pass Trail (both ends), Bean Creek Trail, Summit Creek Trail, Devils Pass Trail, and at area campgrounds and public buildings. Notices also would be published in Anchorage and Kenai Peninsula newspapers.
- Use of the Resurrection Pass Trail for construction would be minimized. Construction access along the trail would not be allowed except for construction of trail improvements. Understory vegetation would be left undisturbed within the 1,000-foot-wide trail corridor to the extent possible to preserve the natural appearance of the corridor. Use of the trail corridor by vehicles would be minimized, and damaged areas would be replanted with native species seed mix and native trees after construction. Such restoration planning would take place in conjunction with the USFS.
- Where a construction access road between the new highway alignment and material extraction and overburden disposal sites would overlap a 1,600-foot stretch of the southern Bean Creek Trail, the construction contractor would provide a temporary, rerouted trail alignment for recreation users to separate them from truck traffic. The rerouted trail would make use of existing old logging roads and portions of loop trails on the east side of Bean Creek, and would include a new bridge crossing of the creek to connect with the historic Bean Creek Trail alignment. The temporary trail would be rehabilitated in conjunction with USFS when construction was completed and it was no longer needed. DOT&PF would coordinate and develop a construction traffic management plan with the USFS to best accommodate summer and winter trail users crossing the construction access road. A portion of the road embankment would be left after construction as the trail surface, and the road culvert/bridge over Bean Creek would be designed to be left in place for trail use following construction, or would be replaced with a footbridge. The main Bean Creek Trail would be rerouted back onto its historic

alignment at the end of construction. The area would be revegetated following construction where embankment material was removed or trail-side vegetation was disturbed.

Compensatory Mitigation for Resurrection Pass National Recreation Trail, Common to Juneau Creek and Juneau Creek Variant Alternatives. The Juneau Creek Alternative and Juneau Creek Variant Alternative would cross the Resurrection Pass Trail at approximately trail mile 3.4 and would provide easier access to the 9-mile valley upstream, changing the character and experience currently available on the trail. To compensate for the break in the long-distance character of the Resurrection Pass Trail, the USFS proposed construction, and DOT&PF would fund construction, of an important link in another long-distance trail nearby—the Iditarod National Historic Trail, as described in the following paragraph. See the inset on Map 4-13.

DOT&PF would provide a pedestrian walkway on the Snow River bridges (Snow River West Channel: 188 feet long, and Snow River Center Channel: 649 feet long) near MP 17 of the Seward Highway. This link would serve to connect existing and planned portions of the "Iditarod National Historic Trail—Southern Trek" route, a trail segment approved in the USFS's *Seward to Girdwood Iditarod National Historic Trail Environmental Assessment* (2003) but not yet built. Providing pedestrian facilities on the Snow River bridges would offset impacts to the Resurrection Pass Trail by creating an important connection in another long-distance trail in the National Trails System within the Kenai River watershed. DOT&PF would provide the pedestrian walkways at the time the Snow River bridges were replaced. To the extent that segments of the Iditarod National Historic Trail would need to be placed within the Seward Highway right-of-way in the Snow River area, DOT&PF would agree to USFS construction of trail segments in the right-of-way on the condition that the trail would meet current highway and trail safety and design standards and on the condition that DOT&PF would have the ability to relocate the trail within the right-of-way as needed to accommodate highway transportation needs in the future.

4.6.5 Bean Creek Trail

4.6.5.1 G South Alternative

Anticipated Use

The G South Alternative would cross the winding Bean Creek Trail three times in close succession, as described in Section 4.5.3.

Avoidance Options

Because the affected portion of the Bean Creek Trail occurs within the larger Sqilantnu Archaeological District, any attempt to avoid this resource would result in Section 4(f) impacts to the Sqilantnu District (see Section 4.4.3).

Measures to Minimize Harm—Alignment Options

Summary: For Bean Creek Trail/ G South Alternative, the minimization options presented here are not considered reasonable. Therefore, no alignment shift or design change is proposed as a minimization measure.

Minimizing harm through design changes could mean (a) routing the G South alignment south of the southern end of the trail, or (b) shifting the highway alignment slightly north, crossing the trail only once, and substantially maintaining the existing trail alignment through use of a trail bridge over the highway. For reference, see Figure 4.6-1, which shows a realignment under option (a) in gray. See also Map 4-6 and Map 4-7 at the end of this chapter.

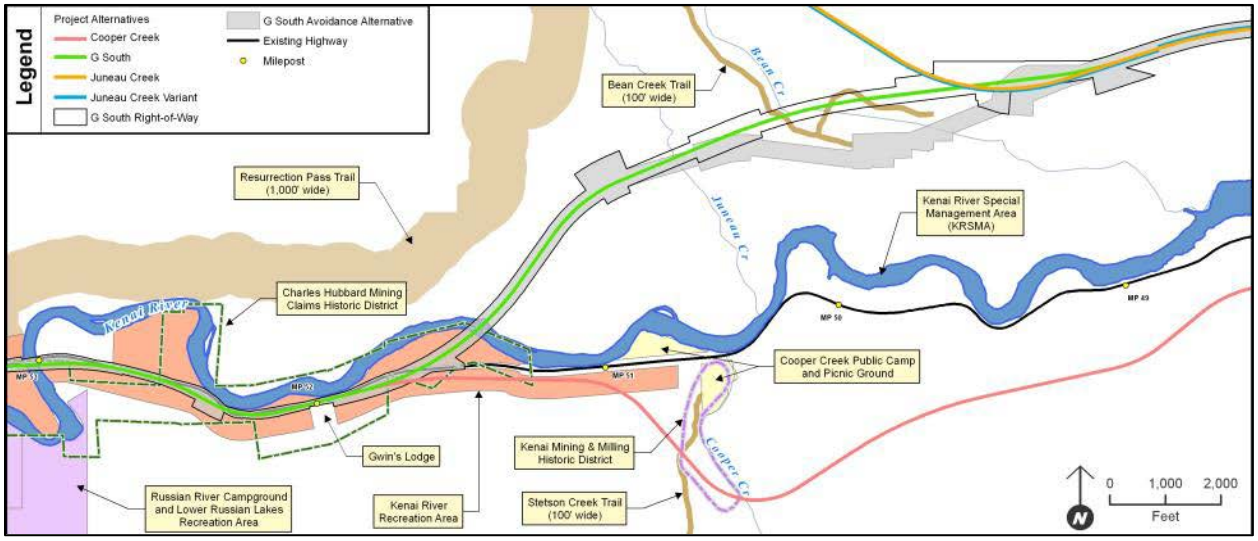

Figure 4.6-1. Bean Creek Trail, surrounding Section 4(f) properties, and potential realignment of the G South Alternative

Option (a) would route the alignment immediately south of the two southern terminal spurs of the Bean Creek Trail. This alignment is not reasonable as a measure to minimize harm because of the cost (ii) and impact (iii) of the alignment. Such an alignment would route the highway through an existing neighborhood, requiring full acquisition of eight lots, including five residential homes to be relocated, and partial acquisition of a ninth developed residential lot. The impacts are in the context of 161 occupied households and another 207 seasonally occupied residences in the community (see Section 3.4, Housing and Relocation). The nine properties had a borough assessed value of $1.08 million at the beginning of 2012. Fair market value for acquisition is generally accepted to be higher than assessed value, plus there would be costs for relocation.

This route would be technically feasible and within current standards, and it would minimize harm to the Bean Creek Trail. However, by removing neighborhood homes and placing the highway alignment adjacent to the western spur and trail terminus (the historic route), neighborhood access and a good part of the neighborhood would be eliminated. While this alignment technically would minimize harm to the trail, it is not considered to be a reasonable measure to minimize harm because of the impacts to the community of Cooper Landing and to

individual property owners (iii), and the costs of relocating residents and compensating for property losses (ii).

As indicated in Section 4.8.3, the Bean Creek Trail overall is not one of the most important Section 4(f) properties in the project area, and as indicated under option (b) immediately below, the officials with jurisdiction (i) have been more interested in formalizing the trail and providing for continuity of the trail across the new highway than in keeping to the existing alignment (the officials had previously shifted the trail off its historic alignment to the east to avoid user-conflict impacts within the neighborhood). Finally, any alignment shift around the southern end of the trail would remain within the Sqilantnu Archaeological District in an area that has not been fully surveyed for archaeological resources. Based on estimated right-of-way, the shifted alignment would use 414 acres of the district, compared to 417 acres for the proposed G South Alternative alignment. It is possible that archaeological sites would be discovered along the shifted alignment and that impacts to the District would be greater than the alignment proposed.

Option (b), shifting the alignment north and putting the trail over the highway on a bridge was considered but found to be not reasonable as a measure for minimizing harm because of a combination of cost (ii) and impact (iii). It was determined that a bridge over the trail would be feasible without substantially altering the existing trail alignment. Such an approach theoretically could minimize harm to the trail. However, the cost (ii) of the bridge would be substantially higher than the combination of placing the trail in a tunnel, replacing the trail bridge over Bean Creek, and rerouting the trail. Cost of a pedestrian bridge over the highway is estimated at $427,500, while the proposed cost of trail realignment, a pedestrian tunnel under the highway, and a pedestrian bridge over the creek together would total $116,475. The estimated bridge cost therefore would be about 3.7 times higher. This cost is not considered reasonable, especially in light of consultation with the officials with jurisdiction (i), described in the following paragraph.

As further described in the following paragraphs, measures are proposed to maintain continuity of the trail by rerouting the trail and placing it under the highway in the small topographic depression created by Bean Creek. DOT&PF and FHWA consulted with the USFS (primary trail manager), the Alaska Department of Natural Resources (DNR; land owner), and the Borough (owner of adjacent land and access route) about these proposed measures to minimize harm, and these officials with jurisdiction agreed with the measures. The primary advantage of bridging over or tunneling under the trail would be to leave the trail on its precise existing alignment rather than rerouting it slightly to create an undercrossing for the trail. The officials with jurisdiction expressed no concerns about the minor reroute proposed. The trailhead and southern end of this trail are not highly managed or fixed in place at this time, and the proposed measures would help to formalize the southern end of the trail. Finally, a trail bridge over the new highway would be a large engineered structure in an area lightly forested with only moderate-sized trees. The bridge would stand out in an otherwise mostly natural-appearing environment. Therefore, based on consultation (i), costs (ii), and impacts outside the trail in question (iii), options for bridging and tunneling were determined to be not reasonable.

Measures to Minimize Harm—Design and Construction

For the historic portion of the Bean Creek Trail, mitigation measures would be finalized in a Section 106 agreement among consulting parties (see Section 4.5.1). A formalized summer trailhead/parking area would be established at a location acceptable to the USFS and DNR. The new trailhead would be located near the trail on the north side of the new highway (see Map 4-7)

and would be maintained by the USFS. The highway would pass over the existing trail (Slaughter Ridge Road extension), rerouting the trail/road beneath the highway in a tunnel, to maintain access to the trail from the community of Cooper Landing via Slaughter Ridge Road. The trail would pass under the highway with no connection between the highway and the trail at the crossing location. The Bean Creek Trail would be rerouted on the north side of the highway, across Bean Creek on a new pedestrian bridge, and past the new trailhead. To accomplish the highway crossing, the trail would be given sufficient clearance for passage by trail users and wildlife.[10]

The trail south of the new highway also would be connected to the historic spur trail into the neighborhood. The trail would remain accessible both from the neighborhood and via Slaughter Ridge Road, as it is today, without the need to cross the new highway at grade. DOT&PF would coordinate the new trailhead design with USFS, DNR, and the Borough, and would prepare the parking spaces and a trailhead sign/kiosk. However, resolving easements and upgrading the unimproved portion of Slaughter Ridge Road south of the new highway would not be part of the mitigation. The trailhead is proposed as a summer-only trailhead (i.e., not plowed in winter). A winter pullout/parking area would be established close to the summer trailhead to provide winter/snowmobile user access to the Bean Creek Trail and alternate winter access to the Resurrection Pass Trail. This long pullout would likely be designed with distinct entry and exit points. It would be plowed by DOT&PF road crews, and would be designed for efficient plowing. The pullout would be sized to accommodate multiple trucks with snowmobile trailers.

There is potential that the Bean Creek Trail would become the favored access to the Resurrection Pass Trail by most users instead of remaining a secondary access (it would be shorter than the distance from the existing trailhead for Resurrection Pass Trail, with somewhat less elevation gain). Based on consultation with the USFS, signs would be provided at the trailhead to direct non-motorized overflow traffic to the existing trailhead for the Resurrection Pass Trail and would direct snowmobile overflow traffic to West Juneau Road. “No Parking” signs would be posted along the highway shoulder in this area.

In addition to the new trailhead, the following measures would be instituted to minimize harm to the trail and its users:

- The contractor would be required to maintain access for trail users across the construction zone throughout the construction process via marked detours. The rerouted trail and new highway bridge over the trail would be constructed as early as possible to allow trail users to use it and avoid crossing the construction zone at grade.
- An archaeological survey of the rerouted trail alignment would be completed to ensure no archaeological sites would be impacted. The trail alignment would be adjusted to avoid any discovered archaeological sites.

[10] The Bean Creek Trail in this location is coincident with the extension of the platted but unbuilt Slaughter Ridge Road and Cecil Road. This extension on State lands, beyond the platted area on Borough lands, is an old logging road created by the USFS. The USFS retained public access easements on portions of these logging roads when the land transferred to the State. The new tunnel under the highway for Bean Creek Trail would be designed to pass trucks and wildlife, although current uses are primarily for foot traffic and for snowmobiles in winter.

- A permanent sign interpreting trail history would be placed at the new trailhead or at the intersection of the Bean Creek Trail and Resurrection Pass Trail.
- Other measures such as steepening side slopes would be accomplished wherever practical, within the bounds of accepted engineering practice, to reduce the footprint impact of the alternative.

4.6.5.2 Juneau Creek and Juneau Creek Variant Alternatives

Anticipated Use

The Juneau Creek and Juneau Creek Variant alternatives would cross the Bean Creek Trail near the proposed Juneau Creek Bridge, as described in Section 4.5.4, and would result in rerouting the historic trail more than 1,500 feet to pass under the eastern end of the bridge.

Avoidance Options

Because the affected portion of the Bean Creek Trail occurs within the larger Sqilantnu Archaeological District, any attempt to avoid this resource would result in Section 4(f) impacts to the Sqilantnu District. See Section 4.4.3.

Measures to Minimize Harm—Alignment Options

> **Summary:** For Bean Creek Trail / Juneau Creek alternatives, the minimization options presented here are not considered reasonable. Therefore, no alignment shift or design change is proposed as a minimization measure.

Minimizing harm through design changes could mean (a) creating a new alignment south of the southern end of the trail, or (b) placing the trail on a bridge over the highway to retain its existing alignment. See Figure 4.6-2, which illustrates a potential realignment under option (a) in gray. See also Map 4-6 at the end of this chapter.

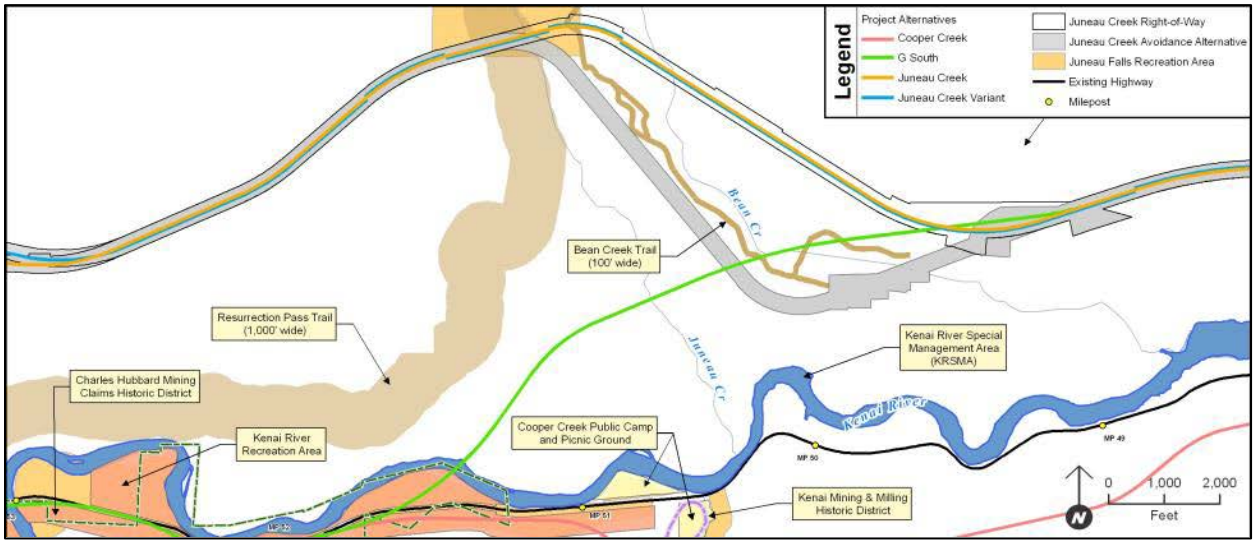

Figure 4.6-2. Bean Creek Trail, surrounding Section 4(f) properties, and potential realignment of the Juneau Creek Alternatives

Option (a), shifting the Juneau Creek alignments to the south and west, would avoid the Bean Creek Trail entirely and would follow the same alignment through a neighborhood as indicated above for the G South Alternative. Based on estimated right-of-way, the use of land from the Sqilantnu Archaeological District would be 391 acres under the shifted alignment versus 414 acres for the proposed alignment. However, this option was found to be not reasonable as a mitigation measure principally because of impacts (iii) and engineering feasibility, and associated cost implications (ii). The alignment around the southern termini of the trail would result in full acquisition of eight properties, including relocation of five homes and cabins, and partial acquisition of a developed ninth residential lot, an impact to the owners and additional cost to the project (see G South Alternative description above in Section 4.6.5.1).

Further, the alignment would constrain the alternative between the edge of the Juneau Creek Canyon (to the west) and the Bean Creek Trail (to the east). This narrow corridor, about 6,600 feet long, would be right at a 6 percent grade throughout (the maximum grade allowed under rural principal arterial standards). This constrained corridor would not allow for a curve to match the bridge crossing location currently proposed, suggesting a clear-span bridge some 500 feet longer than the 825-foot-long long bridge already proposed (the bridge as proposed already would be the longest clear span in Alaska) and built on a curve with its abutment farther south than currently proposed. The rock in a zone along the canyon edge was found to be unstable in a portion of this area, removing the potential of moving the entire bridge south and calling into question the viability of the canyon-edge alignment. If the alignment were pursued, the impacts (iii) could include catastrophic failure of the highway or bridge abutment. A curved clear-span bridge approximately 1,300 feet long theoretically possible but is outside common bridge engineering practice and would cost more (ii) than the bridge otherwise proposed because of its extra length and because of the curve. While such a bridge theoretically would be possible, the combination of factors described here did not warrant complex preliminary design and cost estimating for such a bridge; the alignment in whole was considered not reasonable even without this data.

For this combination of cost (ii) and impact (iii), this alignment shift was not considered a reasonable measure to minimize harm to the Bean Creek Trail.

Option (b), placing a trail bridge over the highway, was determined to be not reasonable as a way to maintain the existing, historic alignment and to minimize harm, primarily because of cost (ii). A bridge approximately 100 feet long would be required to meet horizontal and vertical clearance requirements for a rural principal arterial. The trail would need to be realigned slightly at the approaches to the bridge, but would otherwise retain its existing historic alignment. Based on engineering completed for this SEIS, realigning the trail over 2,900 feet as proposed under the two Juneau Creek alternatives is expected cost less than $9,000, while construction of a trail bridge, instead of realigning the trail, would cost approximately $427,500, approximately 50 times more. Because of cost (ii), bridging over the highway is not considered reasonable as a measure to minimize harm.

As further described in Section 4.6, rerouting the trail and placing it under the eastern end of the proposed Juneau Creek Bridge is a better option for minimizing harm. DOT&PF and FHWA consulted with the USFS (i), the officials with jurisdiction as land owner and trail manager, about these proposed measures to minimize harm, and the USFS raised no objection to these measures. Section 4.6 describes how these measures would combine with measures proposed for

the Resurrection Pass Trail and Juneau Falls Recreation Area to create a system of recreation facilities in the Juneau Creek Falls area.

Measures to Minimize Harm—Design and Construction

Measures proposed to minimize harm to the Bean Creek Trail are discussed together with the Resurrection Pass Trail and Juneau Falls Recreation Area above in Section 4.6.4, Resurrection Pass Trail.

4.6.6 Stetson Creek Trail

4.6.6.1 Cooper Creek Alternative

Anticipated Use

The Cooper Creek Alternative would cross the lower end of the Stetson Creek Trail, truncating it and creating a small new pullout trailhead south of the highway and a small interpretive loop for Cooper Creek Campground north of and below the highway, as described in Section 4.5.2.

Avoidance Options

Because the affected portion of the Stetson Creek Trail occurs within the larger Sqilantnu Archaeological District, any attempt to avoid the trail would result in Section 4(f) impacts to the Sqilantnu District. See Section 4.4.3.

Measures to Minimize Harm—Alignment Options

Minimization through design changes could mean (a) routing the highway alignment around the lower end (north end) of the trail, or (b) maintaining trail continuity and the existing historic trail alignment by placing the trail in a tunnel under the new highway. See Map 4-8. See also Section 4.5.2.2 for related discussion about realignments in this area.

Summary: For Stetson Creek Trail/Cooper Creek Alternative, the minimization options presented here are not considered reasonable. Therefore, no alignment shift is proposed as a minimization measure. The proposed design in this area reflects a USFS proposal to minimize harm that appears reasonable.

Option (a), routing the Cooper Creek Alternative around the northern end of the trail, is not considered a reasonable way of minimizing harm primarily because of impacts (iii) associated with steep topography, known poor soils within the steep slopes, and use of the Cooper Creek Camp and Picnic Ground. It would not be possible for the Cooper Creek Alternative to go around the trail immediately to the north without using land from the campground, a Section 4(f) resource. The slopes that constitute the eastern bluff above Cooper Creek are about 200 feet high and have failed in the past, leaching silt and mud into Cooper Creek and the Kenai River. Multiple geotechnical studies done in this area by DOT&PF and consulting engineers noted the fine-grained soils in the area that are subject to failure, advised against tall cuts into such slopes, and stated that walls above 100 feet tall have not previously been constructed (HDR 2014a). Some of these slopes are already considered steeper than can be naturally maintained, so material continually sloughs. Alignments farther north are represented by the G South Alternative and the Juneau Creek alternatives.

Option (b), placing the trail in a tunnel or under a bridge, may be technically possible but this was rejected based on consultation with the officials with jurisdiction (i). DOT&PF originally proposed placing the trail in an oversized culvert and maintaining its existing historic alignment.

However, during consultation, the USFS indicated that separating the trailhead from the campground would resolve existing management challenges, because most trail users are separate from campground users and because miners use the trail for legal motorized access to mining claims, and motorized use may conflict with campground use. Based on the consultation to date, and based on the balance of adverse impacts to the trail itself created by the project (truncating the trail), the benefits to the trail (formalizing a trailhead, interpreting trail history), and impacts to the trail and nearby campground that occur today without the project (motorized conflicts, indistinct trailhead), it appears the USFS proposal is a reasonable measure to minimize harm to the trail and would benefit the campground as well. Measures to minimize harm are described in Section 4.6.

Measures to Minimize Harm—Design and Construction

Mitigation measures to be formalized in a Section 106 agreement among consulting parties would be implemented to minimize impacts of the Cooper Creek Alternative on the Stetson Creek Trail (see Section 4.5.1). As proposed by the USFS, a new pullout trailhead would be established for the trail at a location south (uphill) of the new highway at or near the point that the new alignment would cross the existing trail. The trail would end at the new pullout trailhead and would not extend to the Cooper Creek Campground. There would be no trailhead facilities built at the new pullout trailhead except for a historic trail interpretive sign. Subject to agreement of the Borough and the USFS (land owners), the historic trail on the campground side of the new highway would be combined with the existing informal access track and a segment of new trail to create a short interpretive loop for campground users. The USFS proposed this scenario as the best recreation scenario because it would resolve an existing issue of two access points for the trail, which is difficult to manage. The USFS stated that campground users are focused mostly on fishing and not on trail hiking, so there would be little recreation loss to campground users by separating the trail and campground. The new trails would be owned and maintained by the USFS, and the new pullout trailhead parking would be owned and maintained by DOT&PF.

The trail would be rerouted from its existing historic alignment where a cut above the new highway would eliminate the trail (see Map 4-8). Beyond this segment (some 500 feet long), the trail would rejoin the existing (and historic) route. A trail sign and basic historic interpretive material would be posted near the new trailhead and on the new interpretive loop trail. Design details would be coordinated with the USFS and the SHPO during the final design phase. During construction, access along the trail would be maintained or a temporary alternative route would be provided; trail closure would occur temporarily only during placement of the highway embankment across the trail, and during realignment of the trail. Notice of any detour and of trail closures would be given to the USFS and to registered mining claimants who have claims accessible via the trail. Notice of any detour or closure would be prominently displayed at the Cooper Creek Campground and both the gated trailhead and the existing informal alternate trailhead. The new segments of trail alignment above the new highway and near the campground would be subject to archaeological surveys to ensure no archaeological sites would be impacted; if such sites were discovered, the trail would be routed to avoid them.

DOT&PF would incorporate design shifts or narrowing of the embankment width at contributing features during final design wherever practical to further minimize harm.

4.6.7 Juneau Falls Recreation Area

4.6.7.1 Juneau Creek and Juneau Creek Variant Alternatives

Anticipated Use

The Juneau Creek and Juneau Creek Variant alternatives would use land from the southern edge of the Juneau Falls Recreation Area on identical alignments, as further described in Section 4.5.

Avoidance Options

Because the affected portion of the Juneau Falls Recreation Area occurs partially within the larger Sqilantnu Archaeological District and within the protected corridor for the Resurrection Pass Trail (1,000 feet wide), any attempt to avoid this resource would result in Section 4(f) impacts to the trail or Sqilantnu District or both. See Section 4.4.3.

Measures to Minimize Harm—Alignment Options

> **Summary:** For Juneau Falls Recreation Area/Juneau Creek alternatives, the minimization options presented here are not considered reasonable. Therefore, no alignment shift is proposed as a minimization measure.

The alignment of these two alternatives was placed at the southern edge of the recreation area and not near the falls, in order to minimize harm to the area. Further minimizing harm through design changes could mean (a) routing the alignment south of the recreation area boundary, or (b) routing north of the recreation area boundary. See Map 4-1, Map 4-5, and Map 4-10 for reference.

Option (a) is not considered reasonable as a measure to minimize harm primarily because of impacts (iii). Avoiding the recreation area to the south is represented by the previous Juneau Creek Alternative alignment originally proposed in about 2001 (called the Juneau Creek "F" Alternative). It was proposed specifically because it would not have used land from the recreation area. However, because of the magnitude of the large bridge required over Juneau Creek Canyon, DOT&PF had geotechnical engineers complete a preliminary field investigation of the canyon crossing area. This investigation resulted in discovery of a recent landslide within the canyon and evidence of instability in the canyon walls in that area. The nearest location with better rock was located slightly to the north—just inside the recreation area. Use of the original bridge site could result in catastrophic failure of the bridge and was not recommended by geotechnical engineers. The canyon is too wide to reasonably bridge at locations a short distance south of the original crossing site. Locations still farther south are represented by the G South alignment, which avoids the Juneau Falls Recreation Area but uses land from several other Section 4(f) properties, including the Kenai River Recreation Area and Charles G. Hubbard Mining Claims Historic District, that the current Juneau Creek alternatives do not affect.

Option (b), avoiding the recreation area to the north, is not considered a reasonable measure to minimize harm because it would provide relatively poor level of service, combined with other impacts (iii), as described below. This concept was represented in the 1994 DEIS and early in the current effort (2001–2003) by a Juneau Creek alignment that headed north, made a large arcing curve north of Juneau Creek Canyon, and turned south again. It was not carried forward for full analysis in this SEIS because of impacts to the recreation area and to the Resurrection Pass and Bean Creek trails, coupled with roadway design issues that would degrade the level of service such as steep grades to reach higher elevations (compared to the alignment of the two Juneau Creek alternatives currently proposed) and rolling terrain (which adds to grade issues). In

addition, winter maintenance would become more difficult and costly to provide safe driving conditions at higher elevations. This means it did not satisfy the project purpose and need as well as the more direct route across the canyon.

An alignment that would completely avoid the recreation area to the north would necessarily extend more than 1 mile farther north, and would be squeezed against the mountain walls (particularly to the east), would have steeper and more sustained grades, and would have a longer curve making a full 180-degree turn from north back to south. This implies its level of service would be the same or worse than previously analyzed, and it would not satisfy the purpose and need as well as the alignment proposed. It also would cross the Resurrection Pass and Bean Creek trails farther into their lengths. The result could be similar or greater acreage of use of the trails and greater impacts to the activities and attributes of these long-distance backcountry trails and to the recreation area, concerns discussed at multiple consultation meetings (i) with the USFS. Such an alignment also would surround the recreation area on three sides rather than passing through its southern edge, arguably rendering more of the area into a "front country" recreation area than backcountry recreation area than the proposed alignment. For these reasons, an alignment to the north is not a reasonable measure for minimizing harm to the recreation area.

Measures to Minimize Harm—Alignment Options

Measures proposed to minimize harm to the Juneau Falls Recreation Area are discussed together with the Resurrection Pass Trail and Bean Creek Trail above in Section 4.6.4, Resurrection Pass Trail.

4.6.8 Cooper Landing Boat Launch and Day Use Area

4.6.8.1 Cooper Creek Alternative

Anticipated Use

The Cooper Creek Alternative would use land from the boat launch ramp portion of the Cooper Landing Boat Launch and Day Use Area, but only during construction. The ramp is located within the existing highway right-of-way (see Section 4.5.2 and Figure 4.6-3).

Avoidance Options

Because the affected portion of the Cooper Landing Boat Launch occurs within the larger Sqilantnu Archaeological District and overlaps KRSMA, any attempt to avoid this resource would result in Section 4(f) impacts to the Sqilantnu District or KRSMA or both (see Section 4.4.3).

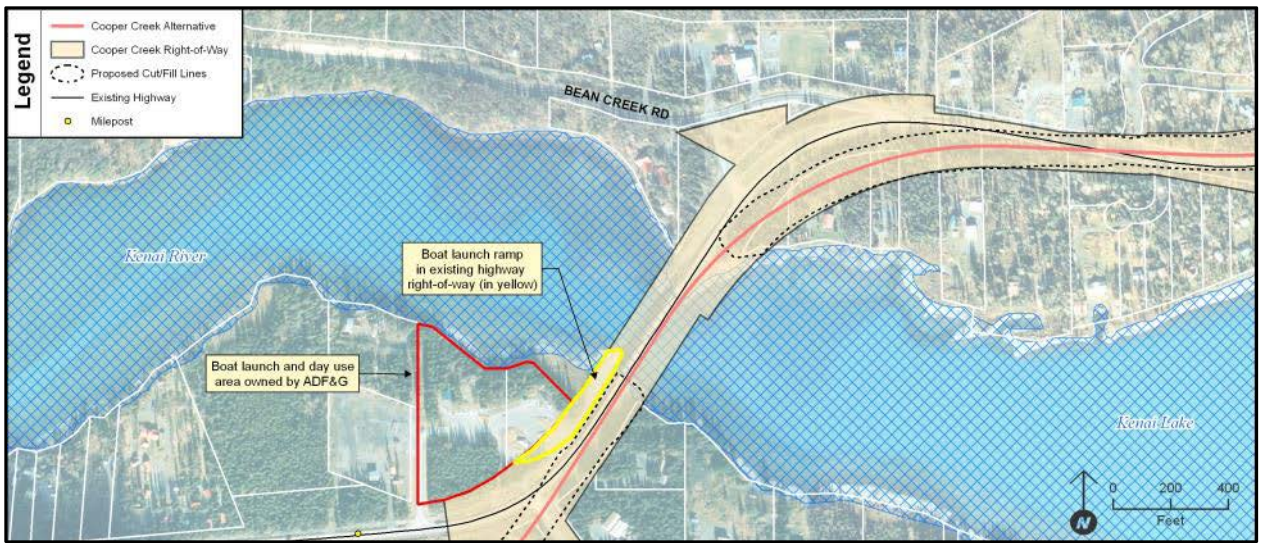

Figure 4.6-3. Cooper Landing Boat Launch and Day Use Area, Cooper Creek Alternative, and surrounding properties

Measures to Minimize Harm—Alignment Options

Summary: For Cooper Landing Boat Launch and Day Use Area/Cooper Creek Alternative, the alignment as proposed has been adjusted to minimize harm to the Section 4(f) property. No other alignment shift or design change is proposed as a minimization measure.

The alignment of the Cooper Creek Alternative has been routed and readjusted to minimize impacts to the Boat Ramp and Day Use Area and to surrounding private properties within the community of Cooper Landing. Further minimizing harm to the Section 4(f) property through alignment shifts could mean (a) routing the alignment completely around the Boat Launch and Day Use Area to the northwest or (b) to the southeast. See Map 4-1 and Map 4-10 for reference.

Options (a) and (b) are not considered reasonable ways to minimize harm, because they would take the alignment through the middle of Cooper Landing, where multiple private homes and a church would need to be acquired. The alternative in the bridge area has been redesigned from early alignments, which used a large portion of the Boat Launch and Day Use Area, and the preliminary design of the current alignment was redesigned to use a retaining wall to ensure no fill resulted in permanent impacts to the boat launch ramp. Because of costs (ii) and impacts (iii), no further design change is considered to be a reasonable measure to minimize harm to the boat launch and day use area. Consultation (i) with DPOR and ADF&G indicated relatively little concern about these impacts as long as they were timed to occur outside the prime summer boating season and were temporary. Proposed mitigation measures were found acceptable.

The current alignment is considered optimal for balancing temporary impacts to the boat launch ramp on one side of the highway against permanent private property impacts on the other side of the highway. The alignment would use land from several private parcels near both ends of the bridge, without full acquisition and without removing homes or a church. Shifting the alignment to the northwest of the Boat Launch and Day Use Area (option (a)) would be a dramatic change. It would require a bridge crossing the river at an angle at a minimum of 900 feet long, versus just less than 600 feet long, as proposed under the Cooper Creek Alternative. This would increase bridge structure costs (ii) by about 50 percent and increase use of the Kenai River (KRSMA,

another Section 4(f) property), by requiring additional permanent piers. Furthermore, private waterfront properties would be used on both sides of the river (assessed value of three lots, including at least one guiding business, of $1.2 million, plus use of a developed corner of a substantial resort property with assessed value of $1.16 million). These acquisitions would require additional costs for relocation and would disrupt or relocate two businesses. Costs and permanent community/business impacts make this option unreasonable as a way to minimize temporary impacts to the boat launch ramp.

Shifting the alignment farther upstream (option (b)) to eliminate any use of the boat launch ramp would mean full acquisition of a waterfront home on the north side of the bridge (assessed value in 2013: $313,100), with relocation required, plus greater acquisition of several parcels on both ends of the bridge, including potential relocation of a church near the south side of the bridge. Further minimizing harm to the boat launch ramp through realignment was not deemed reasonable in light of these costs and impacts.

Measures to Minimize Harm—Design and Construction

Temporary impact to the boat launch ramp would be minimized by requiring construction contractors to stage construction equipment and materials elsewhere, unless they were required to be on the boat launch ramp for construction immediately adjacent to the ramp. Access to the day use area and boat launch ramp would be maintained during the peak summer use season: approximately June 15 through August 15. Notice of intent to temporarily close the ramp outside the peak season would be given to permitted river guides and land management agencies; posted on site and at area campgrounds and other boat launch ramps; displayed on changeable message signs in the project area; and published in Anchorage and Kenai Peninsula newspapers. The potential for provision of temporary boat ramp facilities was discussed with DPOR, but no suitable location was identified. Further consultation with the DPOR would be undertaken to determine if a reasonable site can be located on public or private land.

Other measures such as steepening side slopes would be accomplished wherever practical, within the bounds of accepted engineering practice, to reduce the footprint impact of the alternative.

4.6.9 Sqilantnu Archaeological District

4.6.9.1 All Build Alternatives

Anticipated Use

All alternatives would use land from the Sqilantnu Archaeological District. They would impact the district in different ways, as described in Section 4.5. In all cases, the alignments pass through the district boundaries, and in all cases several individual archaeological historic sites and the contributing Confluence TCP would be affected.

Summary: For the Sqilantnu Archaeological District, the four reasonable build alternatives represent different reasonable ways to minimize harm. Options discussed that would further minimize harm are not reasonable and therefore not proposed, principally because of steep topography and avalanche hazard. Minor design shifts and design changes have been incorporated to minimize harm to contributing elements of the district. DOT&PF would examine small design shifts or narrowing of the embankment width at contributing features during final design for potential to further minimize harm.

Avoidance Options

Because the Sqilantnu District extends into the larger KNWR, any attempt to avoid the Sqilantnu District by going around it would result in impacts

to the KNWR. Avoiding one Section 4(f) resource by using another is not a Section 4(f) avoidance alternative. See also discussion of the Sqilantnu District in Section 4.4.3.

Measures to Minimize Harm—Alignment Options

Minimizing harm through alignment changes could mean routing the alignment above or near the 1,000-foot elevation contour line (a) at the northern edge of the archaeological district or (b) at the southern edge of the district, or (c) rerouting the highway on a completely different alignment outside the project area. A theoretical option (d) would snake any of the alternatives around individual archaeological sites that contribute to the Sqilantnu District, potentially minimizing harm to the district overall by reducing impacts to important features of the district. See Map 4-1 for reference.

Option (a), routing north, is not considered reasonable because of impacts (iii) to other Section 4(f) properties and avalanche risk. Routing north would impact the Resurrection Pass Trail and KNWR (including Federal Wilderness), both 4(f) resources. An Avalanche Hazard Evaluation for this project (Fesler 2001) indicated avalanche hazard on slopes in the Bean Creek area, which noted approximately 26 avalanche paths that terminate near elevation 900 feet near Bean Creek. Other steep slopes occur above the Sqilantnu District between MP 54 and 58, with a break in cliffs and steep slopes only at Fuller Creek. Avalanches are likely in this area as well. A road on such slopes would be difficult to build and at such elevations would be subject to long winter driving conditions and a long snow-clearing season. From a 4(f) perspective, 4.5 miles of right-of-way 300 feet wide through KNWR would amount to at least 164 acres of impact. Also, this land is designated Wilderness, and the alignment would isolate a large island of land between the old and new highways that could no longer be considered Wilderness. For all these reasons, the alignment is not considered reasonable as a minimization alternative. The cost (ii) of construction and maintenance would be higher than the Cooper Creek Alternative as proposed, but impacts alone were determined to make this routing not reasonable, and specific costs were not calculated.

Option (b), routing south, is considered not to be reasonable as a measure to minimize harm because of cost (ii) and impacts (iii). The portion of the Sqilantnu District that extends farthest to the south is in the Russian River Valley; to avoid this portion, the alignment would have to extend 1.5 miles to 2 miles up the Russian River Valley beyond the district boundary to also avoid Lower Russian Lake Recreation Area (a Section 4(f) property) and lower Russian Lake. Such an alignment still would use land from Stetson Creek Trail, Russian Lakes Trail, and KNWR—all Section 4(f) properties—and would use federally designated Wilderness lands south of the Kenai River in the KNWR. The Russian River in this crossing area is managed by USFS as a Wild and Scenic River, although it is not formally designated as such by Congress, and a highway crossing would not be considered compatible.

A routing south of the district also would be subject to avalanche on steep slopes. This hazard was indicated in the bench area east and west of Cooper Creek in an Avalanche Hazard Evaluation for this project (Fesler 2001). The report noted “approximately a dozen steep, snow-filled gullies and bowls that produce sizeable avalanches relatively frequently….Two of these paths reach the current 115 kv powerline right-of-way.” The report recommended that any alignment in this area specifically occur below the 1,000-foot elevation contour, which would place it within the Sqilantnu District. In the Russian River Valley, such an alignment necessarily would cross avalanche paths that are known to impact the Russian Lakes Trail in the valley

bottom, substantially lower than 1,000 feet, and would traverse likely avalanche-prone slopes west of Lower Russian Lake. A road on steep slopes would be difficult to build, and for a sustained distance at such elevations would be subject to long winter driving conditions and a long snow-clearing season.

Avoiding the district to the south would require a very long bridge across Kenai Lake—KRSMA, resulting in a use of a Section 4(f) resource. The bridge likely would be located at the eastern terminus of the project near MP 45 (Quartz Creek). In that area, the minimum crossing length would be about 1,800 feet. The longest bridge otherwise proposed is the Juneau Creek Bridge under the two Juneau Creek alternatives, at 1,200 feet. A bridge in the Quartz Creek area would be at least 50 percent longer and, at a similar cost per square foot, would be expected to be approximately 50 percent more costly than the proposed crossing.

From a Section 4(f) perspective, an alignment south of the district would impact (iii) land from KRSMA/Kenai Lake, Stetson Creek Trail, Russian Lakes Trail, and nearly 4.5 miles of KNWR land (164 acres). Also, at least 3.5 miles of the alignment would be within designated Wilderness. A longer route on steep slopes would also cost more to construct and maintain (ii), but impacts alone were sufficient to determine this route not reasonable, and therefore specific costs were not calculated. For all these reasons, an alignment routed south of the Sqilantnu District is not reasonable as a minimization alternative.

Option (c), routing outside the Kenai River Valley would not meet the purpose and need of this project and would impact other 4(f) resources, as discussed under avoidance of all 4(f) resources in Section 4.6.

Option (d), routing around individual archaeological features, theoretically would be possible. Within the Sqilantnu District, relatively small, individual, archaeological historic properties that contribute to the district are quite dense in some areas, particularly at lower elevations, where hundreds of the properties have been documented. In these areas, it is impossible to meet current highway standards for relatively broad curves and for grades less than 6 percent and to route around all of these contributing properties. Routing around most of them is possible. There are two basic ways of minimizing harm—going around as many known archaeological sites as possible, and threading through the known archaeological sites by using the existing alignment as much as possible. The four alternatives presented in this SEIS already represent these approaches. “Going around as many as possible” is represented best by the Juneau Creek Alternative, which would cross 13 of these contributing properties. “Threading through” on the existing alignment is represented best by the Cooper Creek and G South alternatives, which respectively would cross 27 and 25 of these contributing properties. The Juneau Creek Variant Alternative would minimize harm by going around many historic sites on most of its alignment and threading through as many sites as possible on the western end of the alignment (it would cross 22 contributing properties). As noted previously, the western end of the Juneau Creek Variant Alternative was developed to avoid impacts to the KNWR and the Mystery Creek Wilderness. Finally, during consultation (i), officials with jurisdiction indicated that all land within the district boundary was important to the district, not just the documented individual archaeological sites. For this reason, even routing around individual sites does not eliminate impact to this culturally sensitive area.

In summary, the present alternatives illustrate a reasonable mix of approaches to minimizing harm to the Sqilantnu Archaeological District. During final design, small shifts may be possible

to further minimize harm at individual sensitive archaeological historic sites, and all effort will be made to reduce the "footprint" width of the selected alternative where it crosses or is adjacent to an individual archaeological site. Other measures to minimize harm to affected archaeological sites are addressed in the following paragraphs.

Measures to Minimize Harm—Design and Construction

Measures applicable to all build alternatives. Measures to be formalized in a Section 106 agreement among consulting parties would be implemented. The Advisory Council on Historic Preservation will be invited to participate with other consulting parties in formation of the agreement. Consulting parties have agreed that a phased approach to identification of historic properties will be implemented. That is, while the current identification efforts are sufficient for the Draft SEIS, it is intended that more identification efforts may be undertaken once a single, preferred alternative is selected. The agreement document would prescribe additional identification efforts to be implemented for the selected alternative as well as methods for the resolution of adverse effects to historic properties. It would address jurisdictional and compliance responsibilities with the Archeological Resource Protection Act, the Native American Graves Protection Act, and curation requirements related to artifacts, should any be discovered during road construction. The agreement document is expected to be an environmental commitment in the Final EIS and Record of Decision.

It is likely the agreement would provide for financial support for development of a district and TCP management plan under any of the alternatives. It is likely that recovery of some archaeological data and artifacts by trained archaeologists would be undertaken at affected archaeological sites specified in the agreement. To reduce impact potential, it is likely the agreement would specify that areas around contributing historic properties would be marked in the field and on project plans as "sensitive areas," and construction limits would be clearly marked before construction activity began. Provisions in plans and specifications would prohibit contractor activity in sensitive areas. It is likely that trained monitors would be required on site during the earth-moving phases of construction in certain areas. Also, it is likely that the agreement would specify the posting of permanent signs for public interpretation of the district and the TCP, at one or more locations in the project corridor, such as:

- For the Cooper Creek Alternative: The Stetson Creek Trail pullout, Cooper Creek Campground, or Sportsman's Landing
- For the G South Alternative: The trailhead for Bean Creek Trail or Sportsman's Landing
- For the Juneau Creek and Juneau Creek Variant alternatives: The Bean Creek Trail crossing area, the junction of the Bean Creek and Juneau Creek trails, or the proposed new trailhead for Resurrection Pass Trail

Other measures such as steepening side slopes would be accomplished wherever practical, within the bounds of accepted engineering practice, to reduce the footprint impact of the alternative.

Other measures specific to the Cooper Creek and G South alternatives. During construction in the summer use period, access to the K'Beq Footprints Heritage Site interpretive area would be maintained.

Other measures specific to the Juneau Creek Variant Alternative only. Specific measures would be implemented to reduce potential for impacts in the area of known human burials. It is

likely that the Section 106 agreement would specify that the burials area would be more formally delineated, and data recovery of some non-burial features would be likely. It is likely that the agreement would specify marking the area of human burials in the field and in design documents as a "sensitive area," and construction limits would be clearly marked before construction activity in this area. Plans and specifications would stipulate no contractor activity in sensitive areas. It is likely that trained monitors would be required on site during the earth-moving phases of construction near this area.

4.6.10 Confluence Site Traditional Cultural Property

4.6.10.1 All Build Alternatives

Anticipated Use

All build alternatives would use land from the Confluence TCP, as described in Section 4.5.

Avoidance Options

Because the affected portion of the Confluence TCP occurs within the larger Sqilantnu Archaeological District and partly within the larger Kenai National Wildlife Refuge, any attempt to avoid this resource would result in Section 4(f) impacts to the Sqilantnu District and Refuge. See Section 4.4.3. However, it may be possible to minimize harm to the TCP through design changes, as described below.

Measures to Minimize Harm—Alignment Options

> **Summary:** For the Confluence TCP, and for all build alternatives, options of routing around the TCP are not considered to be reasonable ways to minimize harm. Therefore, no alignment shift is proposed as a minimization measure.

Minimizing harm to the Confluence TCP through design changes could mean (a) routing to the north of the TCP, or (b) routing to the south. See Map 4-1 and Map 4-12 for reference.

Option (a) is not considered reasonable as a measure to minimize harm primarily because of impact (iii) to other Section 4 (f) properties. This option would route any alternative north of the TCP and would necessitate going through KNWR for about 1 mile, using a minimum of about 36 acres of KNWR land. This option also would isolate a portion of Mystery Creek Wilderness land that likely may no longer qualify as federal Wilderness (typical minimum is 5,000 acres).

Option (b), routing to the south of the TCP, is not considered reasonable as a measure to minimize harm primarily because of impact (iii) to other Section 4 (f) properties. This option would route any alternative through the KNWR for 4.6 miles (using about 167 acres) and would require a new long bridge over the Russian River. It is theoretically possible that this option could avoid the Andrew Simons Wilderness unit that lies south of the Kenai River, but careful engineering would be required to ensure a bridge over the Kenai River, a bridge approach in a narrow area between the river and the Wilderness boundary, and tie-in to the existing Sterling Highway in the MP 55.5–55.7 area would be feasible. Otherwise, this option would use a small corner of Wilderness. An alignment south of the TCP also would impact the Russian River Campground, Russian River Trail, and Russian River Angler's Trail—all Section 4(f) properties. Also, the large bridges over the Russian and Kenai Rivers would be expected to increase costs (ii), but impacts alone were sufficient to determine this option was not reasonable as a measure to minimize harm, and specific costs were not calculated.

Under either scenario (a) or (b), the alignments would use a larger amount of the KNWR and as much or more acreage from the Sqilantnu District as any of the build alternatives. In addition, the Kenaitze Indian Tribe has indicated that all existing uses and features of the TCP, not just Kenaitze uses, are part of the access to and use of the area for cultural exchange. The existing highway and sport fishing are features and activities of the area that are included as part of the TCP. While changes to the highway through the TCP would have an adverse effect on the TCP, the effects are in the context of an acknowledged continual series of changes to the area. Routing around the TCP to the north would minimize harm to the TCP but would increase harm to KNWR. Routing around the TCP to the south would minimize harm to the TCP but would substantially increase harm to the Sqilantnu District (because more contributing archaeological properties would be impacted) and to the KNWR. Based on consultation (i) with the Kenaitze Indian Tribe, CIRI, and SHPO (officials with jurisdiction) about the importance of the TCP, its features, and its boundaries, and based on the balance of impacts and benefits, neither of these options is considered a reasonable way to minimize harm to the Sqilantnu District.

Measures to Minimize Harm—Design and Construction

The Confluence TCP is a sub-set of the greater Sqilantnu Archaeological District. Similarly, the measures to minimize harm to the TCP are the same as those discussed conceptually above in Section 4.6.9 for the Sqilantnu district, but focused more tightly on the TCP area. All alternatives would affect the TCP. The agreement that is being developed with the consulting parties is likely to be similar among the alternatives and address the same issues addressed in Section 4.6.10.

4.6.11 Charles G. Hubbard Mining Claims Historic District

4.6.11.1 Cooper Creek and G South Alternatives

Anticipated Use

The Charles G. Hubbard Mining Claims Historic District largely follows the Kenai River from about MP 51 to MP 54.5, in the same area that the Cooper Creek and G South alternatives would follow the existing Sterling Highway alignment along the river. Widening the highway and improving curves would expand the highway into portions of the historic district, as described in Section 4.5.

Differences between the alternatives: See Map 4-1. The Cooper Creek and G South alternatives share the same alignment through the historic district, except within the last few dozen feet at the eastern end of the district. The issues associated with realignment to minimize harm to the district are identical, so the alternatives are discussed together.

Avoidance Options

Because the affected portion of the Hubbard Claims Historic District occurs within the USFS Kenai River Recreation Area and larger Sqilantnu Archaeological District, any attempt to avoid this resource would result in Section 4(f) impacts to the recreation area and Sqilantnu District. See Section 4.4.3.

Measures to Minimize Harm—Alignment Options

Minimization of harm through design changes could mean routing the highway (a) north or (b) south of the historic district. In addition, minor shifts could result in minimizing harm to individual contributing features (e.g., mining pits and trenches) located within the historic district. The district is not mapped in this document, to help protect potentially sensitive sites.

Summary: For Hubbard Mining Claims Historic District / Cooper Creek and G South alternatives, minimization options (a) and (b) presented here are not considered reasonable. Therefore, no alignment shift is proposed as a minimization measure. Option (c) would entail minor changes in design to minimize the project footprint and will be considered during final design.

Option (a) is not considered to be a reasonable measure to minimize harm because of costs (ii) and impacts (iii). Routing north would mean placing the alignment north of the Kenai River on the extension of the G South Alternative addressed in Section 4.6.1. For the Cooper Creek Alternative, this would mean creating a new crossing (1.7 acres) of the Kenai River/KRSMA, a State park protected under Section 4(f). For both alternatives, it would mean using land from the Resurrection Pass Trail (minimum 10 acres). As indicated in Section 4.8.3, both the KRMSA and the Resurrection Pass Trail are considered generally important 4(f) properties. Option (a) is not considered a reasonable measure to minimize harm to the Hubbard District because of these impacts, coupled with the design issues associated with the G South extension alignment, including large cuts, long retaining walls and/or long road segments on pilings, and the associated costs (ii) and impacts (iii) described above in Section 4.6.1.

Option (b), avoidance to the south, is not considered to be a reasonable measure to minimize harm because of costs (ii) and impacts (iii). This option is represented by the previously studied Russian River Alternative, described in Section 4.6.1.2, which would use land from the USFS Russian River Campground, Russian Lakes Trail, Russian River Anglers' Trail, and Kenai National Wildlife Refuge, all of which are Section 4(f) resources. These and other issues are addressed in more detail in Section 4.6.1.

Option (c), smaller shifts to route around known individual mining features within the district, may be reasonable as a measure to minimize harm. If the Cooper Creek or G South alternative were selected, DOT&PF would examine small design shifts or narrowing of the embankment width at contributing features during final design for potential to further minimize harm.

Measures to Minimize Harm—Design and Construction

The following applies to both the Cooper Creek and G South alternatives. Mitigation measures to be formalized in a Section 106 agreement among consulting parties would be implemented (see Section 4.5.1). It is likely the agreement would contain measures such as recovery of information at the contributing historic properties within this district that would be impacted during construction, or that the site otherwise would be formally documented. It is likely that at one or two locations agreed upon by the SHPO and the USFS, possibly at Cooper Creek Campground or at the trailhead for the Stetson Creek Trail, basic historic interpretive material would be posted about the two historic districts. To reduce impact potential, nearby contributing historic properties likely would be clearly marked before construction activity, and provisions in plans and specifications would prohibit all contractor activity in these sensitive areas.

DOT&PF would incorporate design shifts or narrowing of the embankment width at contributing features during final design wherever practical to further minimize harm.

4.6.12 Kenai Mining and Milling Co. Historic District

4.6.12.1 Cooper Creek Alternative

Anticipated Use

The Cooper Creek Alternative would use land from Kenai Mining and Milling Co. Historic District (KMM District) as described in Section 4.5, including use of some contributing mining features within the district.

Avoidance Options

Because the affected portion of the KMM District occurs within the larger Sqilantnu Archaeological District, any attempt to avoid this resource would result in Section 4(f) impacts to the Sqilantnu District. See Section 4.4.3.

Measures to Minimize Harm—Alignment Options

Minimization of harm to the KMM District through design changes would mean (a) routing the alignment slightly farther to the south and west to route around or minimize impact to the district, or (b) route an alignment north of the district.

> **Summary:** For the KMM District/Cooper Creek Alternative, minimization options (a) and (b) presented here are not considered reasonable. Therefore, no alignment shift is proposed as a minimization measure.

Option (a) is not considered reasonable as measure to minimize harm because of costs (ii) and impacts (iii). The discussion that follows includes multiple components. The concern about soil instability is based on reasonable inference from nearby soils investigations. However, the size of earth cuts, length of bridge, and impacts to other Section 4(f) properties were sufficient to determine this alignment was not reasonable as a measure to minimize harm to the KMM District.

The topography of the Cooper Creek valley is not conducive to moving the Cooper Creek alignment farther upstream. The new bridge over Cooper Creek would be forced into headland on the west side of the creek, requiring very large cuts in material of poor quality (based on well-known soil conditions on the opposite side of Cooper Creek valley). The alignment would require a higher and longer bridge—1,400 feet long versus the proposed 846 feet. Even if the bridge were able to be two lanes wide instead of the proposed three lanes (because of a passing lane on the proposed grade), the bridge would be 65 percent longer, and this would translate to about 33 percent greater costs for the bridge, or approximately $8 million. The realignment would not be able to take advantage of an existing lower terrace on the western side of Cooper Creek.

Rather than fitting the alignment to the topography in this area, the steep slopes in this area would require large cuts and fills. The cuts were calculated at up to 160 feet deep at the highway centerline (the height of a 16-story office building), and, while not calculated, likely would be substantially higher on the uphill side. The cuts would be in soils assumed to be similar to those on the opposite side of Cooper Creek known to include fine-grained soils that could be subject to erosion and slope failure. The DOT&PF soils engineers recommend designing terraces in the large cut that would occur on the east side of the creek to account for these soils; applying similar methods west of the creek would require greater soil removal and a higher cut height. These cuts likely would be visible from the Kenai River and from points across the river, including from Resurrection Pass Trail, a visual impact in part affecting Section 4(f) properties.

The grade would be right at the 6 percent maximum allowed by standards for more than a mile, suggesting that a climbing/passing lane should be added, which would widen the road and therefore further increase the depth of the cuts on the uphill side. The new alignment would cross Stetson Creek Trail farther up the valley. Inserting a trailhead parking area at this point and rebuilding the trail would shorten the trail, widen the footprint of the road-trail-parking, and thus increase the height of the earth cuts still farther. Such an alignment would minimize harm to the historic district and would reduce the acreage of impact to the USFS Kenai River Recreation Area, but the large volume of material to be removed, extra costs associated with the longer bridge and large cuts, and effects to the Stetson Creek Trail combine to render this option not reasonable as a measure to minimize harm to the KMM District.

Option (b), continued use of the existing alignment, is considered not reasonable as a measure to minimize harm because of impacts (iii). Use of the existing alignment east of Cooper Creek is represented by the Kenai River Walls Alternative examined earlier in the alternatives development process. This would require the construction of unusually high walls (180+ feet) in documented poor soils that could be subject to failure, and therefore could not be constructed as a matter of sound engineering judgment. However, at the point the existing right-of-way passes the KMM District, these issues do not occur; at that point it would be possible to avoid the KMM District if the alignment were not constrained to continue east within the existing right-of-way. Therefore, engineers also examined an alignment that would proceed straight east from the KMM District into a large cut and up onto a high bench to rejoin the Cooper Creek Alternative alignment. However, the cut in the hillside would be even larger than the cuts under option (a), with a maximum height of 220 feet. This single cut would require excavation of several million cubic yards of poor quality soils if done without retaining walls or would require walls higher than have been built in the U.S. The walls would be as tall as or taller than those examined for the Kenai River Walls Alternative and indicated by engineers as beyond the norms of standard engineering practice, and not recommended because of potential failure. For these reasons, option (b) is not considered a reasonable measure to minimize harm to the KMM District.

Measures to Minimize Harm—Design and Construction

Mitigation measures to be formalized in a Section 106 agreement among consulting parties would be implemented for the KMM District (see Section 4.5.1). It is likely the agreement would contain measures such as recovery of information at the contributing historic properties within this district that would be impacted during construction, or that the site otherwise would be formally documented. It is likely that at one or two locations agreed upon by the SHPO and the USFS, possibly at Cooper Creek Campground or at the trailhead for the Stetson Creek Trail, basic historic interpretive material would be posted about the historic district. To reduce impact potential, nearby contributing historic properties likely would be clearly marked before construction activity, and provisions in plans and specifications would prohibit all contractor activity in these sensitive areas.

DOT&PF would incorporate design shifts or narrowing of the embankment width at contributing features during final design wherever practical to further minimize harm.

4.7 Coordination Summary

Chapter 5, Comments and Coordination, addresses public and agency coordination and consultation extensively. Many of the general issues in the project area such as wildlife habitat

fragmentation, water quality and fish habitat in the Kenai River, cultural sites impacts, and impacts to public recreation are Section 4(f)-related impacts, so the majority of the consultation addressed in Chapter 5 is relevant to Section 4(f). The following summarizes key points, with emphasis on efforts specific to Section 4(f) properties.

4.7.1 Coordination: General Public

Coordination occurred between 2000 and 2012 with the general public and project stakeholders and is ongoing. This coordination has included residents of Cooper Landing and the project area as well as interested people outside the project area in interviews, five Stakeholder Sounding Board meetings, nine "Listening Post" meetings, and other meetings. Public meetings have been held in Anchorage and Kenai/Soldotna as well as in the project area. Meetings and interviews have included many interested non-governmental organizations. Some among the public and organizations have been highly interested in potential effects to the Kenai River, sport fishing, camping, trails, and other park and recreation issues. These typically are Section 4(f) resources. The public process is expected to continue through a formal comment period and public hearing process on this SEIS, the proposed Section 4(f) *de minimis* impact findings, and the Section 4(f) Evaluation, and other public outreach efforts before publication of the Final EIS, the Final Section 4(f) Evaluation, and the Record of Decision. Section 5.3 discusses public coordination in greater detail.

4.7.2 Coordination: Officials with Jurisdiction

Consultation with officials with jurisdiction began in 2001, during the EIS scoping process. Agency representatives, including land managers of the Borough, the State of Alaska, and the Federal government, were interviewed in 2001 to better understand area issues. An Agency Consultation Committee met six times between 2001 and 2006 and included the Section 4(f) land-managing agencies: DNR/SHPO, the Borough, USFS, ADF&G, USFWS, and several tribal entities, including the Kenaitze Indian Tribe and CIRI, which have been most involved among tribal entities. Concerns of the land-managing agencies addressed refuge, park, recreation area, and cultural resource issues, often without necessarily specifying Section 4(f). Section 5.2.5 includes a summary of agency issues raised at that time.

A separate consultation track following the procedures of Section 106 of the NHPA is ongoing and has included 13 meetings of consulting parties between 2002 and 2013 (see also Sections 3.9.1.4 and 5.4). Some of the consulting parties, such as CIRI, SHPO, USFS, and USFWS, are officials with jurisdiction over historic properties that have Section 4(f) protection. The consultation process has resulted in substantial advances—among which are expansion of the Sqilantnu Archaeological District boundaries and recognition of two previously unrecognized traditional cultural properties.

Meetings specifically focused on Section 4(f) refuge, park, and recreation lands and issues occurred in 2007 and each year 2009–2013, for a total of approximately 15 meetings on these topics (and separate from the 13 NHPA meetings). These mostly were specific to one agency at a time, but some meetings occurred with multiple agencies. Those involved were:

- USFWS/KNWR (KNWR, its wildlife, and its facilities located in the project area): Nov. 28, 2007; April 30, 2009; June 2, 2009; Sept. 27, 2010; Aug. 30, 2012.

- USFS/CNF meetings (recreational trails, recreation areas/campgrounds): April 8, 2009; June 9, 2009; Aug. 19, 2010; Feb. 9, 2011; Sept. 1, 2011; April 10, 2012; Aug. 6, 2012. Important correspondence includes a letter from USFS to DOT&PF (Vaughan 2007) regarding significance and lack of significance of several properties under USFS jurisdiction and a summary of discussions and mitigation (DOT&PF 7/12/2009).
- Alaska DPOR (Kenai River/KRSMA, proposed KRSMA additions, boat launch ramps, Bean Creek Trail): April 9, 2009. Important correspondence includes an exchange of letters regarding significance of DPOR-managed property (Sinclair 2007) and a summary of discussions and mitigation (DOT&PF 7/12/2009).
- ADF&G, Sport Fish Division (boat launch ramps): April 30, 2009. Correspondence includes a summary of discussions and mitigation (DOT&PF 7/12/2009). Note also the ADF&G Habitat Division has participated extensively in wildlife meetings, which have been related to the wildlife/KNWR and KRSMA resources.
- The Borough (trails, KRSMA, Borough lands): Nov. 30, 2012.

DOT&PF and FHWA consulted with managing entities to develop an understanding of the location and boundaries of Section 4(f) properties, to understand the management direction governing those properties and the significance of the properties, and to discuss potential avoidance and measures to minimize harm to Section 4(f) resources. See also Factor (vi) in Section 4.8.1, below.

Coordination revealed that DOT&PF and FHWA had not overlooked any Section 4(f) properties or misunderstood the general significance of the project area's wildlife refuge, park, or recreation areas. DOT&PF and FHWA have accepted the opinions of the officials with jurisdiction regarding significance and impacts and have reflected these discussions in the description of impacts in this Section 4(f) Evaluation. DOT&PF's and FHWA's understanding of the severity of impacts and the proposed determinations of *de minimis* impact also reflect agency input, and any instance of potential *de minimis* impact reflects the opinions of the managing agency. Mitigation proposals presented in this Section 4(f) Evaluation typically are the result of discussion with the officials with jurisdiction. Mitigation proposals sometimes were proposed by DOT&PF and FHWA and sometimes proposed by the officials with jurisdiction, but all have been discussed with the officials. DOT&PF and FHWA have confidence that the mitigation measures to minimize harm to Section 4(f) properties are considered acceptable and reasonable by the land managers as measures to minimize harm.

Two issues related in part to mitigation of Section 4(f) impacts are known to require further coordination before mitigation will be decided: (1) impacts to wildlife movement across the highway corridor, and (2) impacts to cultural resources. The mitigation measures that might facilitate animal movement and might compensate for loss of cultural information will be topics of ongoing discussion. A wildlife movement study, now underway, will generate data that can be used to move the discussion forward. The consultation process under the NHPA is proceeding, with the next phase focused on development of an agreement regarding mitigation measures. DOT&PF and FHWA are committed to ongoing coordination on these topics.

As indicated above, coordination is addressed in greater detail in Chapter 5.

4.8 Preliminary Least Overall Harm Analysis

If project analysis concludes that there is no feasible and prudent alternative that would avoid Section 4(f) properties entirely, FHWA may approve only the alternative that causes the least overall harm in light of the Section 4(f) statute's preservation purpose[11] [23 CFR 774.3(c)].

The preceding sections of this Section 4(f) Evaluation, particularly Section 4.4, described efforts undertaken to identify feasible and prudent avoidance alternatives. Based on the information, analysis, and consultation conducted to date, no alternative that avoids all Section 4(f) properties has been identified. Therefore, this section of the Section 4(f) Evaluation presents information for consideration in identifying which alternative may cause the least overall harm.

Process used in this Section 4(f) Evaluation

The process outline, with the current step in bold, is as follows:

1. Identify Section 4(f) properties.
2. Evaluate whether any impact is likely to be a *de minimis* impact.
3. Identify any alternatives that would avoid all Section 4(f) properties.
4. Present the impacts of proposed alternatives on Section 4(f) properties.
5. Identify alignment shifts that could avoid individual Section 4(f) properties or minimize harm to individual properties, and identify other measures to minimize harm.
6. **Evaluate least overall harm (preliminary evaluation).**

4.8.1 The Seven Factors of Analysis

FHWA regulations [23 CFR 774.3(c)] state that:

> The least overall harm is determined by balancing the following factors:
>
> (i) The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);
>
> (ii) The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
>
> (iii) The relative significance of each Section 4(f) property;
>
> (iv) The views of the official(s) with jurisdiction over each Section 4(f) property;
>
> (v) The degree to which each alternative meets the purpose and need for the project;
>
> (vi) After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
>
> (vii) Substantial differences in costs among the alternatives.

The following sections provide background on each factor and summarize these issues for each alterative in turn. Much of the material in this section summarizes material that is presented in more detail earlier in this Section 4(f) Evaluation chapter. This analysis incorporates all previous sections, which are included in FHWA's analysis. Related factors are discussed together.

[11] Preservation purpose: "It is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites" (49 USC 303[a]).

This Least Overall Harm Analysis is preliminary; the FHWA will identify the alternative that results in the least overall harm only following an opportunity for public and agency comment on this Draft Section 4(f) Evaluation. The FHWA will document the decision in the Final Section 4(f) Evaluation. By that time, it is likely that mitigation measures will be more refined as a result of continuing coordination. Not all Section 4(f) properties in the project area are included in the Least Overall Harm Analysis. Only those for which there would be a use by one or more of the build alternatives are included.

The analysis in the following pages incorporates the results of the *de minimis* impact analysis in Section 4.3, assumes the implementation of the minimization and mitigation measures discussed in Section 4.6 (including assumptions about the Section 106 agreement among consulting parties that will specify mitigation measures for historic properties), and incorporates the results of the agency consultation to date, as indicated in Section 4.1 and Chapter 5.

Table 4.8-1 indicates those Section 4(f) properties included in the discussions that follow—including those for which a *de minimis* impact determination is proposed. Table 4.8-10 through Table 4.8-16, which appear at the end of this section, summarize the principal issues addressed in this Least Overall Harm Analysis.

Table 4.8-1. Section 4(f) use,[a] accounting for *de minimis* impact

Section 4(f) Property	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
KRSMA (Park)	*de minimis*	**Use**	—	—
Kenai National Wildlife Refuge	—	—	**Use**	—
Resurrection Pass National Recreation Trail	—	—	**Use**	**Use**
Bean Creek Trail[b]	—	**Use**	**Use**	**Use**
Stetson Creek Trail[b]	**Use**	—	—	—
USFS Kenai River Recreation Area	*de minimis*	*de minimis*	—	*de minimis*
Juneau Falls Recreation Area	—	—	**Use**	**Use**
Cooper Landing Boat Launch	**Temporary Use**	—	—	—
Sqilantnu Archaeological District (contributing sites protected by 4[f])	**Use** (27 sites)	**Use** (25 sites)	**Use** (13 sites)	**Use** (22 sites)
Confluence Traditional Cultural Property	**Use**	**Use**	**Use**	**Use**
Charles G. Hubbard Mining Claims Historic District	**Use**	**Use**	—	—
Kenai Mining and Milling Co. Historic District	**Use**	—	—	—

[a] "Use" expressed in this table is somewhat separate from "impact" of Section 4(f) property. Properties noted as "*de minimis*" involve use of Section 4(f) property, but the use does not adversely affect the activities, features, and attributes of the Section 4(f) property. Because the impact is so small, this use would not have a determinative affect on the decision to select one alternative over another.

[b] Bean Creek Trail has both historic segments and recreation segments. This table does not distinguish.

— = Not applicable or not affected

Note: Table does not include properties to which Section 4(f) does not apply for any of the alternatives, or for which there has been determined to be no use.

4.8.2 Factors i and ii: Ability to Mitigate Impacts, and Magnitude of Remaining Impact

The ability to mitigate impacts (Factor i) and the magnitude of remaining impact after mitigation (Factor ii) are closely related and are discussed together for each alternative. Section 4.6 presents measures to minimize harm in greater detail than this section. FHWA considers the full suite of mitigation measures proposed for each alternative in its Least Overall Harm Analysis.

4.8.2.1 Cooper Creek Alternative

Table 4.8-2 summarizes impacts to the eight properties affected by the Cooper Creek Alternative, including those with *de minimis* impact. The following paragraphs address the Cooper Creek Alternative in relation to these Section 4(f) properties. Section 4.5.2 provides detail on impacts.

Table 4.8-2. Cooper Creek Alternative use overview

Impacts to Park, Recreation Area, Refuge Properties	
Kenai River Special Management Area	*de minimis*
Stetson Creek Trail [a]	2.5 acres / 4.9% of the total
Cooper Landing Boat Launch and Day Use Area	0.55 acre / 18% of the total area (100% of the boat launch ramp area), but impact would be temporary
USFS Kenai River Recreation Area	*de minimis*
Impacts to Historic Properties[a]	
Sqilantnu Archaeological District	• 27 contributing historic properties buried or excavated • 161 acres / 1.3% of the total
Confluence TCP	29 acres / 2.5% of the total
Kenai Mining and Milling Co. Historic District	• 2 contributing historic properties buried or excavated • 4.0 acres / 14% of the total
Charles G. Hubbard Mining Claims Historic District	• 7 contributing historic properties buried or excavated • 27.4 acres / 6% of the total

[a] Acreage of impact is not a complete indication of impact, but provides a gauge of the extent of involvement of an alternative with a Section 4(f) property. The Sqilantnu Archaeological District and TCP are different than the two historic mining districts: all land within the Sqilantnu District boundary or TCP boundary is protected by Section 4(f). Only the contributing properties in the mining district boundaries are protected by Section 4(f).

KRSMA

Ability to Mitigate Impact. The Cooper Creek Alternative would replace two existing bridges over the Kenai River. DOT&PF and FHWA have the ability to mitigate permanent impacts, as fully explained in Section 4.6.2. Mitigation proposed would ensure minimal permanent in-water impacts (likely fewer piers than older bridges, and no more piers than exist today) and would ensure that the bridge was designed with aesthetics in mind as seen from the KRSMA. Construction impacts could be minimized through careful crafting of a river closure and navigation plan that accommodates boaters to the greatest extent possible, but temporary river closures to drift boats and rafts and temporary disturbance of the river bottom and river banks, causing siltation, are not avoidable.

Magnitude of Remaining Impact. Mitigation would not eliminate the impacts of construction or permanent placement of new, wider bridges. Also, there are a few locations where the right-of-way would expand slightly into the river's edge, and where fill or riprap armoring would be placed along the high water line and be clearly visible to river users. Most of these locations are areas where the existing highway currently is visible. Overall, the permanent effect would be very similar to existing conditions. Based on consultation with the officials with jurisdiction, and the proposed measures to minimize harm (including the avoidance of specific features, mitigation, and/or enhancement), the FHWA believes the use of the property will result in a *de minimis* impact. The FHWA intends to make a *de minimis* impact finding; a preliminary finding appears in Appendix F.

KNWR

As noted in Section 4.5.1, the Cooper Creek Alternative would have no Section 4(f) use of KNWR.

Resurrection Pass Trail

As noted in Section 4.5.1, the Cooper Creek Alternative would have no Section 4(f) use of the Resurrection Pass Trail.

Bean Creek Trail

As noted in Section 4.5.1, the Cooper Creek Alternative would have no Section 4(f) use of the Bean Creek Trail.

Stetson Creek Trail

Ability to Mitigate Impact. The Cooper Creek Alternative would cross the Stetson Creek Trail. Mitigation proposed would establish a new trailhead for the Stetson Creek Trail on the south side of the new highway and would create a short interpretive loop using the historic trail for campground users on the north side of the new highway. The ability to mitigate for trail connectivity and continuity is good. For example, a trail could be placed in a tunnel beneath the new highway. However, the USFS has indicated that doing so would perpetuate an existing management challenge stemming from two trailheads in the campground and conflicts between campground users and motorized trail users. At the request of the USFS, the two would not be physically linked. Interpretive signs explaining the historic significance of the trail would help to offset impacts to the historic trail's alignment and continuity.

Magnitude of Remaining Impact. Based on analysis above in this chapter, the creation of a new interpretive loop trail near the campground and new trailhead for the Stetson Creek Trail at the new highway is likely to create better recreation/access experience for trail users, but the historic trail alignment would be severed permanently. Mitigation in the form of interpretation could make clear to the public (campground users, trail users, and highway travelers stopping at the pullout/trailhead) the history of the trail and the prior connection between the lower portion and upper portion, replacing the physical through-connection of the trail with historic context that is not evident today at all. The specifics of this interpretation would be developed among consulting parties in the Section 106 process as part of a comprehensive agreement regarding mitigation.

USFS Kenai River Recreation Area

Ability to Mitigate Impact. Based on consultation, the primary function of the recreation area is to maintain a public lands buffer to the river for public access from the highway to the river, so the highway is integral to the purpose of the recreation area. The USFS indicated that minor changes to the existing right-of-way through the Kenai River Recreation Area likely would be found compatible and that a *de minimis* impact finding would be warranted (HDR 2007b). This outcome indicates that the USFS recognizes the highway as a long-standing adjacent use and recognizes that the magnitude of impact from construction and operation of the road in this area would be low. However, for the impacts that would occur—principally removal of forest buffer—there would be little ability to mitigate. DOT&PF would offer to return a small portion of existing right-of-way, no longer needed once the highway was straightened, to the USFS to be added to the recreation area. This land could be used to enhance public access or be allowed to regrow as part of the forest buffer.

Magnitude of Remaining Impact. Based on consultation with the officials with jurisdiction, and the proposed measures to minimize harm, the FHWA believes the use of the property will result in a *de minimis* impact. The FHWA intends to make a *de minimis* impact finding; a preliminary finding appears in Appendix F.

Juneau Falls Recreation Area

As noted in Section 4.5.1, above, the Cooper Creek Alternative would not have a Section 4(f) use of Juneau Falls Recreation Area.

Cooper Landing Boat Launch and Day Use Area

Ability to Mitigate Impact. The Cooper Creek Alternative would use the boat launch ramp area for the construction process and would limit public use of this area temporarily. However, the only impacts would be temporary impacts. There would be no permanent impact following construction. Therefore, overall ability to mitigate impact is good. The immediate proximity of the concrete boat launch ramp to the highway embankment means there would be no practical way to keep the boat ramp open at all times during the construction process. Impacts would be much reduced by timing intrusive construction stages outside of popular recreation times, but closures or restrictions on use would be likely during parts of the summer season.

Magnitude of Remaining Impact. Based on the analysis above in this chapter, FHWA believes the temporary use of the boat launch ramp during construction would cause adverse disruptive impacts for a short time but would not result in any permanent impacts.

Historic and Archaeological Districts

Ability to Mitigate Impact. The Cooper Creek Alternative would impact more cultural districts than the other alternatives, using property from the Sqilantnu Archaeological District, the KMM District, and the Charles G. Hubbard Mining Claims Historic District. Types of impact principally would be destruction or burial of sites or features that contribute to the districts. The ability to mitigate impacts is moderate. Mitigation to be proposed is likely to include partial recovery of data using trained specialists, assistance with planning for the archaeological district, and use of interpretive materials to raise public awareness. These efforts would partially mitigate impacts. There is potential for cultural material to remain after data recovery is completed, given that 100 percent recovery is rarely possible and is unlikely to be proposed. Any cultural material remaining after data recovery is generally accepted as lost, so the ability to fully mitigate impacts

is not expected. The types of mitigation listed should, however, substantially raise public awareness of these cultural resources, which are now virtually unknown to the public.

Magnitude of Remaining Impact. Based on the analysis in Section 4.5, in other sections above in this chapter, and in Section 3.9, FHWA believes the impact to historic and archaeological districts after mitigation would be adverse but that public awareness of the resource would be higher than it is today.

Confluence Traditional Cultural Property

Ability to Mitigate Impact. Like all other build alternatives, the Cooper Creek Alternative would impact the Confluence TCP. The type of impact includes changes to the "setting, feeling, and association" of the property. The existing highway is considered part of the TCP, and the Cooper Creek Alternative would follow the existing alignment in this area, widening shoulders and improving curves. Mitigation proposed likely would include assistance with the development of a management plan for archaeological resources in the area, including the TCP, and an effort to interpret the archaeological and cultural importance of the area for the public. These efforts are expected to mostly compensate for the impacts. The ability to mitigate impacts is high.

Magnitude of Remaining Impact. Although the Cooper Creek Alternative would have a larger acreage of impact within the TCP boundaries, the actual effect could be considered less than the two Juneau Creek alternatives because this alternative largely would follow the existing alignment. Based on the analysis above in this chapter and in Section 3.9, Historic and Archaeological Preservation, FHWA believes that the anticipated mitigation would not directly change impact to the setting, feeling, and association but would largely compensate for the impact.

4.8.2.2 G South Alternative

Table 4.8-3 summarizes impacts to the six properties affected by the G South Alternative, including those with *de minimis* impact. The following paragraphs address the G South Alternative in relation to these Section 4(f) properties. Section 4.5.3 provides detail on impacts.

Table 4.8-3. G South Alternative Section 4(f) use overview

Park, Recreation Area, Refuge Properties	
Kenai River Special Management Area	• 2.8 acres / 0.4% • One new bridge over the river
Bean Creek Trail [a]	3.1 acres / 10.0%
USFS Kenai River Recreation Area	*de minimis*
Historic Properties [a]	
Sqilantnu Archaeological District	• 25 contributing historic properties buried or excavated • 166 acres / 1.3%
Confluence Traditional Cultural Property	29 acres / 2.5%
Charles G. Hubbard Mining Claims Historic District	• 4 contributing historic properties buried or excavated • 25.5 acres / 5.8%

[a] Acreage of impact is not a complete indication of impact, but provides a gauge of the extent of involvement of an alternative with a Section 4(f) property. The Sqilantnu Archaeological District and TCP are different than the historic mining district. All land within the Sqilantnu District boundary or TCP boundary is protected by Section 4(f). Only the contributing properties in the mining district boundaries are protected by Section 4(f).

KRSMA

Ability to Mitigate Impact. The G South Alternative would replace the existing Schooner Bend Bridge over the Kenai River (KRSMA) in a location adjacent to the existing bridge. The G South Alternative would add a new bridge over the Kenai River near existing MP 51.2 (see Map 4-2, panel 2). This would add a third bridge to the two existing bridges over the upper Kenai River (project area). The mitigation proposed in Section 4.6.2 would ensure minimal permanent in-water impacts. The replacement bridge likely would have fewer piers than the older bridges, and no more than exist today, but there likely would be an overall increase in piers to support the three bridges instead of two. Mitigation also would ensure the bridges were designed with aesthetics in mind as seen from the KRSMA. The new and replacement bridges would change fish habitat, with piers in different locations and new shading of the river, riverbed, and shoreline (the replacement bridge would be wider than the existing bridge). Also, as an alternative with greater river-side mileage than the two Juneau Creek alternatives, there would be greater risk of hazardous substance spills into the Kenai River. Also, there are a few locations where the right-of-way would expand slightly into the river's edge, and where fill or riprap armoring would be placed along the high water line and would be clearly visible to river users. Most of these are areas where the existing highway is already visible. Overall, the impact of adding a third bridge would be impossible to eliminate and would be a permanent, if small, impact to fish habitat, river hydraulics, river navigation, and noise and visual impacts to river users. Guide services that operate on the river and general public users of the river downstream of Cooper Landing would be unable to avoid the visual impact of a new bridge. It is possible to mitigate impacts to the KRSMA, but the ability to mitigate is limited.

Magnitude of Remaining Impact. While impacts to KRSMA would be greater than those for other alternatives, principally because of the addition of a third bridge over the Kenai River, mitigation measures would ensure the bridges were reasonably attractive and that flooding and other hydraulic risks were minimized. Based on the analysis above in this chapter, FHWA believes the river would continue to function well as a park for recreation, as a visual resource, as a free-flowing river navigable by small craft, and as fish habitat.

Bean Creek Trail

Ability to Mitigate Impact. The G South Alternative would cross the Bean Creek Trail. Mitigation for the Bean Creek Trail would include establishing a formal summer trailhead north of the new highway, and rerouting both the historic and recreational spurs of the trail under the new highway to maintain continuity and connection to neighborhoods. A winter pullout near the new trailhead for Bean Creek also would be constructed. The pullout would be sized to accommodate multiple trucks with snowmobile trailers. Mitigation also would include installation of interpretive signs explaining the trail's historical significance. These measures would retain the trail as a working route, and therefore indicate good ability to mitigate impact to trail connectivity. However, there would be no way to eliminate the impact of the new highway and trail tunnel introducing an engineered structure in what had been a mostly natural (if formerly logged) environment. The historic alignment would be permanently severed at its southern end. The ability to mitigate these impacts is low.

Magnitude of Remaining Impact. Traffic noise levels would be relatively high for a short distance along the rerouted trail, but most trail use likely would start at the new trailhead and move quickly away from the highway. Based on the analysis above in this chapter, FHWA

believes that mitigation will not eliminate or entirely compensate for impacts to the trail but that formalizing the trailhead will resolve long-standing management difficulties on the lower end of the trail. There is potential that these summer and winter parking areas would make this the trailhead of choice for access to the entire Resurrection Pass Trail, which could require increased management for the USFS related to maintenance and operation of the lower parts of the two trails (potentially offset by lower maintenance needs at the current beginning of the Resurrection Pass Trail).

USFS Kenai River Recreation Area

Ability to Mitigate Impact. Based on consultation, the primary function of the recreation area is to maintain a public lands buffer to the Kenai River for public access from the highway to the river, so the highway is integral to the purpose of the recreation area. The USFS indicated that minor changes to the existing right-of-way through the Kenai River Recreation Area likely would be found compatible and that a *de minimis* impact finding would be warranted (HDR 2007b). This outcome indicates that the USFS recognizes the highway as a long-standing adjacent use and recognizes that the magnitude of impact from construction and operation of the road in this area would be low. However, for the impacts that would occur—principally removal of forest buffer—there would be little ability to mitigate. DOT&PF would offer to return a small portion of existing right-of-way, no longer needed once the highway was straightened, to the USFS to be added to the recreation area. This land could be used to enhance public access or be allowed to regrow as part of the forest buffer.

Magnitude of Remaining Impact. Based on consultation with the officials with jurisdiction, and the proposed measures to minimize harm (including the avoidance of specific features, mitigation, and/or enhancement), the FHWA believes the use of the property would result in a *de minimis* impact. The FHWA intends to make a *de minimis* impact finding; a preliminary finding appears in Appendix F.

Historic and Archaeological Districts

Ability to Mitigate Impact. The G South Alternative would impact fewer cultural districts than the Cooper Creek Alternative but more than either of the Juneau Creek alternatives, using property from the Sqilantnu Archaeological District (including impacts to 25 contributing sites) and the Charles G. Hubbard Mining Claims Historic District. The types of impact would be principally destruction or burial of sites. Mitigation to be proposed is likely to include principally the recovery of data using trained specialists, assistance with planning for the archaeological district, and raising public awareness via interpretive materials. These measures indicate partial ability to mitigate impacts. There is always a potential for cultural material to remain after data recovery is completed, given that 100 percent recovery is rarely possible and is unlikely to be proposed. Any cultural material remaining after data recovery is generally accepted as lost, and full mitigation of impacts would not expected. Mitigation should, however, substantially raise public awareness of these cultural resources, which are now virtually unknown to the public.

Magnitude of Remaining Impact. Based on the analysis in Section 4.5, in other sections above in this chapter, and in Section 3.9, FHWA believes the impact to historic and archaeological districts after mitigation would be adverse but that public awareness of the resource would be higher than it is today.

Confluence Traditional Cultural Property

Ability to Mitigate Impact. Like all other alternatives, the G South Alternative would impact the Confluence TCP. The type of impact for this TCP includes changes to the "setting, feeling, and association" of the property. The existing highway is considered part of the Confluence TCP, and the G South Alternative would follow the existing alignment through this area, widening shoulders and improving curves. Mitigation proposed likely would include assistance with the development of a management plan for archaeological resources in the area, including the TCP, and an effort to interpret the archaeological and cultural importance of the area for the public. These efforts are expected to mostly compensate for the impacts. The ability to mitigate impacts is high.

Magnitude of Remaining Impact. Although the G South Alternative would have a larger acreage of impact within the TCP boundaries than the Juneau Creek alternatives, the actual effect could be considered less than from the Juneau Creek alternatives because the G South Alternative largely would follow the existing alignment. Based on the analysis above in this chapter and analysis reflected in Section 3.9, Historic and Archaeological Preservation, FHWA believes that the anticipated mitigation would not directly change impacts to the setting, feeling, and association but largely would compensate for them.

4.8.2.3 Juneau Creek and Juneau Creek Variant Alternatives

Table 4.8-4 and Table 4.8-5, respectively, summarize impacts to the six properties affected by the Juneau Creek and Juneau Creek Variant alternatives, including those properties for which there is expected to be a *de minimis* impact. The paragraphs following the tables address the Juneau Creek alternatives in relation to these Section 4(f) properties. Section 4.5.3 provides detail on impacts.

Table 4.8-4. Juneau Creek Alternative use overview

Park, Recreation Area, Refuge Properties	
Kenai National Wildlife Refuge	33.4 acres/0.001%
Resurrection Pass Trail	7.4 acres/0.2%
Bean Creek Trail [a]	1.1 acres/3.55%
Juneau Falls Recreation Area	17.1 acres/5.3%
Historic Properties [a]	
Sqilantnu Archaeological District	• 13 contributing historic properties buried or excavated • 180 acres/1.4%
Confluence Traditional Cultural Property	• 14.7 acres/1.2%

[a] Acreage of impact is not a complete indication of impact, but provides a gauge of the extent of involvement of an alternative with a Section 4(f) property.

Table 4.8-5. Juneau Creek Variant Alternative use overview

Park, Recreation Area, Refuge Properties	
Resurrection Pass Trail	7.4 acres/0.2%
Bean Creek Trail [a]	1.1 acres/3.55%
USFS Kenai River Recreation Area	*de minimis*
Juneau Falls Recreation Area	17.1 acres/5.3%
Historic Properties [a]	
Sqilantnu Archaeological District	• 22 contributing historic properties buried or excavated • 167 acres/1.3%
Confluence Traditional Cultural Property	• 19.7 acres/1.7%

[a] Acreage of impact is not a complete indication of impact, but provides a gauge of the extent of involvement of an alternative with a Section 4(f) property.

KNWR

Ability to Mitigate Impacts. The Juneau Creek Variant Alternative would have no Section 4(f) use of the KNWR. The Juneau Creek Alternative would use KNWR land outside the existing highway right-of-way near the eastern refuge boundary, largely in an area designated as Federal Wilderness. The impacts would be the loss of forested hillside habitat and the loss of designated Wilderness. The Juneau Creek Variant Alternative was created to avoid the KNWR and associated Wilderness.

The land area or percentage of KNWR that the Juneau Creek Alternative would affect is small compared to the millions of acres in the KNWR. The acreage of designated Wilderness that would be used within the KNWR is also relatively small compared to the overall acreage of designated Wilderness within the KNWR, yet the impact of crossing Wilderness with a road is large because it is a Congressionally designated area with special protections and is likely to be of concern to Wilderness proponents nationwide. Based on the analysis above in this chapter, FHWA believes that its ability to mitigate land use and land management impacts to the KNWR is low.

In addition, there is the potential that wildlife movement in and out of KNWR would be affected under the Juneau Creek Alternative, because the alignment would cross the length of the topographic bench areas on both sides of Juneau Creek, an area that is thought to be important habitat and a movement area for both moose and bears. These impacts[12] would occur mostly outside KNWR but would affect wildlife that moves across the KNWR boundary. The ongoing study of wildlife movement and potential crossing sites also would aid in the placement of wildlife undercrossings or overcrossings of the highway and other methods of protecting wildlife and wildlife movement. Such techniques would help to retain movement in and out of KNWR and help to reduce risk of vehicle-wildlife collisions. FHWA and DOT&PF are optimistic that

[12] The Juneau Creek Variant Alternative would have almost the same effects on wildlife movement in and out of the KNWR, and the G South Alternative would have similar but lesser impacts, also affecting movement to and from lower Juneau Creek. The Cooper Creek Alternative also would impact wildlife movement, but in a different area with less importance for wildlife movement (based on consultation with agencies). However, none of these alternatives would have a Section 4(f) use of property from the KNWR, so the wildlife movement impacts under these alternatives are discussed in Chapter 3.22.

implementing the mitigation opportunities identified by the wildlife study and coordinated with the resource agencies would minimize impacts to wildlife movement.

Magnitude of Remaining Impact. Assuming the land retains its current status as KNWR and designated Wilderness, the magnitude of remaining impact from the Juneau Creek Alternative would be substantial. This alternative would conflict with the purpose of Wilderness designated by Congress and would be inconsistent with the land management plans for KNWR. The acreage and percentage of land affected would be modest, but the symbolic value of the land impacted would be large, because Wilderness embodies large ideals such as preserving ecosystems for their own sake, providing for spiritual renewal, and preserving natural beauty. It is possible that CIRI and the USFWS would agree on a land exchange (provided for under the Russian River Lands Act) that would remove the refuge status and Wilderness designation in this area before project construction. In either case, land management changes would need to be incorporated in USFWS plans (e.g., plan amendments) and would be a management impact to the agency, requiring staff time and cost outside those currently anticipated.

Mitigation measures such as the potential dedicated wildlife crossings of the highway would reduce impacts to wildlife movement in and out of the KNWR, but increased levels of habitat fragmentation, habitat loss, and animal mortality from vehicle-animal collisions would remain for the Juneau Creek Alternative at a higher level than exists today—impacts that are unlikely to be fully mitigated.

Resurrection Pass Trail

Ability to Mitigate Impact. The Juneau Creek and Juneau Creek Variant alternatives would affect the Resurrection Pass Trail identically. The alignment would cross the Resurrection Pass Trail overhead, and a new trailhead would be constructed near this crossing. The use pattern of the trail would change substantially. Mitigation incorporated into the alternatives includes the proposed passage of the Resurrection Pass Trail under the new highway bridge, which would keep the trail from being segmented for users who want to use the existing trailhead or experience the full length of the trail. The new trailhead would provide off-highway parking to minimize safety concerns related to users walking and parking along the new highway. Addressing bridge aesthetics would mitigate for the visual intrusion of the structure on the landscape. Proposed mitigation to add pedestrian walkways for crossing the Snow River bridges on the long-distance Iditarod National Historic Trail would compensate for some of the loss of the long-distance Resurrection Pass Trail experience. These measures indicate substantial ability to mitigate impacts. However, it would not be possible to fully mitigate all impacts, as there would be no way to eliminate the new highway and bridge as engineered structures crossing the trail 3.4 miles from the existing trailhead, in what had been a natural, backcountry environment, substantially changing the southern portion of the full 38-mile trail experience.

Magnitude of Remaining Impact. Based on the analysis above in this chapter, FHWA believes that mitigation measures would make the new highway and the trail mesh well in a new configuration but that impacts to the existing character of the trail could not be eliminated or substantially reduced. See also the related discussion below under Juneau Falls Recreation Area, indicating the enhancements to the recreation area near the location where the highway would cross the trail.

Bean Creek Trail

Ability to Mitigate Impact. The Juneau Creek and Juneau Creek Variant alternatives would cross the Bean Creek Trail. Mitigation would include rerouting a substantial section of the trail off of its historic route to pass under the eastern end of the proposed Juneau Creek highway bridge (avoiding an at-grade crossing of the new highway), and interpreting trail history for the public. These measures would retain the trail as a highly functional working route.

Magnitude of Remaining Impact. There would be no way to eliminate the impact of the new highway and bridge introducing an engineered structure in what had been a natural environment. With the severing of the historic alignment and rerouting of the trail, the bypassed segment of the historic alignment likely would fall into disuse and might be lost over time as an identifiable trail. Based on the analysis in earlier sections of this chapter, FHWA believes the main mitigation proposed—trail rerouting—would retain the trail's recreational function but that remaining aesthetic impact and impact to the historic route could not be well mitigated.

USFS Kenai River Recreation Area

Ability to Mitigate Impact. No impact to the Kenai River Recreation Area would occur under the Juneau Creek Alternative. The Juneau Creek Variant Alternative would use a small corner of the recreation area, at its western end. The type of effect would be similar to effects from the Cooper Creek and G South alternatives—removal of forest buffer—but the amount would be substantially less. Mitigation of the visual impact of the new highway from the existing highway would occur, and would focus on making the new highway as attractive as possible within the recreation area. Such measures might include revegetation, landscaping, and attractive treatments of any retaining walls. These measures indicate substantial ability to mitigate impacts to the recreation area but would not eliminate all impact.

Magnitude of Remaining Impact. Based on consultation with the officials with jurisdiction, and the proposed measures to minimize harm, the FHWA believes the magnitude of impact remaining to the recreation area after mitigation would be a *de minimis* impact. A preliminary finding appears in Appendix F.

Juneau Falls Recreation Area

Ability to Mitigate Impact. The Juneau Creek and Juneau Creek Variant alternatives would affect the Juneau Falls Recreation Area identically. The impacts and measures to minimize harm overlap heavily with those discussed above for the Resurrection Pass Trail, because the trail passes through the recreation area. The highway alignment would cross the southern portion of the recreation area and bridge the canyon that is the central geographic feature of the area. The use pattern of the trail/recreation area/falls/backcountry campsites is expected to change substantially. Extensive mitigation is proposed. Besides the new trailhead, a walkway would be included on the bridge, with trails on each end that would connect respectively to the Resurrection Pass Trail and the Bean Creek Trail. This walkway would allow for safe pedestrian crossings of the highway and safe passage on the bridge, with access to broad views of the Kenai River Valley. These connections would create a loop trail around the falls. These measures would substantially mitigate impacts. The recreation area would function differently than it does today, but would serve an important recreation function within CNF—as a highway-related recreation area instead of a backcountry recreation area.

Magnitude of Remaining Impact. Based on the analysis in earlier sections of this chapter, FHWA believes the magnitude of remaining impact to the recreation area as a whole would be moderate, because there would be a mix of change to the existing recreational environment and development of new recreational opportunity. FHWA believes the mitigation measures proposed would substantially enhance the value of the recreation area in its new form.

Cooper Landing Boat Launch and Day Use Area

As noted in Section 4.5.1, above, the Juneau Creek and Juneau Creek Variant alternatives would have no Section 4(f) use of the Cooper Landing Boat Launch and Day Use Area.

Historic and Archaeological Districts

Ability to Mitigate Impact. The Juneau Creek and Juneau Creek Variant alternatives would cross the Sqilantnu Archaeological District but would not affect any other historic district. The type of impact would be principally destruction of, respectively, 13 and 22 contributing archaeological sites or features. Although there are human burials within an area affected by the Juneau Creek Variant Alternative, no graves would be disturbed. Mitigation to be proposed is likely to include principally the recovery of data using trained specialists, assistance with development of a management plan for the archaeological district, and raising public awareness via interpretive materials. There is always a potential for cultural material to remain after data recovery is completed, given that 100 percent recovery is rarely possible and is unlikely to be planned. Any cultural material remaining after data recovery is generally accepted as lost, so the ability to fully mitigate impacts is not expected. Mitigation should, however, substantially raise public awareness of these cultural resources, which are now virtually unknown to the public.

Magnitude of Remaining Impact. Based on the analysis in Section 4.5, in other sections above in this chapter, and in Section 3.9, FHWA believes the impact to historic and archaeological districts after mitigation would be adverse but that public awareness of the resource would be higher than it is today.

Confluence Traditional Cultural Property

Ability to Mitigate Impact. Like all other alternatives, the two Juneau Creek alternatives would impact the Confluence TCP. These two alternatives would pass through the northern edge of the TCP on slightly different alignments in an area not currently affected by development. The type of impact for this TCP includes changes to the "setting, feeling, and association" of the property. Mitigation proposed likely would include assistance with the development of a management plan for archaeological resources in the area, including the TCP, and an effort to interpret the archaeological and cultural importance of the area for the public.

Magnitude of Remaining Impact. Based on the analysis above in this chapter and analysis reflected in Section 3.9, FHWA believes that the anticipated mitigation would not directly change impacts to the setting, feeling, and association but would largely compensate for them.

4.8.3 Factor iii: Relative Significance of Each 4(f) Property

The "relative significance" of Section 4(f) properties refers to a comparison of different Section 4(f) properties to each other (see Table 4.8-6 and Table 4.8-7). The comparison presented is a DOT&PF and FHWA judgment based on consideration of the apparent importance of a property depending upon how it was established, consideration of management plans, consultation with the officials managing the properties, and research about the project area.

Table 4.8-6 presents three ways of considering relative significance. Table 4.8-7 indicates a more subjective final grouping based on the considerations in Table 4.8-6 and other considerations described below.

Table 4.8-6. Use and recognition of 4(f) properties affected by alternatives

Property	(1) Annual use	(2) Protection/ Recognition	(3) Agency indictors of significance
KRSMA (Park)	25,000 boaters and 51,000 angler days (upper river)	Established by State law	Comprehensive Plan MOU is signed by USFS, USFWS, State, and Borough
KNWR	300,000 or more across the entire refuge; fewer in project area. A substantial portion of the boaters and angler days reported above use KNWR in the project area.	Established by Federal law (ANILCA)	Considerable concern expressed by USFWS during this project. Concern for wildlife that enters and leaves KNWR expressed also by ADF&G and USFS.
Resurrection Pass National Recreation Trail	4,000–5,000	Established by nomination/Federal decision under National Trails System, + protected under ANILCA	USFS stated for this project that it considers the trail to be the "crown jewel" of CNF trail system.
Bean Creek Trail[a]	<4,000 [b]	Protected by State and Federal decision under federal law (NHPA 106), + in USFS mgmt plan	USFS, State, Borough cooperate for lower trail. Low maintenance and no user tracking; SHPO general interest.
Stetson Creek Trail[a]	<4,000 [b]	Protected by State and Federal decision under Federal law (NHPA 106), + in USFS mgmt plan	USFS during this project indicate this trail less important than its other trails. Low maintenance and no user tracking. SHPO general interest.
USFS Kenai River Recreation Area	Well used by people focused on the river and viewed by drivers on highway, but not known as a formal recreation area.	Designated by Federal Agency by Public Land Order to prevent other uses	Concern expressed by USFS for this project.
Juneau Falls Recreation Area	<4,000 [b] Known for waterfall; not known as a formal recreation area.	Designated by Federal Agency by Public Land Order to prevent other uses	Considered more important/sensitive by USFS than Kenai River Recreation Area.

Property	(1) Annual use	(2) Protection/ Recognition	(3) Agency indictors of significance
Cooper Landing Boat Launch and Day Use Area	+/-200,000	Established by State under Federal fishing access law	Concern expressed by State for this project.
Sqilantnu Archaeological District	<4,000 [b]	Protected by State and Federal decision under Federal law (NHPA 106), + recognized in Federal law (Russian River Land Act)	Considered important by Tribes, CIRI, USFS, and USFWS, which have signed an MOU, and by SHPO.
Confluence TCP	Conscious use of TCP: <4,000 [b] However, much of the KRSMA use (above) is part of the cultural exchange the TCP recognizes.[c]	Protected by State and Federal decision under Federal law (NHPA 106), + recognized in Federal law (Russian River Land Act)	Considered important by SHPO, Kenaitze Tribe, CIRI, USFWS, and USFS, which have signed a Russian River Lands Act MOU, and by SHPO.
Charles G. Hubbard Mining Claims Historic District	<4,000 [b]	Protected by State and Federal decision under Federal law (NHPA 106)	SHPO/USFS expressed general interest during this project. Much less concern than Sqilantnu District.
Kenai Mining and Milling Co. Historic District	<4,000 [b]	Protected by State and Federal decision under Federal law (NHPA 106)	SHPO/USFS expressed general interest during this project. Much less concern than Sqilantnu District.

Note: The public use numbers cannot be completely separated. For example, people who put in a raft at Cooper Landing Boat Launch and take out at Jim's Landing may be counted for the Cooper Landing Boat Launch, KRSMA, and KNWR, and could be counted on trails on the same day.

[a] Bean Creek Trail has both historic segments and recreation segments, and Stetson Creek Trail throughout has both recreation and historic values. This table does not distinguish between the two.

[b] For many properties, there are no counts or estimates of use, but officials with jurisdiction indicate use is relatively low. This table uses "< 4,000" to indicate lower use than the Resurrection Pass Trail—the property with the lowest counts in the project area.

[c] The TCP was formed in part because of its ongoing function as a gathering place for cultural exchange among all people, centered around the river confluence and fishing. Thousands of people pass through the TCP on the highway and thousands stop for fishing, viewing, hiking the banks, etc., but the vast majority is unlikely to be aware that they are in a culturally rich area in which similar activities have been occurring for hundreds or thousands of years.

In general, referring to Table 4.8-6, indication of greater relative significance would be properties that have public use above 50,000[13] (column 1), protection under Federal law (named

[13] 50,000 is not an absolute number indicating significance. It is a round figure evident in the table as a break point. Some properties have use levels in the 4,000-5,000 range, and some have 10 times as much use. The higher levels of use are one measure of greater significance.

in law; column 2), and/or an expression of strong concern by the managing agency or engagement and interest by multiple agencies (column 3).

Indications of moderate significance would be properties with public use important enough to be counted but counted at under 50,000, protection under State law (named in the law), and/or expression of concern by the managing agency but not of highest concern.

Indications of lower relative significance would be properties with public use quite low or not important enough to agencies to track and record, protection enabled principally by administrative decisions, and/or relatively little expression of concern by the managing agency.

Generally, the KRSMA, Resurrection Pass Trail, and KNWR appear to be the most used Section 4(f) properties among the public, with the Sqilantnu Archaeological District and TCP similarly important for their prominence among Tribes and involved agencies.

On one hand, the Kenai River often is most prominent, because it is well known and frequently discussed in the media. This reflects the Kenai River's value not only for direct recreation (e.g., fishing and boating) but also for its protection of habitat for salmon, which are important as prey species for wildlife, and for Cook Inlet commercial fishing, sport fishing in the inlet, and tourism, affecting not only the Borough economy but the statewide economy (see also the background information in Section 4.2.2). In addition, KNWR and the USFS have signed a memorandum of agreement regarding the State's *Kenai River Comprehensive Management Plan*, indicating the river's significance to all area land-managing agencies. Note that it is the river that is prominent among the public, not its status as a legislatively designated "special management area" or as a unit of the State park system. Most people probably do not think of it as a State park even if they are among the thousands who float it or fish it often and help make it prominent.

On the other hand, the Sqilantnu District and Confluence TCP also have national significance, and the interpretive sites are important to the public. The district and TCP are of particular importance to the Kenaitze Tribe, the SHPO, and CIRI (which expended great effort to secure the "archaeological estate" in the Russian River Ferry area as part of its land claims under ANCSA). While the archaeological sites, the district as a whole, and the TCP are not known to the general public, the TCP incorporates both the Kenai and Russian rivers and is significant not only for its archaeology and landmarks of Alaska Native culture but for its ongoing cultural exchange among many cultures. This specifically includes the dominant culture that sees the river as a sport fishing attraction and that creates media attention for the rivers. In this way, the TCP could be thought of as combining the significance of KRSMA and of the Sqilantnu District.

Meanwhile, the Resurrection Pass Trail is designated as a National Recreation Trail, is known nationally, and is among the most-used long-distance hiking trails in the state. The USFS, as manager of the trail, indicated it as the "crown jewel" of the CNF trail system and expressed strong concern over impacts to the trail.

In addition to these Section 4(f) properties, KNWR is vast, nationally important, and the most visited of the Federal refuges in Alaska. In the project area, a key KNWR attribute is the sport fishing activity that centers on the confluence of the Kenai and Russian rivers and KNWR's Russian River Ferry. Other important KNWR features and attributes are the wildlife that moves in and out of the refuge and across the highway within the refuge, Wilderness recreation opportunities, and the visitor contact station that is the first contact point for travelers coming from points east.

The Juneau Falls Recreation Area has high value to the USFS although it is known to the public not as a "recreation area" but as a scenic view of a waterfall along the trail. It appears to have less value than the KRSMA, KNWR, or the Resurrection Pass Trail. The use level of the recreation area separate from the Resurrection Pass Trail is unknown, but likely is much less than trail use and a small fraction of KRSMA use. The Cooper Landing Boat Launch and Day Use Area is a smaller, site-specific recreational facility on a different scale than KNWR, KRSMA, or the Resurrection Pass Trail, but it has high use levels and is important to the public and managers of the river corridor as the upstream put-in point for boating trips on the upper Kenai River.

Because different people and different agencies place different values on different types of Section 4(f) properties, it is not appropriate to rank all the properties in order of significance. However, DOT&PF and FHWA have grouped the properties in categories of their relative significance, as shown in Table 4.8-7, based on the analysis presented in this section. Further views of the officials with jurisdiction and of the public expressed during the review of this draft Section 4(f) Evaluation could alter some of the groupings.

Table 4.8-7. Categories of relative significance among 4(f) properties

Higher significance	Moderate significance	Lower significance
• KRSMA • Resurrection Pass Trail • Kenai National Wildlife Refuge • Sqilantnu Archaeological District • Confluence TCP	• Juneau Falls Recreation Area • Cooper Landing Boat Launch and Day Use Area • Kenai River Recreation Area • Bean Creek Trail	• Stetson Creek Trail • Kenai Mining and Milling Co. Historic District • Charles G. Hubbard Mining Claims Historic District

The relative Section 4(f) use of each alternative on the more important properties is discussed below. All alternatives would use land from the Sqilantnu Archaeological District and Confluence TCP, although in different ways.

There is a distinct difference between the two Juneau Creek alternatives. The Juneau Creek Alternative would have a Section 4(f) use of KNWR land, while the Juneau Creek Variant Alternative would not.

4.8.3.1 Cooper Creek Alternative

The Cooper Creek Alternative would use land from the following "higher significance" properties:

- KRSMA (two replacement bridges)
- Sqilantnu Archaeological District
- Confluence TCP

The Cooper Creek Alternative would use land from the following "moderate significance" properties:

- Cooper Landing Boat Launch and Day Use Area
- USFS Kenai River Recreation Area (however, the impact is expected to be *de minimis*)

4.8.3.2 G South Alternative

The G South Alternative would use land from the following "higher significance" properties:

- KRSMA (one replacement bridge, one new bridge)
- Sqilantnu Archaeological District
- Confluence TCP

The G South Alternative would use land from the following "moderate importance" properties:

- Bean Creek Trail
- USFS Kenai River Recreation Area (however, the impact is expected to be *de minimis*)

4.8.3.3 Juneau Creek Alternative

The Juneau Creek Alternative would use land from the following "higher significance" properties:

- KNWR
- Resurrection Pass Trail
- Sqilantnu Archaeological District
- Confluence TCP

The Juneau Creek Alternative would use land from the following "moderate significance" properties:

- Juneau Falls Recreation Area
- Bean Creek Trail

4.8.3.4 Juneau Creek Variant Alternative

The Juneau Creek Variant Alternative would use land from the following "higher significance" properties:

- Resurrection Pass Trail
- Sqilantnu Archaeological District
- Confluence TCP

The Juneau Creek Variant Alternative would use land from the following "moderate significance" properties:

- Juneau Falls Recreation Area
- Bean Creek Trail
- USFS Kenai River Recreation Area (however, the impact is expected to be *de minimis*)

4.8.4 Factor iv: Views of Officials with Jurisdiction

Views from officials with jurisdiction over impacted Section 4(f) properties were solicited. The following paragraphs provide an overview of the views expressed and input received for each

property. Section 4.7 provides further information about consultations, including meeting dates specific to Section 4(f)-related discussions, and Chapter 5 provides a broader detailed summary of agency coordination for the entire project.

KRSMA. The DPOR agreed that the Kenai River/KRSMA is an important park resource and that land areas proposed as KRSMA additions, although significant resources, would not be subject to Section 4(f) protection unless formally added to the KRSMA by the Alaska Legislature. DPOR indicated that the Cooper Creek Alternative appeared less favorable overall because of soil stability questions, and the G South and the Juneau Creek alternatives appeared likely the most realistic alternatives, with Juneau Creek alternatives appearing to be most favorable to the river, because of a higher degree of separation from the river. ADF&G indicated that the Juneau Creek and Juneau Creek Variant alternatives would have the least impact to the Kenai River and important fisheries resources. Both agencies felt that non-point-source pollution from road runoff and spills would be less under the Juneau Creek and Juneau Creek Variant alternatives due to the greater distance between large portions of the main highway (most traffic) and the Kenai River, including portions of tributaries that provide habitat for anadromous fish. ADF&G also stated that the Juneau Creek and Juneau Creek Variant alternatives would have fewer temporary in-river impacts during construction. The new bridge proposed under the G South Alternative was a concern for both agencies because of permanent visual impact, increased impact to riparian habitat (because of the addition of a new bridge), and construction impact that could mean temporary closure of the river to guides and other river users. DPOR stated that impacts to KRSMA appeared minimal under all but the G South Alternative, while ADF&G said that all build alternatives would be improvements over the current conditions because they would move a portion of the highway away from the Kenai River and construct safer traffic corridors.

KNWR. In multiple meetings, the greatest concerns of USFWS were about impacts to designated Wilderness (Juneau Creek Alternative), Sportsman's Landing/Russian River Ferry facilities (Cooper Creek, G South, and Juneau Creek Variant alternatives), brown bear habitat (particularly in the MP 55–58 (KNWR) area), and movement of wildlife across the highway in general (applicable to all alternatives, but a Section 4(f) issue only for the Juneau Creek Alternative). USFWS characterized the visual impacts of the Juneau Creek Variant Alternative at Sportsman's Landing (and the boundary of the refuge) as "drastically altered views" and "avoidable in light of the fact that there are other viable alternatives" that would not pose the same adverse impacts to refuge visitors. Parking along the highway near Sportsman's Landing also was a concern. USFWS indicated relatively little concern about potential impacts to KNWR facilities within the existing right-of-way: the visitor contact station and trailhead for the Fuller Lakes Trail. The USFWS indicated general satisfaction with plans adjacent to Sportsman's Landing and ongoing concern about wildlife movement. USFWS is participating in the wildlife movement study that is intended to address wildlife movement impacts. ADF&G and USFS also have jurisdiction that pertains to wildlife and also are participating. At a February 2013 "agency summit," these wildlife agencies indicated that it appeared the Cooper Creek Alternative would have the least impact to wildlife movement, the G South Alternative would have more impact to habitat and movement, and the two Juneau Creek Alternatives would have the greatest impact to wildlife (HDR 2013b).

Resurrection Pass Trail. The USFS, as manager of the trail, indicated it is considered the "crown jewel" of the CNF trail system. The USFS indicated that the crossing of the trail by the two Juneau Creek alternatives likely would considerably reduce the value of the lower 3.4 miles

of the trail. USFS indicated the project under these alternatives likely would fundamentally change the use of the trail, making the falls area a more "front country" experience than the "backcountry" experience it is today. Extensive discussion took place regarding measures to minimize harm in the trail crossing area and regarding compensatory mitigation outside the project area. USFS proposed compensatory mitigation on the Iditarod National Historic Trail, which DOT&PF and FHWA considered and agreed to should either of these alternatives be advanced to construction.

Bean Creek Trail. USFS agreed that for Section 4(f) purposes, the trail begins at a public lands boundary. The agency requested a trailhead under the G South Alternative north of the new highway at Bean Creek and indicated agreement to own and manage the trailhead even though the land at that location is State of Alaska land overlain by a USFS trail easement. The existing easement would need to be negotiated and enlarged. The USFS, DNR, and the Borough have discussed the trail principally as a recreation resource. Section 106 consulting parties, including USFS and SHPO (a subdivision of DNR), have commented little on the trail as an historic resource compared to their comments on the Sqilantnu Archaeological District and TCPs. However, the consulting parties have agreed there would be adverse effects to the trail as an historic resource.

Stetson Creek Trail. The USFS noted that construction of the Cooper Creek Alternative could increase access to and use of the Stetson Creek Trail. USFS suggested mitigation, which DOT&PF agreed to, should the alternative be advanced to construction. The USFS has discussed the trail principally as a recreation resource. Section 106 consulting parties, including USFS, have commented little on the trail as an historic resource compared to their comments on the Sqilantnu Archaeological District and TCPs. However, the consulting parties have agreed there would be adverse effects to the trail as an historic resource.

USFS Kenai River Recreation Area. The USFS indicated that the recreation area was established to retain public ownership of the Kenai River banks and public access to the Kenai River at the important (high-use) segment of the stream in the Russian River confluence area. The USFS indicated relatively little concern about widening the highway where it passes through this recreation area (compared, for example, with greater concern of the Juneau Falls Recreation Area, a similar recreation withdrawal). USFS indicated that impacts appeared minimal because the highway already exists in this area and because the recreation area was defined in part by the highway.

Juneau Falls Recreation Area. The USFS indicated the Juneau Falls Recreation Area has high value to the agency and to the public, and that the entire area was established around the falls and upper canyon because the falls and creek are a scenic attraction, and that waterfalls are rare in the region. USFS indicated the project under either of the Juneau Creek alternatives likely would change the use of the trail, making the falls area a more "front country" experience than the "backcountry" experience it is today. The USFS suggested trailhead mitigation and provided a conceptual design. USFS also indicated the new trailhead should be located within the Juneau Falls Recreation Area; such a parking area would be an enhancement and would be appropriate to the high-quality front country experience USFS would seek to achieve for the Recreation Area, and doing so would reduce wetland impacts compared to locating the trailhead outside the recreation area. DOT&PF agreed to these measures.

Cooper Landing Boat Launch and Day Use Area. The Sport Fish Division of ADF&G administers access at boat launch ramps; DPOR manages the site. ADF&G stated that the highway improvements should improve river access. Concerns included damage to asphalt in the parking area and to concrete boat ramp planks from heavy equipment during highway construction. ADF&G acknowledged impacts to use of the area that would occur during construction and suggested using spring and early summer for major construction efforts in this area to minimize impact to users during the height of summer and fall salmon and trout fishing seasons. DOT&PF has agreed to avoid the high use period. DPOR was most concerned about impacts to access and river/ramp closures at this location, but indicated that mitigation measures for construction similar to those used for the Soldotna Bridge over the Kenai River, as is proposed by DOT&PF, should be adequate to reasonably minimize impact.

Sqilantnu Archaeological District. The Sqilantnu District and Confluence TCP are of particular importance to the Kenaitze Tribe, SHPO, and CIRI (which expended great effort through Federal legislation to secure the "archaeological estate" in the Russian River Ferry area as part of its land claims under ANCSA). Meetings and correspondence to date with consulting parties have resulted in identification of much-expanded district boundaries, agreement regarding a determination of adverse effect, and initial informal discussion of mitigation concepts.

Confluence Traditional Cultural Property. The Sqilantnu District and Confluence TCP are of particular importance to the Kenaitze Tribe, SHPO, and CIRI (which expended great effort to secure the "archaeological estate" in the Russian River Ferry area as part of its land claims under ANCSA). Meetings and correspondence to date with consulting parties have resulted in determination of basic significance of the TCP, definition of TCP boundaries, agreement regarding a determination of adverse effect, and initial informal discussion of mitigation concepts.

Charles G. Hubbard Mining Claims Historic District. Meetings and correspondence with consulting parties have resulted in identification of district boundaries and agreement regarding a determination of adverse effect. Consulting parties have commented little on this historic district in comparison to the Sqilantnu Archaeological District or TCPs. Consultation is ongoing regarding mitigation measures to help resolve adverse effects.

Kenai Mining and Milling Co. Historic District. Meetings and correspondence with consulting parties have resulted in identification of district boundaries and agreement regarding a determination of adverse effect. Consulting parties have commented little on this historic district in comparison to the Sqilantnu Archaeological District or TCPs. Consultation is ongoing regarding mitigation measures to help resolve adverse effects.

4.8.5 Factor v: The Degree to which Each Alternative Meets the Purpose and Need

As a reminder, the basic elements of the project purpose and need from Chapter 1 are as follows:

- Need 1: Reduce Highway Congestion.
- Need 2: Meet Current Highway Design Standards.
- Need 3: Improve Highway Safety.

All of the build alternatives would satisfy the purpose of and need for the project. However, there are gradations in the ability of the alternatives to satisfy the project purpose and need. These are further described below.

Need 1—Reduce Highway Congestion. The Purpose and Need chapter indicates that the project is intended to provide the opportunity for free-flowing traffic at highway speeds, to improve the level of service to the greatest extent practical, and to achieve Level of Service (LOS) C or better wherever practical at the end of the project's design life (2043, the design year). Table 4.8-8 provides LOS ratings.

Table 4.8-8. Factors relating to congestion (Need 1)

		Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Passing lanes					
Percent (%) of length with passing lane		29	26	42	39
Intersections					
Number of intersections of side roads and driveways		42	20	11	11
Level of Service					
Segment	**Direction**				
1	EB	D	D	D	D
	WB	C	C	C	C
2	EB	D	C	C	C
	WB	C	B	B	B
3	EB	C	C	C	C
	WB	C	B	B	B
4	EB	C	C	C	C
	WB	C	B	C	C
5	EB	D	D	C	C
	WB	C	C	C	C
6	EB	D	D	D	D
	WB	C	C	C	C
Percentage of alignment at or better than LOS C[a]		60.8	69.2	83.2	82.0

LOS source: *Traffic Study Update* (Lounsbury 2014). Note that in the Lounsbury report, Tables 21A and 21B, the segments are numbered in the opposite order from those in this SEIS.

EB = eastbound; WB = westbound. Entire table is calculated on 100th highest hour for traffic volume in the year.

[a] The project area is about 15 miles long. The "alignment" in "percentage of alignment" includes both directions of travel and therefore is approximately 30 miles long for this calculation.

Chapter 1 thoroughly explains LOS; in brief, it is an A through F rating system, based on traffic modeling, that grades traffic congestion from best to worst. LOS A represents free-flowing

traffic, LOS C represents heavy volumes but acceptable traffic flow that maintains reasonable speeds, and LOS F represents failure of the roadway, in which traffic demand exceeds the capacity of the road. All build alternatives would provide for less traffic congestion even as traffic increased over time. However, the LOS differs between the alternatives and is a distinguishing feature among the alternatives (see Table 4.8-8). The table indicates the percent of alignment length with passing lanes (passing lanes contribute to traffic flow efficiency) and identifies the number of intersections (intersections inhibit efficiency when traffic enters the highway from a side road or slows to turn into a driveway).

Need 2—Meet Current Design Standards. All of the build alternatives would meet the current design standards for a rural principal arterial. It is therefore difficult to distinguish between alternatives based solely on achieving the standards. While all alternatives equally achieve the standard, there is a distinction that can be made between "desirable" levels of meeting the standards, and acceptable or minimum levels. The desirable design speed for the National Highway System is 65 mph or greater, and this project's design speed is 60 mph because of rolling terrain. While all curves meet the minimum standard, many curves can accommodate the more desirable 65 mph speed or higher. These are not indications of the speed limit that would be posted but of how safe the curves would be and how easily drivers could maintain consistent highway speeds. Table 4.8-9 notes various measures for each alternative to indicate how well the alternative meets the standard indicated—that is, whether it is achieving the minimum acceptable standard, or performing better than the standard.

Table 4.8-9. Factors relating to design standards (Need 2)

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Horizontal Curves[a]				
Total number of horizontal curves *(existing highway = 43)*	27	25	21	22
Number of curves at or better than the "desirable" standard	23	24	20	21
Number below "desirable"	4	1	1	1
Grades				
Percent (%) of length above maximum grade (>6% grade)	0	0	0	0
Percent (%) of length at 5.9%-6% grade (steep)	9	8	2	0
Percent (%) of length at >5% grade (hilly)	9	14	16	26

[a] "Minimum" is curves designed for 60 mph design speed, which is the design criteria for this project in rolling terrain. "Desirable" is curves designed for 65 mph or that could handle higher speeds.

Need 3—Improve Highway Safety. Each of the build alternatives would be expected to improve highway safety, as follows:

- Segments built on a new alignment would separate slower-moving local traffic (on the "old" highway) from faster-moving through-traffic (on the new highway). (Note: length of new highway segment varies by alternative.)
- The highway would better match the driving experience on the Sterling Highway to the west of the project area and the Sterling and Seward highways to the east, providing drivers with a consistent driving experience with fewer surprises.
- A 65 percent reduction in crash rate compared to the No Build Alternative is estimated, based on improvements such as adding wider lanes and shoulders, full clear zones, and improving curves to better see around them.

More description of the safety issue appears in Chapter 1 and in Section 3.6. Table 4.8-8 and Table 4.8-9 present information on passing lanes, intersections, and desirable versus minimum achievement of standards. Passing lanes generally help make the highway safer by providing opportunities to pass without entering the oncoming lane. More intersections generally make the highway less safe, because they present conflict points with traffic entering the highway at low speeds, or traffic suddenly slowing to turn from the highway. Curves that not only meet standards, but reach a "desirable" level or better, are curves that are easier to negotiate and are generally safer.

4.8.6 Factor vi: Magnitude of Impacts to Non-4(f) Resources

Regulations at 23 CFR 774.3(c) indicate that the balancing of factors for a Least Overall Harm Analysis must include consideration of non-4(f) resources—specifically, FHWA must consider, "after reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f)." DOT&PF and FHWA have thoroughly considered the impacts of the project alternatives on all resource categories. Chapter 3 of this SEIS presents resource categories covering the human and natural environment. Most of the resources addressed in Chapter 3 are not protected by Section 4(f). This Least Overall Harm Analysis incorporates in whole the analysis in Chapter 3. Table 4.8-12 through Table 4.8-17 (at the end of this chapter) summarize impacts from Chapter 3 and present them in comparative form for the Least Overall Harm Analysis.

Chapter 3 indicates *some* adverse impact after mitigation for most of resources addressed, but the impacts typically are low, particularly following mitigation. Also, Chapter 3 indicates that some resources categories typically addressed in FHWA EISs do not exist in the project area. These no-impact or low-impact categories are listed at the end of this section.

Resources with greater/substantive adverse impacts. A few resource categories addressed in Chapter 3 include somewhat greater impacts for one of more of the alternatives. These resource categories are listed below (with their section numbers for easy reference).

3.1 Land Ownership

3.2 Land Use Plans and Policies

3.4 Housing and Relocation

3.5 Economic Environment

3.15 Noise

3.16 Visual Resources

3.20 Wetlands and Vegetation

3.22 Wildlife

Resources with less substantive adverse impacts. The rest of the resource categories discussed in Chapter 3 are anticipated to have lower or less-substantive impacts following mitigation. They are:

3.3 Social Environment

3.6 Transportation

3.7 River Navigation (*addressed under Section 4(f))*

3.8 Parks and Recreation (*some park and recreation properties are addressed under Section 4(f))*

3.9 Historic and Archaeological Preservation (*addressed under Section 4(f))*

3.10 Subsistence

3.11 Utilities

3.12 Geology and Topography

3.13 Water Bodies and Water Quality

3.14 Air Quality

3.17 Hazardous Waste Sites and Spills

3.18 Energy

3.19 Floodplains

3.21 Fish and Essential Fish Habitat

3.23 Coastal Zone Management

Resources and issues not present in the project area. Several resource topics that FHWA typically examines do not occur in the project area. These include: Farmland; Joint Development; Wild and Scenic Rivers; Coastal Barriers; and Threatened or Endangered Species of plants or animals. Therefore, there would be no impacts in these resource categories.

The following sections summarize key impacts by alternative.

4.8.6.1 Cooper Creek Alternative

The Cooper Creek Alternative would have impacts to private property and relocation of households and businesses, because the alignment would traverse part of the community of Cooper Landing. This would also result in more traffic noise impacts to sensitive receivers like homes. However, routing the alignment through the community would result in lower impact to local highway-dependent businesses under the Cooper Creek Alternative, because highway traffic still would be routed through a portion of the community, and businesses would be more

visibly evident to motorists. Being located south of the Kenai River for a long segment, this alternative would have lower impacts to the natural environment that were identified as concerns by agencies, including vegetation and wetland loss, wildlife habitat, and effects to important wildlife movement areas. However, it would have somewhat greater visual impacts to Cooper Landing homes and lodges located north of the river. In terms of beneficial impacts, the Cooper Creek Alternative would bring the highway up to current standards. It would provide transportation efficiency and safety benefits, but not as well as other alternatives.

4.8.6.2 G South Alternative

The G South Alternative would reduce impacts within the community, including traffic noise and property impacts, but would have greater natural environment impacts than the Cooper Creek Alternative, including impacts to brown bear habitat and wildlife movement areas in the lower Juneau Creek area. Avoiding the community would mean greater effect to businesses within the community because most traffic would be anticipated to follow the main highway around the community. Visual impacts would be less than those of the Cooper Creek Alternative and more than the two Juneau Creek alternatives (see Section 3.16, Visual Environment). In terms of beneficial impacts, the G South Alternative would bring the highway up to current standards. It would provide transportation efficiency and safety benefits somewhat greater than the Cooper Creek Alternative but at a somewhat lower level than the two Juneau Creek alternatives.

4.8.6.3 Juneau Creek and Juneau Creek Variant Alternatives

The Juneau Creek and Juneau Creek Variant alternatives, like the G South Alternative, would reduce impacts within the community to private property and homes and would present greater impacts than the Cooper Creek Alternative to highway-dependent businesses. The two Juneau Creek alternatives would have the greatest impacts to wetlands, vegetation, wildlife habitat, and wildlife movement. These alternatives also would result in lower visual and traffic noise impacts than the Cooper Creek Alternative (again because they would avoid sensitive receptors in the community). For the Juneau Creek Variant Alternative only, DOT&PF would acquire approximately 12 acres of the 42-acre CIRI Tract A parcel, as well as bisect it (see Section 3.1.2.6 for detail).

Finally, for the Juneau Creek Alternative only, a substantial change in land use and management would occur because of use of Federally designated Wilderness. In terms of beneficial impacts, the two Juneau Creek alternatives would bring the highway up to current standards. Both would provide greater transportation efficiency and safety benefits than the other alternatives, with the Juneau Creek Alternative considered slightly better than the Juneau Creek Variant Alternative.

4.8.7 Factor vii: Substantial Differences in Cost

Factor vii indicates that “substantial differences in cost” must be considered. The discussion below presents the costs of each alternative, and examines the percentage difference in costs in different categories, including construction costs, maintenance costs, and total expenditures over 20 years (see Table 4.8-10).

“Construction” cost includes direct construction costs, such as labor, materials, and utility relocations, as well as project development costs such as overhead, design, right-of-way, and property acquisition. The “Total Expenditures” combines the “Construction” subtotal with operations and maintenance costs (including annual costs such as snow plowing and periodic

major activities such as pavement overlays) to arrive at a total cost over the 20-year design life of the project.

The construction cost differences between the alternatives are largely the result of differences in the number of bridges. The Juneau Creek and Juneau Creek Variant alternatives each have one major bridge. The G South Alternative has three major bridges. Nonetheless, as indicated in Table 4.8-10, the range of total expenditures to DOT&PF and FHWA over the 20-year life of the project for the build alternatives falls within 20 percent of each other. Given the uncertainties of the preliminary design completed at this stage of the project, DOT&PF and FHWA do not consider this to be a "substantial difference" in cost. Therefore, this criterion provides little determinative value for identifying the alternative that has least overall harm.

Table 4.8-10. Costs by alternative
(costs in millions of dollars, except O&M [a])

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Project Development [b]	$54.5	$53.1	$44.2	$45.4
Direct Construction	$236.2	$250.4	$205.4	$211.6
Construction Subtotal	**$290.7**	**$303.5**	**$249.6**	**$257.0**
O&M and Periodic Major Activities (over 20 years)[b]	**$23.7**	**$23.8**	**$24.2**	**$24.3**
Annual O&M [b]	*$593,400/year*	*$585,400/year*	*$608,600/year*	*$611,700/year*
Total Expenditures, 20 years	**$314.4**	**$327.3**	**$273.8**	**$281.3**
Percentage less than the most costly alternative (G South)	-4%	0%	-16%	-14%
Percentage more than the least costly alternative (Juneau Creek)	15%	20%	0%	3%

[a] O&M = Operations and maintenance; includes annual costs such as snow plowing, crack sealing, and other basic maintenance on the alignments. Periodic major activities include projects such as replacement of guardrail and pavement overlays that are reasonably anticipated over a 20-year span.

[b] Project Development costs include permitting, design, right-of-way acquisition, and indirect costs. The right-of-way cost estimate is for the real estate payment portion only of right-of-way acquisition. It does not address the other per parcel costs of right-of-way acquisition including relocation benefits.

Notes: Many numbers are rounded and do not add up exactly. All dollar figures represent 2014 dollars.

4.8.8 Preliminary Evaluation of Least Overall Harm

Combining the information in the sections above (summarized in Table 4.8-11 through Table 4.8-17 at the end of this chapter) is inherently difficult because different individuals, groups, or agencies each may place higher values on different kinds of resources than others might. The following sections present some of the complexities of weighing the harm caused to Section 4(f) properties and to non-Section 4(f) resources.

The following discussion for each alternative summarizes impacts and presents some of the complexities and trade-offs in determining least overall harm.

4.8.8.1 Cooper Creek Alternative

The Cooper Creek Alternative would impact archaeological historic properties within the Sqilantnu Archaeological District that have relatively greater importance than other historic properties because of their relationship to the Beginnings Heritage Site. It also would impact the Confluence TCP, Charles G. Hubbard Mining Claims Historic District, KMM District, and Stetson Creek Trail. This means the Cooper Creek Alternative would impact the greatest number of cultural properties of the four build alternatives.

Regarding the TCP, however, the alternative would follow the existing highway corridor through the TCP and therefore would change the status quo relatively little. The existing highway in this area is considered part of the Confluence TCP. By comparison, the two Juneau Creek alternatives each would construct a new route through the TCP. The Cooper Creek Alternative arguably would have less impact to the TCP than the Juneau Creek alternatives, especially the Juneau Creek Variant Alternative.

Regarding the Sqilantnu District, the Cooper Creek Alternative would follow the existing alignment more than any of the other alternatives. This means relatively little new highway would be constructed across the archaeological district. However, the existing highway runs through some of the highest concentrations of contributing archaeological sites, and widening the existing highway would result in impacts to more known sites.

Because the Cooper Creek Alternative would remain on the existing alignment along the Kenai River west of MP 51, the risks of hazardous spills entering the river would be greater than the risk from alternatives that would create a new alignment and route most traffic farther away from KRSMA. Also, traffic along the areas near KRSMA would be more visible and audible to Kenai River users.

The Cooper Creek Alternative's overall impacts to vegetation and wildlife habitat, including impacts of traffic noise and disturbance of new dispersed recreation originating with the highway, would be lowest among the build alternatives, but impacts to private property would be the highest. On the other hand, because all traffic still would be routed through a portion of Cooper Landing, fewer impacts to businesses are likely. The projected LOS and the degree to which the alternative would satisfy the project purpose and need would be less than those of the other build alternatives.

4.8.8.2 G South Alternative

The G South Alternative would use land from KRSMA, resulting in impacts to some of the activities, features, and attributes of the park. The other build alternatives would have no use at all or would have a *de minimis* impact. The KRSMA is one of the most important Section 4(f) resources in the project area because of its popularity and its habitat for salmon, which supports commercial and sport fishing, which in turn support the economy of Cooper Landing and the Borough. The G South Alternative's impact would be somewhat greater than the other alternatives impacts because it would add a third bridge over the Kenai River (KRSMA); under all other alternatives, two bridges would remain, as there are today. Because the G South Alternative would remain on the existing alignment along the river west of MP 51, the risks of hazardous spills entering the river would be greater than the risks from alternatives that would create a new alignment and route most traffic farther away from KRSMA. Also, traffic along the areas near KRSMA would be more visible and audible to Kenai River users.

The G South Alternative, like the Cooper Creek Alternative, would impact the Sqilantnu District and the Confluence TCP, including archaeological properties of relatively high importance because of their relationship to the Beginnings Heritage Site. Regarding the TCP, however, the alternative would follow the existing highway corridor through the TCP and therefore would change the status quo relatively little. The existing highway in this area is considered part of the Confluence TCP. By comparison, the two Juneau Creek alternatives each would construct a new route through the TCP. The G South Alternative arguably would have less impact to the TCP than the Juneau Creek alternatives, especially the Juneau Creek Variant Alternative.

The G South Alternative's impact on the Sqilantnu District would be similar to the impact from the Cooper Creek Alternative. It would follow the existing alignment in some of the highest concentrations of contributing archaeological sites and therefore would impact more known sites than the Juneau Creek Alternative (and a few more than the Juneau Creek Variant Alternative).

The G South Alternative also would impact the Charles G. Hubbard Mining Claims Historic District and Bean Creek Trail but would not affect the KMM District.

Impacts to wildlife would be greater than impacts from the Cooper Creek Alternative, because of the introduction of a new highway alignment and bridge through the lower Juneau Creek habitat area, and somewhat less than impacts from the two Juneau Creek alternatives. The G South Alternative's projected LOS and ability to satisfy the project purpose and need would be better than the Cooper Creek Alternative but not as good as the Juneau Creek alternatives. Because it would route most traffic around Cooper Landing, the G South Alternative would have greater business impacts than the Cooper Creek Alternative.

4.8.8.3 Juneau Creek Alternative

The Juneau Creek Alternative would use land from the Resurrection Pass Trail corridor, KNWR, Sqilantnu Archaeological District, and Confluence TCP, all of which are Section 4(f) properties of higher importance, and from the Juneau Falls Recreation Area and Bean Creek Trail, (properties of moderate importance). Many of these are properties that would not be affected by the Cooper Creek and G South alternatives. In addition to the Section 4(f) impact to the KNWR, FHWA considers the impacts to designated Wilderness within KNWR to be of great importance. However, the Juneau Creek Alternative would have no Section 4(f) use of KRSMA, also one of the most important properties of the project area.

The Juneau Creek Alternative would impact approximately half the number of Sqilantnu Archaeological District contributing sites as the Cooper Creek and G South alternatives, but would create more miles of new road on a new alignment, disturbing land across the district. In much of this area, however, there are few known sites. In addition, this alternative would create a new alignment through the Confluence TCP, arguably creating greater impacts to the TCP than alternatives that follow the existing highway corridor (G South and Cooper Creek). This is because the existing highway is considered part of the TCP, and following the existing alignment would cause the least change to the status quo. However, this alternative would run closer to the edge of the TCP than any of the alternatives, impact fewer archaeological sites within the TCP, and use less acreage.

The Juneau Creek Alternative would have no impact on the historic districts associated with mining. The Juneau Creek Alternative would impact the Bean Creek Trail, and its impacts would be greater than the G South Alternative's impact to that trail. It would result in greater habitat

fragmentation effects on bears, moose, and other wildlife than the Cooper Creek Alternative and somewhat more than the G South Alternative because it would create a long new alignment through known areas of good habitat for bears and moose. Because it would route most traffic around Cooper Landing, it would have more business impact than the Cooper Creek Alternative.

Overall, while the Juneau Creek Alternative would affect approximately the same number of Section 4(f) resources as the other alternatives, its individual impacts to Section 4(f) properties, particularly important recreation areas, would be greater. The alternative, however, would satisfy the project purpose and need better than of any of the other build alternatives.

4.8.8.4 Juneau Creek Variant Alternative

The Juneau Creek Variant Alternative would have impacts virtually identical to those of the Juneau Creek Alternative. The main distinguishing feature between the two is that the Juneau Creek Variant Alternative would avoid use of KNWR land and designated Wilderness but would impact more sites within the Sqilantnu Archaeological District and Confluence TCP. This impact would include a site valued by the Kenaitze Indian Tribe that is associated with human burials (but not the graves themselves).

4.8.9 Least Overall Harm Conclusion

The balancing of the seven factors presented in the sections above (and in Table 4.8-11 through Table 4.8-17) indicates there are trade-offs among these four build alternatives. On one hand, under the two Juneau Creek alternatives, there would be greater recreational impacts to important sites, especially the Resurrection Pass Trail, while the KRSMA, a highly valued resource, would not be affected; Sqilantnu Archaeological District cultural properties would be somewhat less affected; and historic mining districts not affected at all. On the other hand, under the Cooper Creek Alternative, there would be substantially greater impacts to cultural properties of all kinds and to individual historic properties, and less impact to important recreational properties. The importance of the archaeological sites impacted would be greater than those affected by the Juneau Creek Alternative (but not necessarily greater than the sites affected by the Juneau Creek Variant Alternative). The G South Alternative lies in the middle, with some impacts to the cultural properties and some to the park and recreation sites, including the greatest impacts to KRSMA.

While the Juneau Creek and Juneau Creek Variant alternatives would be best for cost and purpose and need factors, these benefits arguably would be offset by the larger length of clearing for the segment of each alternative built on a new alignment and by associated impacts to wildlife habitat near the new highway segment. The G South Alternative and the Cooper Creek Alternative would not satisfy the purpose and need as well as the two Juneau Creek alternatives. They also would be slightly more costly. However, with less length of new alignment overall, and particularly with less length on the north side of the Kenai River, these two alternatives would not have as many wildlife habitat impacts as the two Juneau Creek alternatives. The Cooper Creek Alternative would be particularly low in relative impact to wildlife and to wetland habitats.

FHWA ultimately must identify which alternative has the least overall harm. Neither DOT&PF nor FHWA has identified a preferred alternative, and FHWA has drawn no conclusion regarding least overall harm at this time. FHWA is hopeful that input from the public and appropriate agencies with jurisdiction, during the comment period for the Draft Section 4(f) Evaluation, will

prove helpful and assist decision makers in making a formal finding of least overall harm in the Final Section 4(f) Evaluation and SEIS.

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Table 4.8-11. Summary of Section 4(f) use for Sterling Highway alternatives

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Number of 4(f) properties with "use"	8 (6 have greater than *de minimis* impact)	6 (5 have greater than *de minimis* impact)	6 (All have greater than *de minimis* impact)	6 (5 have greater than *de minimis* impact)
Properties with *de minimis* "use" (proposed)	KRSMA USFS Kenai River Recreation Area	USFS Kenai River Recreation Area	—	USFS Kenai River Recreation Area
Summary of impact for properties with Section 4(f) "use" greater than *de minimis* (acres)[a]	• Stetson Creek Trail (2.5) • Cooper Landing Boat Launch and Day Use Area (0.55, temporary) • Sqilantnu Archaeological District (161.7), 27 contributing properties • Confluence TCP (29.0) • Hubbard Claims District (64.6), 6 contributing properties • Kenai Mining and Milling District (9.0), 3 contributing properties	• KRSMA (2.8) • Bean Creek Trail (3.1) • Sqilantnu Archaeological District (166.4), 22 contributing properties • Confluence TCP (29.0) • Hubbard Claims District (69.8), 4 contributing properties	• Kenai National Wildlife Refuge (33.4) • Resurrection Pass Trail (encompassed within Juneau Falls Recreation Area) (7.4) • Bean Creek Trail (1.1) • Juneau Falls Recreation Area (17.1) • Sqilantnu Archaeological District (180.0), 13 contributing properties • Confluence TCP (14.7)	• Resurrection Pass Trail (encompassed within Juneau Falls Recreation Area) (7.4) • Bean Creek Trail (1.1) • Juneau Falls Recreation Area (17.1) • Sqilantnu Archaeological District (167.3), 22 contributing properties • Confluence TCP (19.7)

[a] While the preponderance of the Least Overall Harm Analysis is based on the properties indicated in this row, other properties with *de minimis* use by definition have impacts that would not adversely affect the activities, features, and attributes of the property. Note that total acreage reported in this row is not a complete indicator of Section 4(f) impact, because many of the properties overlap (virtually all are within the Sqilantnu Archaeological District), and because use of portions of the *historic* districts that do not contribute to the district is not considered to be a Section 4(f) use, while use of any portion of the *archaeological* district or TCP is considered to be a Section 4(f) use. Acreage and number of contributing properties reported for the TCP are a subset of those reported for the Sqilantnu District.

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Table 4.8-12. Least Overall Harm Factor i, ability to mitigate adverse impacts to Section 4(f) properties

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Mitigation at Affected properties *Note: ability to mitigate impacts does not apply to "de minimis" properties listed in Table 4.8-11. Such properties are not addressed here.*	**Stetson Creek Trail** *Ability to mitigate is good.* Mitigation: Reroute trail; new trailhead/parking; loop trail at campground; interpretive signs. However, historic alignment would remain severed and character of lower trail would change. **Cooper Landing Boat Launch and Day Use Area** *Ability to mitigate is good.* Mitigation: Timing restrictions. **Sqilantnu Archaeological District, Confluence TCP, Hubbard Claims District, and Kenai Mining District** *Ability to mitigate is moderate.* Mitigation for each district & TCP will be documented in a Section106 agreement that is likely to include the equivalent of the following: data recovery from some portion of affected contributing features; interpretation; funding of Sqilantnu and TCP management plan. However, some loss of data is expected.	**KRSMA** *Ability to mitigate is moderate.* Mitigation: Minimize piers in Kenai River; accommodate river users and river hydraulics; best practices during construction. However, the permanent visual, noise, recreation, and minor hydraulic/fish impacts of a new bridge remain. **Bean Creek Trail** *Ability to mitigate is moderate.* Mitigation: Formalize trailhead parking; reroute trail to cross under highway at Bean Creek; interpretive sign for trail history. However, highway visual/noise/ recreation intrusion remain. **Sqilantnu District, Confluence TCP, and Hubbard Claims District** *Ability to mitigate is moderate.* Mitigation for both districts and TCP will be documented in a Section106 agreement that is likely to include the equivalent of the following: data recovery from some portion of affected contributing features; interpretation; funding of Sqilantnu and TCP management plan. However, some loss of data is expected.	**Kenai National Wildlife Refuge** *Ability to mitigate is low.* Mitigation: Coordinate with KNWR regarding construction access to adjacent KNWR facilities; wildlife movement study and additional separated wildlife crossings as recommended by the study. Incorporation of KNWR land and Wilderness into road right-of-way and habitat loss would remain. **Resurrection Pass Trail** *Ability to mitigate is moderate.* Mitigation: Route highway over trail on bridge; summer and winter trailheads; fund construction of a portion of Iditarod Trail at Snow River bridge; maintain access during construction. However, long-distance character would be reduced/trail effectively shortened by 3.4 mi., character of use would change. **Bean Creek Trail** *Ability to mitigate is moderate.* Mitigation: Formalize trailhead parking; reroute trail to cross under Juneau Creek bridge; interpretive sign for trail history. However, highway visual/noise/recreation intrusion at a point 1.75 miles into trail, and severing and likely disuse of the historic alignment, remain. **Juneau Falls Recreation Area** *Ability to mitigate is good.* Mitigation: New trailhead and trail connections for walkers and horses; formalized falls overlook; pedestrian amenities on bridge with connections to Bean Creek and Resurrection Pass trails and to parking. However a change in character of the area would remain. **Sqilantnu Archaeological District, and Confluence TCP** *Ability to mitigate is moderate.* Mitigation for the districts and TCP will be documented in a Section106 agreement that would likely include the following: data recovery from some portion of affected contributing features; interpretation; funding of Sqilantnu and TCP management plan. However, some loss of data is expected.	**Resurrection Pass Trail** *Ability to mitigate is moderate.* Mitigation: Route highway over trail on bridge; summer and winter trailheads; fund construction of a portion of Iditarod Trail at Snow River bridge; maintain access during construction. However, long-distance character would be reduced/trail effectively shortened by 3.4 mi. Character of use would change. **Bean Creek Trail** *Ability to mitigate is moderate* Mitigation: Formalize trailhead parking; reroute trail to cross under Juneau Creek bridge; interpretive sign for trail history. However, highway visual/noise/ recreation intrusion at a point 1.75 miles into trail, and the severing and likely disuse of the historic alignment, remain. **Juneau Falls Recreation Area** *Ability to mitigate is good.* Mitigation: New trailhead and trail connections for walkers and horses; formalized falls overlook; pedestrian amenities on bridge with connections to Bean Creek and Resurrection Pass trails and to parking. However a change in character of the area would remain. **Sqilantnu Archaeological District, and Confluence TCP** *Ability to mitigate is moderate.* Mitigation for districts and TCP will be documented in a Section106 agreement that would likely include the following: data recovery from some portion of affected contributing features; interpretation; funding of Sqilantnu and TCP management plan. However, some loss of data is expected.
Summary	Can recover some data, but not all impacts can be eliminated. Stetson Creek Trail enhancements mitigate recreation impacts but cannot entirely mitigate severing of historic alignment.	Can recover some data at archaeological/historic properties and Bean Creek Trail, but not all impacts can be eliminated. KRSMA impacts not completely mitigated.	Mitigation of recreation sites would be substantial but cannot eliminate all adverse impacts. Mitigation of KNWR land converted to transportation purposes has not been addressed at this time, because this alternative is not expected to be selected as long as it crosses KNWR land and Wilderness.	Mitigation of recreation sites would be substantial but cannot eliminate all adverse impacts. Sqilantnu/TCP impacts substantial with partial ability to mitigate.

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Table 4.8-13. Least Overall Harm Factor ii, severity of impacts to Section 4(f) properties after mitigation

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Impact Detail	**Stetson Creek Trail** • Trail length reduced by 0.32 mile (of 5.2 miles). • Trail would parallel road (noise, visual change) over approximately 1,600 feet. • Trail would no longer connect to campground, but dual-access management issue would be resolved. • Historic alignment compromised. **Cooper Landing Boat Launch and Day Use Area** • Popular area closed and/or restricted during construction. Short duration closures during summer (longer closures possible at less popular times). **Sqilantnu Archaeological District** • 27 contributing properties impacted. • Some information gained instead of remaining in the ground. • Some data lost. **Confluence TCP** • Minor change in setting, feeling, and association of culturally important lands. • Same as Sqilantnu. **Hubbard Claims Historic District** • 6 contributing properties impacted. • Some information gained instead of remaining in the ground. • Some data lost. **Kenai Mining Historic District** • 3 contributing properties impacted. • Some information gained instead of remaining in the ground. • Some data lost.	**KRSMA** • 2–3 new piers in water. • 1 new bridge (3 total), and visual/noise/recreation changes at new bridge. **Bean Creek Trail** • The highway crossing of the trail remains as an impact despite mitigation to retain continuity. • No snow in undercrossing for winter users. • Minor routing off historic alignment. **Sqilantnu Archaeological District** • 25 contributing properties impacted. • Some information gained instead of remaining in the ground. • Some data lost. **Confluence TCP** • Minor change in setting, feeling, and association of culturally important lands. • Same as Sqilantnu. **Hubbard Claims Historic District** • 4 contributing properties impacted. • Some information gained instead of remaining in the ground. • Some data lost.	**Kenai National Wildlife Refuge** • 33.4 ac. loss of land to highway right-of-way within KNWR; of this 19.2 ac. is designated Wilderness • About half of this acreage would be cleared (habitat loss within KNWR). • Habitat fragmented/wildlife movement inhibited inside and outside KNWR. **Resurrection Pass Trail** • Trail effectively shortened 3.4 mi/9%. • Changes to up-valley trail use. • See also Juneau Falls Recreation Area. **Bean Creek Trail** • Trail rerouted off historic alignment. • Changes to up-valley trail use. • See also Juneau Falls Recreation. **Juneau Falls Recreation Area** • Noise/visual/activity change in character from backcountry to front-country. **Sqilantnu Archaeological District** • 13 contributing properties impacted. • Some information gained instead of remaining in the ground. • Some data lost. **Confluence TCP** • Minor to moderate change in setting, feeling, and association of culturally important lands; affects lands outside existing highway corridor but affects fewer archaeological sites than G South & Cooper Creek alternatives. • Same as Sqilantnu.	**Resurrection Pass Trail** • Trail effectively shortened 3.4 mi./ 9%. • Changes to up-valley trail use. • See also Juneau Falls Recreation Area. **Bean Creek Trail** • Trail rerouted off historic alignment. • Changes to up-valley trail use. • See also Juneau Falls Recreation Area. **Juneau Falls Recreation Area** • Noise/visual/activity change in character from backcountry to front-country. **Sqilantnu Archaeological District** • 22 contributing properties impacted. • Some information gained instead of remaining in the ground. • Some data lost. **Confluence TCP** • Moderate change in setting, feeling, & association of culturally important lands; affects lands outside existing highway corridor and near human burials but affects fewer archaeological sites than G South & Cooper Creek alternatives. • Same as Sqilantnu.
Impact Summary *Compared to other alternatives*	Lowest severity of impacts among the alternatives after mitigation (but more properties impacted).	Intermediate severity of impacts among the alternatives after mitigation.	Greatest severity of impacts among the alternatives after mitigation.	Higher severity of impacts among alternatives, although less than Juneau Creek Alternative.

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Table 4.8-14. Least Overall Harm Factors iii and iv, relative significance of Section 4(f) properties, and views of officials with jurisdiction regarding Section 4(f) properties

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Properties Affected *(See also Table 4.8-6 in Section 4.8.3)*	**KRSMA**: Higher significance compared to other properties (impact *de minimis*). **Stetson Creek Trail:** Lower significance compared to other properties. **USFS Kenai River Rec. Area:** Moderate significance compared to other properties (impact *de minimis*). **Cooper Landing Boat Launch and Day Use Area:** Moderate significance compared to other properties (and impact not permanent). **Sqilantnu District:** Higher significance compared to other properties. **Confluence TCP:** Higher significance compared to other properties. **Hubbard Claims Distr**ict: Lower significance compared to other properties. **Kenai Mining District:** Lower significance compared to other properties.	**KRSMA**: Higher significance compared to other properties. **Bean Creek Trail:** Moderate significance compared to other properties. **USFS Kenai River Rec. Area:** Moderate significance compared to other properties (impact *de minimis*). **Sqilantnu District:** Higher significance compared to other properties. **Confluence TCP:** Higher significance compared to other properties. **Hubbard Claims District:** Lower significance compared to other properties.	**KNWR:** Higher significance compared to other properties. **Resurrection Pass Trail:** Higher significance compared to other properties. **Bean Creek Trail:** Moderate significance compared to other properties. **Juneau Falls Rec Area:** Moderate significance compared to other properties **Sqilantnu District:** Higher significance compared to other properties. **Confluence TCP:** Higher significance compared to other properties.	**Resurrection Pass Trail:** Higher significance compared to other properties. **Bean Creek Trail:** Moderate significance compared to other properties. **USFS Kenai River Rec. Area:** Moderate significance compared to other properties (impact *de minimis*). **Juneau Falls Rec Area:** Moderate significance compared to other properties. **Sqilantnu District:** Higher significance compared to other properties. **Confluence TCP:** Higher significance compared to other properties.
Summary *(See discussion of relative significance in Section 4.8.3).*	Low-moderate significance relative to properties used by other alternatives. Most are historic and archaeological properties that are important to Tribes, SHPO, and land managing agencies. However, Sqilantnu and Confluence TCP are considered quite important. KRSMA is of high significance, but impacts are *de minimis*. *3 Higher; 2 Moderate; 3 Lower* *(1 "Higher" and 1 "Moderate" are de minimis)*	Moderate significance relative to properties used by other alternatives. Historic and archaeological sites are important to Tribes and SHPO. However, Sqilantnu and Confluence TCP are considered quite important. KRSMA is of high importance. *3 Higher; 2 Moderate; 1 Lower* *(1 "Moderate" is de minimis)*	Higher significance relative to other properties used by other alternatives. KNWR important nationally and to State and public. Resurrection Pass Trail important to USFS and public, with national reputation. Bean Creek Trail of moderate importance. Juneau Falls Recreation Area important to USFS. Sqilantnu and Confluence TCP quite important to Tribes, SHPO, and agencies. *4 Higher; 2 Moderate; 1 Lower*	Medium to higher significance relative to sites used by other alternatives. Resurrection Pass Trail important to USFS and public, with national reputation. Bean Creek Trail of moderate importance. Juneau Falls Recreation Area important to USFS. Sqilantnu and Confluence TCP quite important to Tribes, SHPO and agencies. *3 Higher; 3 Moderate; 0 Lower(1 "Moderate" is de minimis)*
iv. Views of officials with jurisdiction regarding 4(f) properties				
View of Officials for Each Property	**Stetson Creek Trail:** Valued by USFS but not as important as Resurrection Pass or Bean Creek trails. **Cooper Landing Boat Launch and Day Use Area:** Valued by ADFG/DPOR because highly used. **Sqilantnu District:** Highly valued by SHPO, Tribes, USFS, and USFWS. **Confluence TCP** Highly valued by SHPO, Tribes, USFS, and USFWS. **Hubbard Claims District:** SHPO views as generally important because eligible for NRHP. **Kenai Mining District:** SHPO views as generally important because eligible for NRHP.	**KRSMA**: Kenai River highly valued by State, USFS, USFWS, Borough, and other agencies. **Bean Creek Trail:** Valued by USFS, State, and Borough but not as highly as Resurrection Pass Trail. Valued by SHPO as generally important because eligible for NRHP. **Sqilantnu District:** Highly valued by SHPO, Tribes, USFS, and USFWS. **Confluence TCP** Highly valued by SHPO, Tribes, USFS, and USFWS. **Hubbard Claims District:** SHPO views as generally important because eligible for NRHP.	**KNWR:** Highly valued by USFWS. **Res. Pass Trail:** Highly valued by USFS. **Bean Creek Trail:** Valued by USFS, State, and Borough but not as highly as Resurrection Pass Trail. Valued by SHPO as generally important because eligible for NRHP. **Juneau Falls Rec Area:** Highly valued by USFS. **Sqilantnu District:** Highly valued by SHPO, Tribes, USFS, and USFWS. **Confluence TCP:** Highly valued by SHPO, Tribes, USFS, and USFWS.	**Res. Pass Trail:** Highly valued by USFS. **Bean Creek Trail:** Valued by USFS, State, and Borough but not as highly as Resurrection Pass Trail. Valued by SHPO as generally important .because eligible for NRHP. **Juneau Falls Rec Area:** Highly valued by USFS. **Sqilantnu District:** Highly valued by SHPO, Tribes, USFS, and USFWS. **Confluence TCP:** Highly valued by SHPO, Tribes, USFS, and USFWS.

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Table 4.8-15. Least Overall Harm Factor vs. degree to which alternative meets purpose and need

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Need 1: Reduce Congestion				
Level of Service (LOS) in 2043 *Eastbound (EB) and westbound (WB) LOS at the 100th highest traffic hour of the year. Percentage calculated on both directions of travel.*	EB: 4 segments at LOS D; 2 segments at LOS C. WB: 6 segments at LOS C. 61% at LOS C or better	EB: 3 segments at LOS D; 3 segments at LOS C. WB: 3 segments at LOS C; 3 segments at LOS B. 69% at LOS C or better	EB: 2 segments at LOS D; 4 segments at LOS C. WB: 4 segments at LOS C; 2 segments at LOS B. 83% at LOS C or better.	EB: 2 segments at LOS D; 4 segments at LOS C. WB: 4 segments at LOS C; 2 segments at LOS B. 82% at LOS C or better
Congestion relief: *Passing lanes* *Percent (%) of length with passing lanes*	29	26	42	39
Congestion avoidance*: Intersections and driveways*[a] *(fewer is better)*	42	20	11	11
Need 2: Meet Standards for a Rural Principal Arterial (Note: all build alternatives would meet the current highway design standards)				
Horizontal Curves *Minimum design speed selected for this project = 60mph* | *Desirable design speed for 'rural principal arterial' class nationwide = 65mph*				
Total number of horizontal curves *(existing highway = 43)*	27	25	21	22
Number of curves at or better than the "desirable" standard	23	24	20	21
Number below "desirable"	4	1	1	1
Grades				
Percent (%) of length above maximum grade (>6% grade)	0	0	0	0
Percent (%) of length at 5.9%-6% grade (steep)	9	8	2	0
Percent (%) of length at >5% grade (hilly)	9	14	16	26
Need 3: Improve Safety (Note: curve information and congestion information above are also indicators of relative safety)				
Anticipated reduction in crash rate based on meeting highway design standards[b]	65%	65%	65%	65%
Summary	Last among the build alternatives for how well it addresses LOS. Many intersections reduce efficiency and safety. More curves/greater percentage than other alternatives of curves less than "desirable."	Third among the build alternatives for how well it addresses LOS. Has half the intersections of Cooper Creek Alternative, but more than double the Juneau Creek alternatives, so intermediate in this safety and congestion factor.	Best among the build alternatives for how well it addresses LOS. Fewest intersections. Likely to be less congested and safer than Cooper Creek and G South alternatives.	Similar to Juneau Creek Alternative: Close second among the build alternatives for how well it addresses LOS and safety.

[a] For comparison, the No Build Alternative currently has 75 intersections of driveways and side roads.
[b] Meeting design standards is known to reduce crashes. This is based on statistics related to lane and shoulder width and other standards.

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Table 4.8-16. Least Overall Harm Factor vi, magnitude of impacts to non-4(f) resources

Much of the project area is encompassed by the Sqilantnu Archaeological District, a Section 4(f) resource. Therefore, technically some of the resources discussed below are within the bounds of a Section 4(f) resource. For the purposes evaluating Factor vi, they are included, as they are not typically identified as Section 4(f) resources.

Impact Category		Impacts by Alternative							
		Cooper Creek Alternative		G South Alternative		Juneau Creek Alternative		Juneau Creek Variant Alternative	
Land Ownership (see Section 3.1)									
Land Ownership *(acres, % in project area)*	Federal (9,008)	54	<1%	90	1%	167	2%	115	1%
	USFS	54	<1%	90	1%	134	1%	115	1%
	USFWS	-	-	-	-	33	<1%	-	-
	State (1,720)	9	<1%	43	3%	90	5%	92	5%
	Borough (2,013)	93	5%	126	6%	129	6%	129	6%
	Native/CIRI (61)	1	2%	1	2%	-	-	12	19%
	Private (698)	57	8%	<1	<1%	<1	<1%	<1	<1%
	Total (13,500)	**214**	**2%**	**261**	**2%**	**387**	**3%**	**349**	**3%**
Land Use (see Section 3.2)									
National Forest Inventoried Roadless Area (IRA) Lands *(Acres of right-of-way)*		3.8 acres		48.4 acres		127.5 acres		96 acres	
Social Environment (see Section 3.3)									
Community Impacts		Change in local traffic patterns and community character through rerouting of traffic, less for the Cooper Creek Alternative, more for the G South, Juneau Creek, and Juneau Creek Variant alternatives.							
Housing and Relocation (see Section 3.4)									
Private Property Acquisition and Relocations *(number of affected parcels)*	**Private**	**38**		**4**		**4**		**4**	
	Full Parcel	16 *(8 residential properties and approximately 14 people relocated)*		0 *(0 relocations)*		0 *(0 relocations)*		0 *(0 relocations)*	
	Part of Parcel	22		4		4		4	
	Native Corporation	**2**		**2**		**0**		**1**	
	Full Parcel	0		0		0		0	
	Part of Parcel	2		2		0		1	
Economic Environment (see Section 3.5)									
Tax Base/Business Impacts		Similar impact types to other build alternatives, but adverse impacts lower because all traffic would remain routed through a portion of the central commercial area of Cooper Landing.		Would not result in any business relocations. These alternatives would remove 70 percent of the traffic from all of the central commercial area of Cooper Landing. Thirty percent of the traffic would continue traveling through Cooper Landing on the "old" highway. Adverse impacts would result from reduced spontaneous stops for services; businesses impacted would need to adapt to the altered traffic pattern or risk failure.					

Impact Category	Impacts by Alternative			
	Cooper Creek Alternative	**G South Alternative**	**Juneau Creek Alternative**	**Juneau Creek Variant Alternative**
Transportation (see Section 3.5)				
Roadway System: ***Travel Patterns***	This alternative would remove 70% of traffic from a portion of the central commercial area of Cooper Landing (MP 48-50) but would retain all traffic in the MP 47-48 portion. No change in overall traffic volumes.	This alternative would remove 70% of all traffic from all of the central commercial area of Cooper Landing (approximately MP 47 to 50). No change in overall traffic volumes.	These alternatives would remove 70% of all traffic from all of the central commercial area of Cooper Landing (approximately MP 47 to 50) and from the primary recreation corridor (approximately MP 50 to 55). No change in overall traffic volumes.	
Roadway System: ***Accessibility***	Under this alternative, getting on and off the highway would remain difficult at some times because all traffic would remain in town in the MP 47-48 area.	Under these alternatives, accessibility for Cooper Landing businesses and residents along the "old" Sterling Highway is expected to improve because traffic would be lighter in this area.		
Aviation, Pedestrians, and Bicyclists	No impacts			
Existing pullouts *not* retained	10	10	5	6
Non Section 4(f) Recreation Resources (see also Section 3.8)				
Non Section 4(f) Recreation Resources Affected	Cooper Lake Dam Road/Powerline Trail crossed with bridge	Birch Ridge Trail shortened Art Anderson/ Slaughter Gulch trail shortened	Birch Ridge Trail shortened Art Anderson/ Slaughter Gulch trail shortened Juneau Bench Trails crossed with culvert or bridge	Birch Ridge Trail shortened Art Anderson/ Slaughter Gulch trail shortened Juneau Bench Trails crossed with culvert or bridge
Subsistence (see Section 3.10)				
Changes in Resources, Resource Habitat, or Competition for Resources	Changes in both fish and wildlife resources may occur as a result of construction and operation of the build alternatives. Impacts to subsistence uses in the project area may include game species avoiding or reducing their use of habitat near the highway, actual loss of habitat within the new alignment, decreased habitat quality, fragmentation of habitat, and injury or mortality of wildlife from collisions or hazardous materials spills.			
Changes in Resource Availability due to Alteration in Wildlife Movement Patterns or Distribution	Changes to the landscape caused by project construction can influence wildlife population movement patterns and distribution through habitat loss, changes in habitat suitability, changes in habitat use, or reduced survival. In addition, the highway itself can become a barrier to animal movement patterns through design, such as steep embankments or retaining walls, or through injuries or mortality due to collisions.			
Physical or Legal Barriers to Accessing Resources	No impact			

Impact Category	Impacts by Alternative			
	Cooper Creek Alternative	**G South Alternative**	**Juneau Creek Alternative**	**Juneau Creek Variant Alternative**
Water Bodies and Water Quality (see Section 3.13)				
New Bridges (not addressed in Chapter 4)	**Cooper Creek** New Cooper Creek Bridge: • No piers or fill in creek.	**Juneau Creek** New Juneau Creek Bridge: • No piers or fill in creek	none	
Drainages	57 small drainage crossings: • 47 replacement culverts • 10 new culverts	73 small drainage crossings: • 39 replacement culverts • 32 new culverts *(drainages were combined into one culvert where possible)*	63 small drainage crossings: • 20 replacement culverts • 41 new culverts *(drainages were combined into one culvert where possible)*	
Water Quality	Increase in storm water runoff because the project area would have more paved surfaces. Cooper Creek Alternative would have least new surface area, G South Alternative more, Juneau Creek Variant Alternative more yet, and Juneau Creek Alterative most.			
Noise (see Section 3.15)				
Noise *Number of Non-4(f) resources impacted*	4 residential 1 commercial	0	0	0
Visual Environment (see Section 3.16)				
Visual Impacts	Visual analysis for the build alternatives indicates that all build alternatives have at least moderate impacts as a result of new or updated roadway elements. The analysis shows that none of the build alternatives would result in impacts that are orders of magnitude different than the others.			
Wetlands and Vegetation (see Section 3.20)				
Wetlands *(acres filled)*	11 acres	26.6 acres	38.5 acres	37.5 acres
Vegetation *(acres removed)*	188 acres	202 acres	269 acres	256 acres
Fish and Essential Fish Habitat (see Section 3.21)				
Essential Fish Habitat Impacts	1.2 acres altered Crossings: • 4 culverts • 2 bridges • 1 creek rerouted	1.0 acre altered Crossings: • 3 bridges • 5 culverts	0.8 acre altered Crossing: • 1 culvert	0.8 acre altered Crossing: • 1 culvert

Impact Category		Impacts by Alternative			
		Cooper Creek Alternative	**G South Alternative**	**Juneau Creek Alternative**	**Juneau Creek Variant Alternative**
Wildlife (see Section 3.22)					
Brown Bear Habitat *Additional habitat avoidance area created by highway segment built on new alignment*		605 acres	1,468 acres	2,834 acres	2,640 acres
Moose Habitat *(total)*		204 acres	216 acres	277 acres	266 acres
Bald Eagles	Number of nests within a 330-foot primary zone	3 nests	3 nests	0 nests	1 nest (may require removal)
	Number of nests within a 330- to 660-foot secondary zone	4 nests	2 nests	0 nests	0 nests
Summary of Impacts to Non-4(f) Properties					
Summary *See rows above for greater detail.*		Impacts least amount of IRA land. Impacts more private property and homes and is only one that requires relocations. Impacts the least acreage of wetlands and vegetation, and has lowest impacts to wildlife habitat. Alternative is adjacent to the highest number (7) of bald eagle nests. Only alternative with noise impacts to non-4(f) resources. This alternative retains more traffic within Cooper Landing community than other alternatives.	Low impacts to private property. No relocations required. High impacts to wildlife habitat. This alternative removes 70 percent of traffic from Cooper Landing (MP 47-50), and some businesses could be at risk.	Impacts most amount of IRA land. Low impacts to private property. No relocations required. Impacts greatest of all alternatives to wetlands, vegetation, and wildlife habitat. This alternative does not have any adjacent bald eagle nests. This alternative removes 70 percent of traffic from Cooper Landing commercial area (MP 47-50) and the recreation corridor (MP 50-55). Some businesses could be at risk.	Impacts relatively high amount of IRA land. Low impacts to private property. No relocations required. High impacts to wetlands, vegetation, and wildlife habitat. This alternative may require the removal of a bald eagle nest. This alternative removes 70 percent of traffic from Cooper Landing commercial area (MP 47-50) and the recreation corridor (MP 50-55). Some businesses could be at risk.

Table 4.8-17. Least Overall Harm Factor vii, substantial cost difference analysis in 2014 dollars

	Cooper Creek Alternative	G South Alternative	Juneau Creek Alternative	Juneau Creek Variant Alternative
Construction Subtotal (includes design and other project development costs)	**$290.7 million**	**$303.5 million**	**$249.6 million**	**$257.0 million**
Operations & Maintenance (annual)	*$593,400/year*	*$585,400/year*	*$608,600/year*	*$611,700/year*
O&M and Periodic Major Activities *Over 20 years*	**$23.7 million**	**$23.8 million**	**$24.2 million**	**$24.3 million**
Total Expenditures *Construction + O&M/Periodic over 20 years, in 2014 dollars*	**$314.4 million**	**$327.3 million**	**$273.8 million**	**$281.3 million**
Summary	Total public expenditures over 20 years would be 15% *more* than the *least costly* alternative. Given the current stage of preliminary design, FHWA does not consider this a substantial difference.	Total public expenditures over 20 years would be 20% *more* than the *least costly* alternative. Given the current stage of preliminary design, FHWA does not consider this a substantial difference.	Total public expenditures over 20 years would be 16% *less* than the *most costly* alternative. Given the current stage of preliminary design, FHWA does not consider this a substantial difference.	Total public expenditures over 20 years would be 14% *less* than the *most costly* alternative. Given the current stage of preliminary design, FHWA does not consider this a substantial difference.

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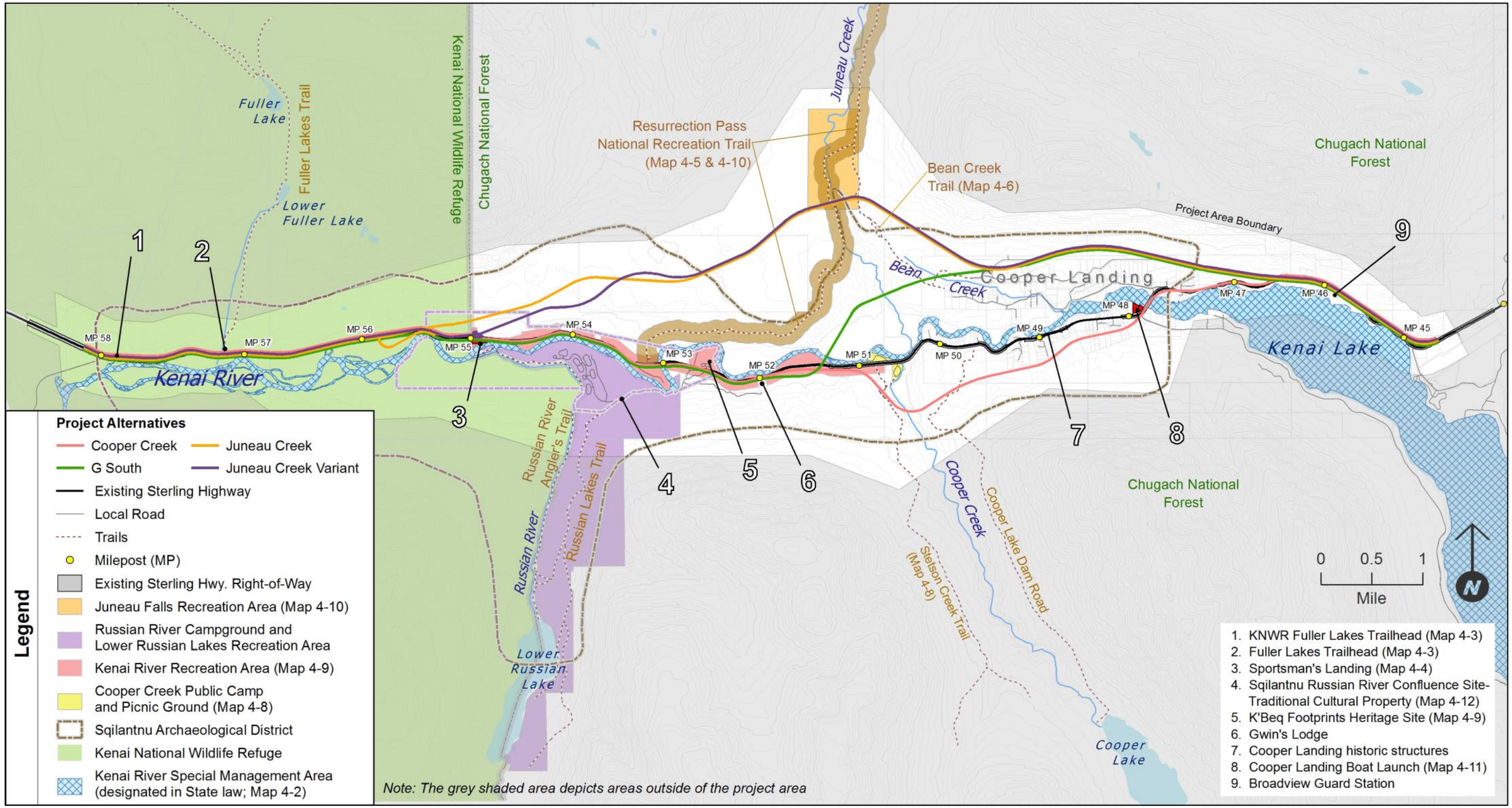

Map 4-1. Project vicinity and Section 4(f) properties

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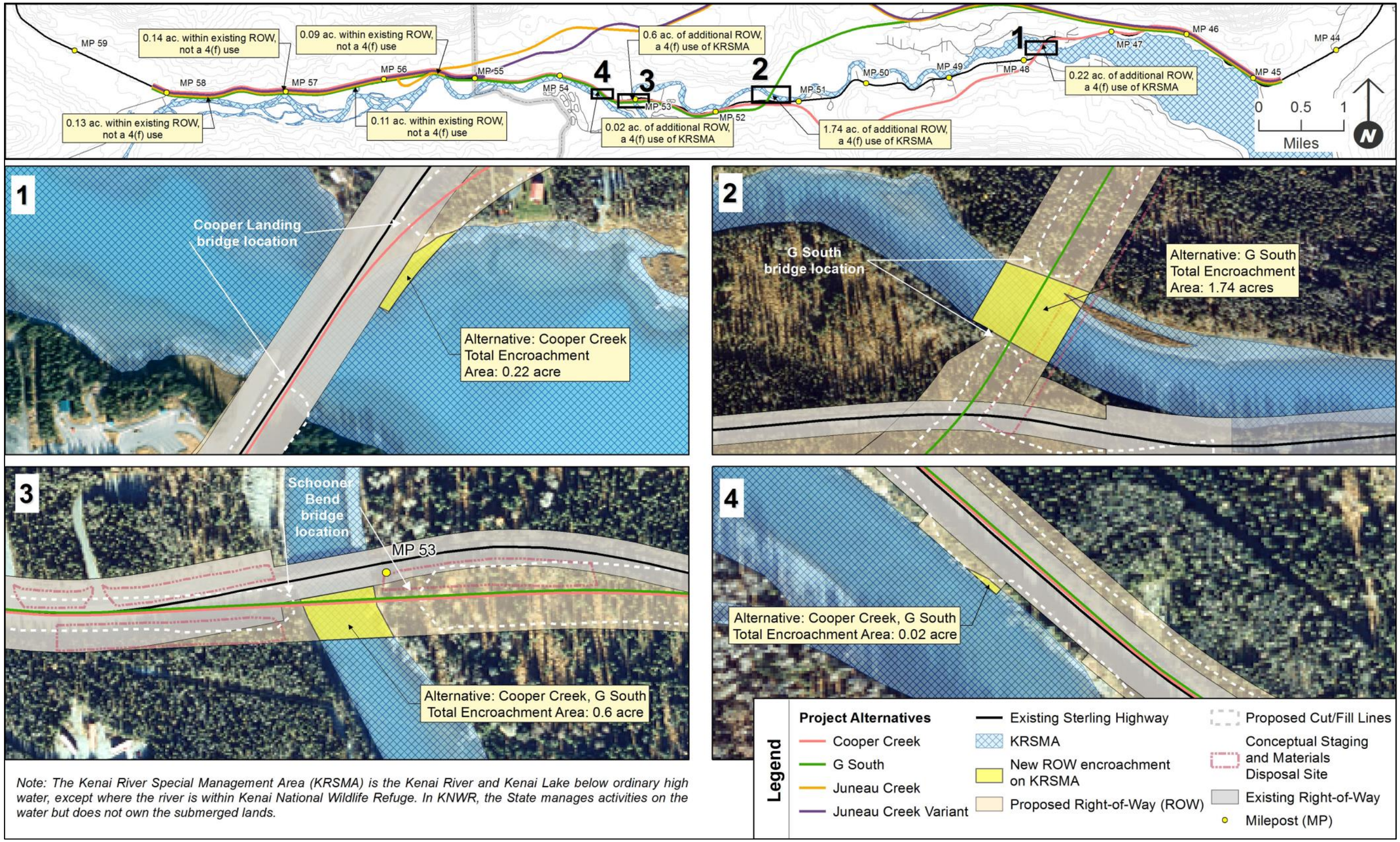

Note: The Kenai River Special Management Area (KRSMA) is the Kenai River and Kenai Lake below ordinary high water, except where the river is within Kenai National Wildlife Refuge. In KNWR, the State manages activities on the water but does not own the submerged lands.

Map 4-2. Kenai River Special Management Area

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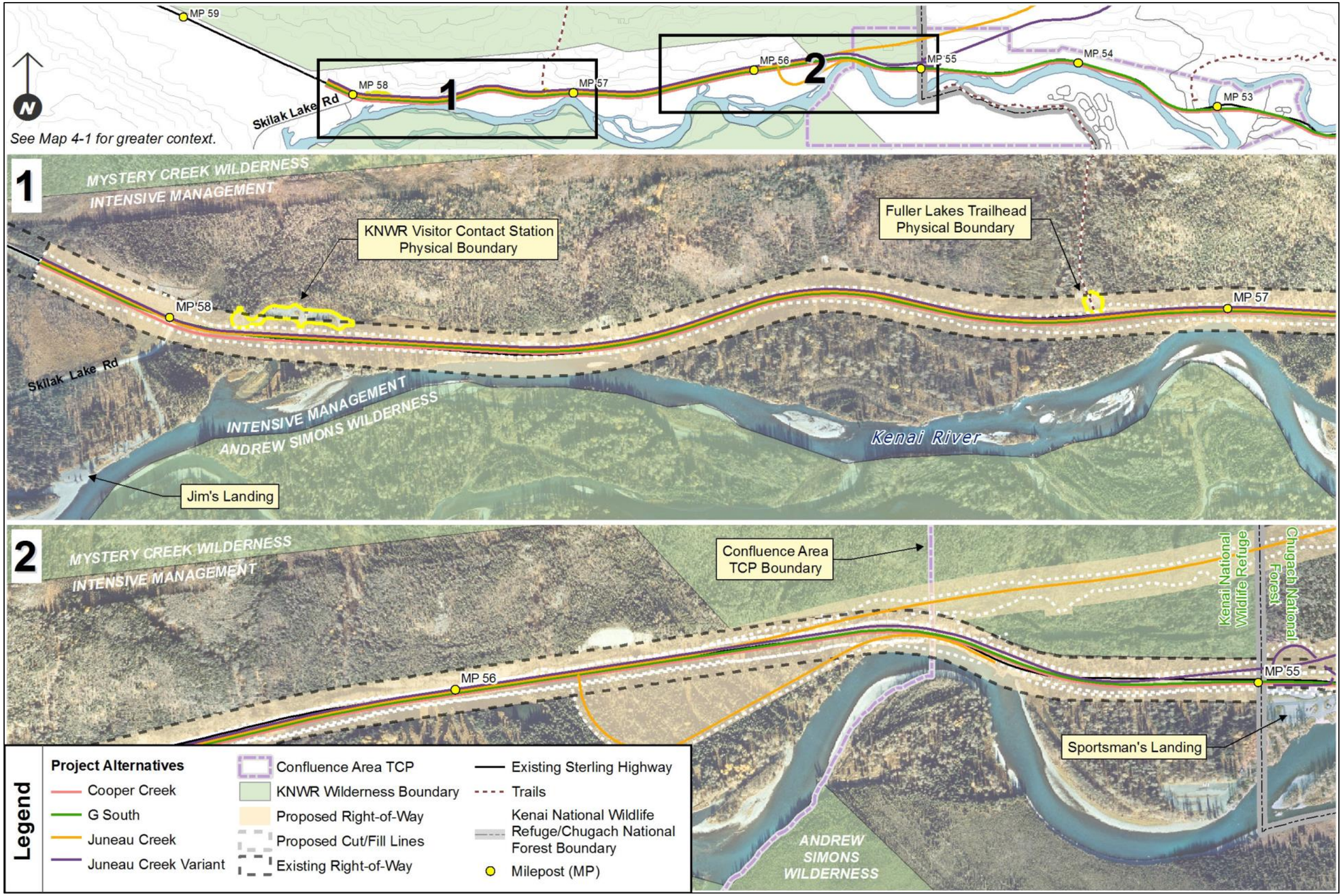

Map 4-3. Kenai National Wildlife Refuge in the MP 55 to MP 58 area

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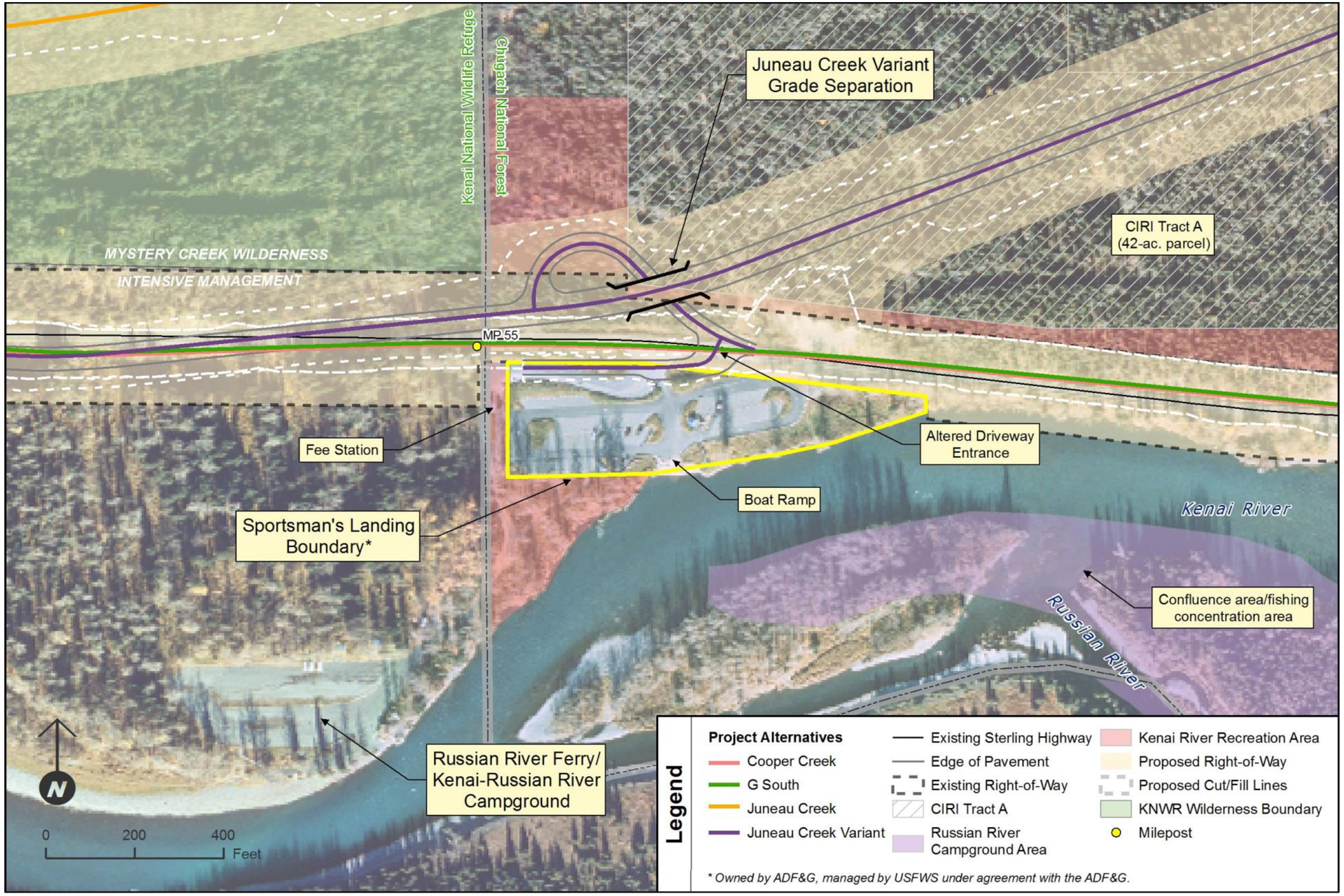

Map 4-4. Sportsman's Landing

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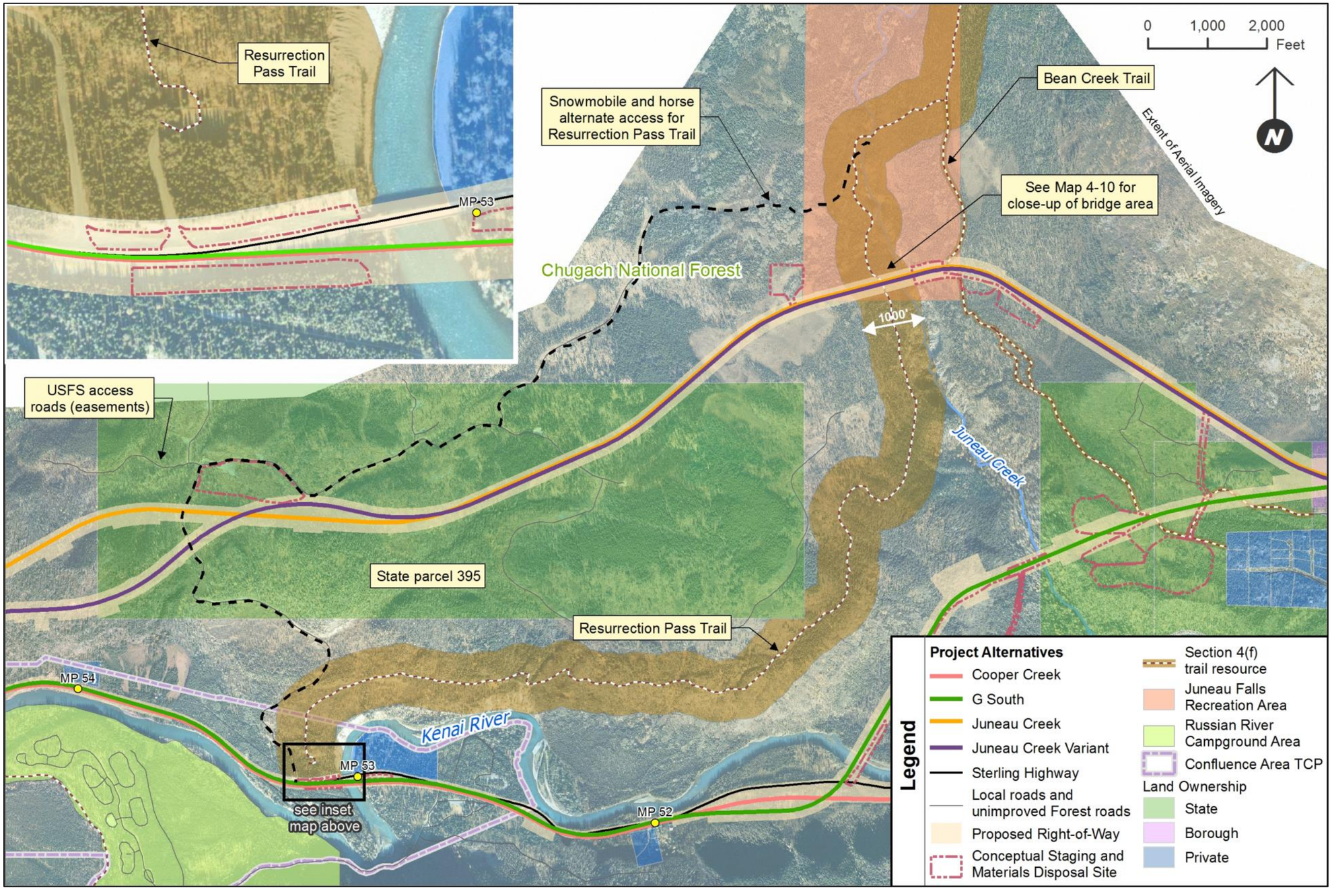

Map 4-5. Resurrection Pass Trail

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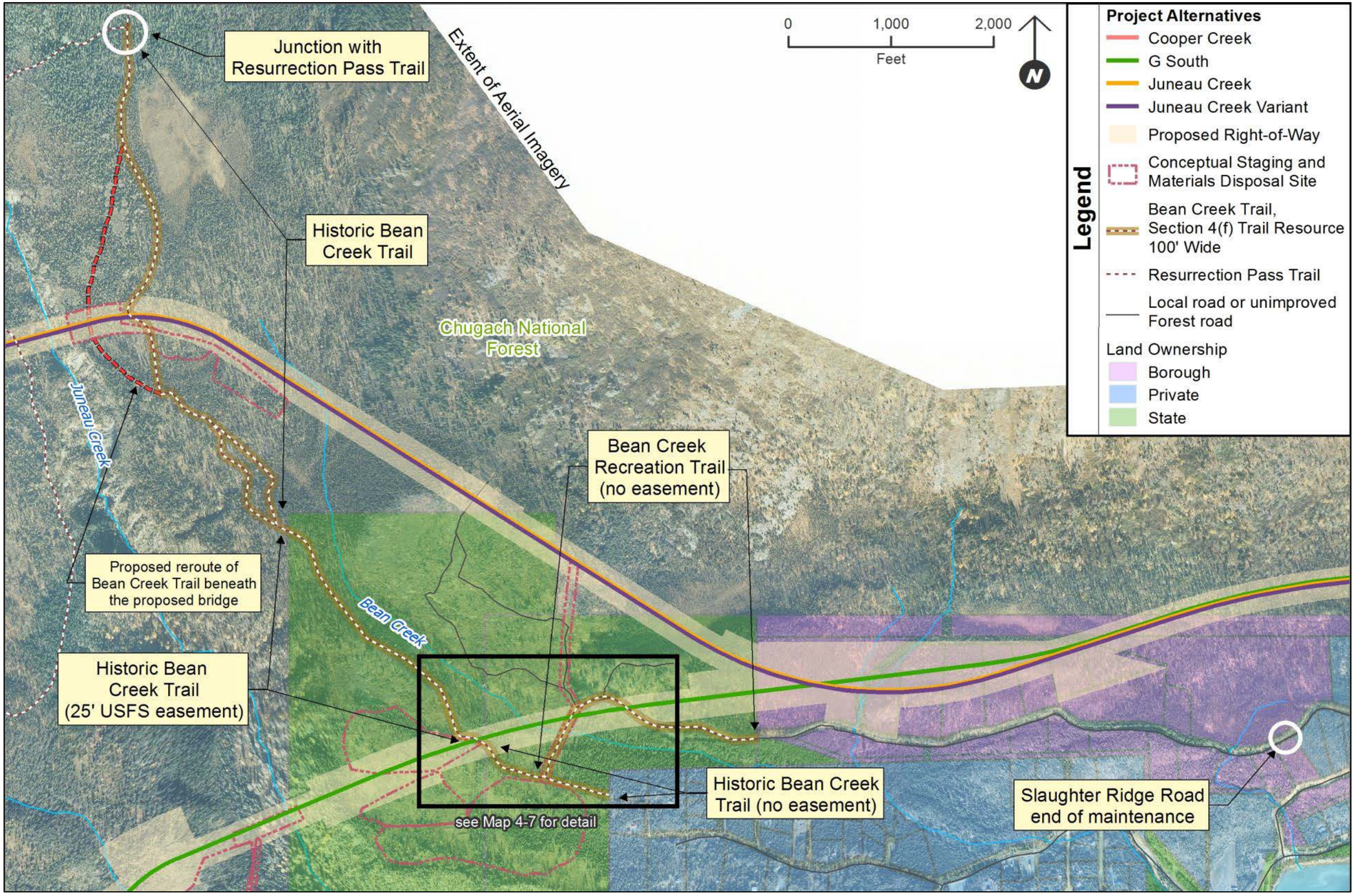

Map 4-6. Bean Creek Trail

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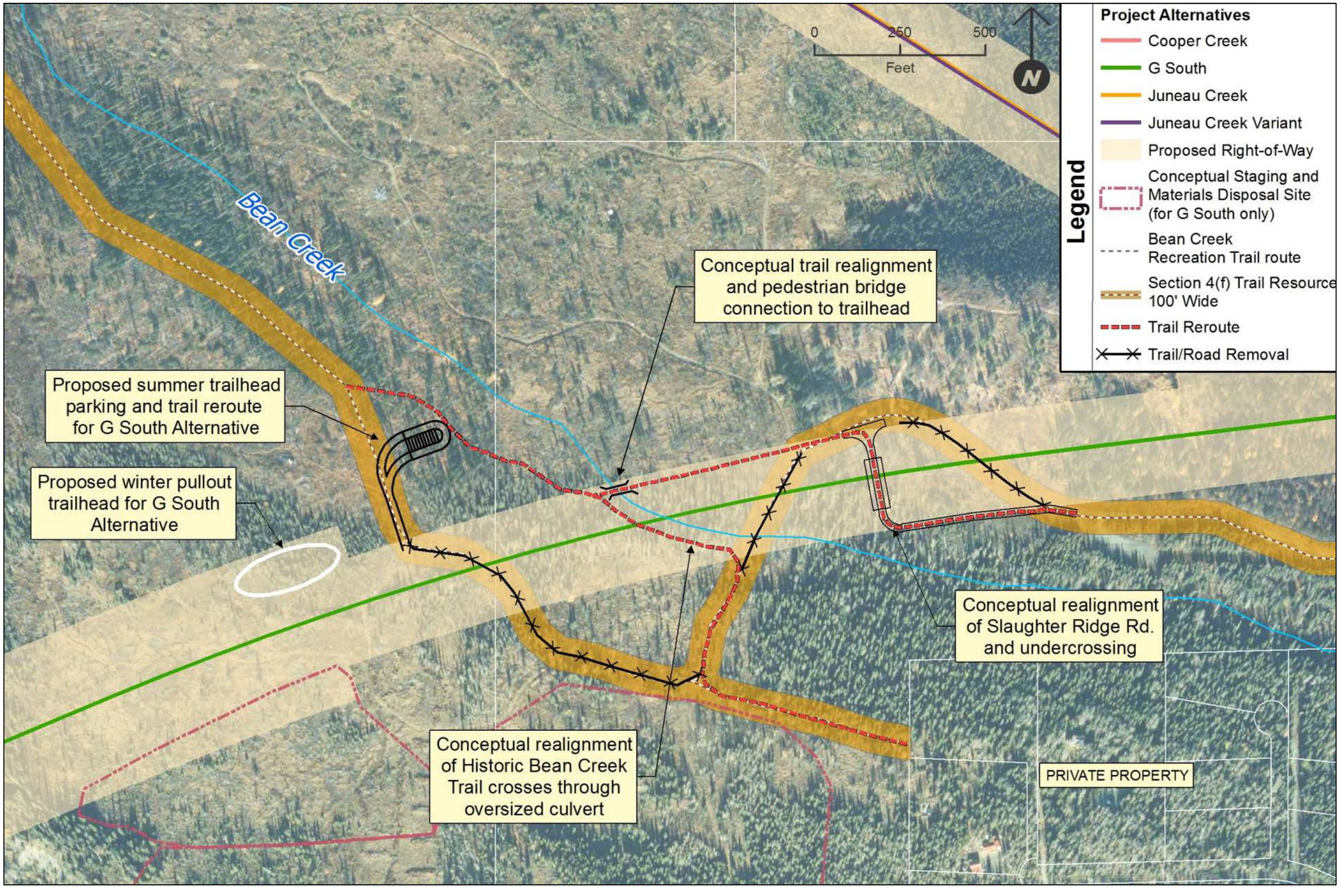

Map 4-7. Bean Creek Trail reroute—detail for G South Alternative

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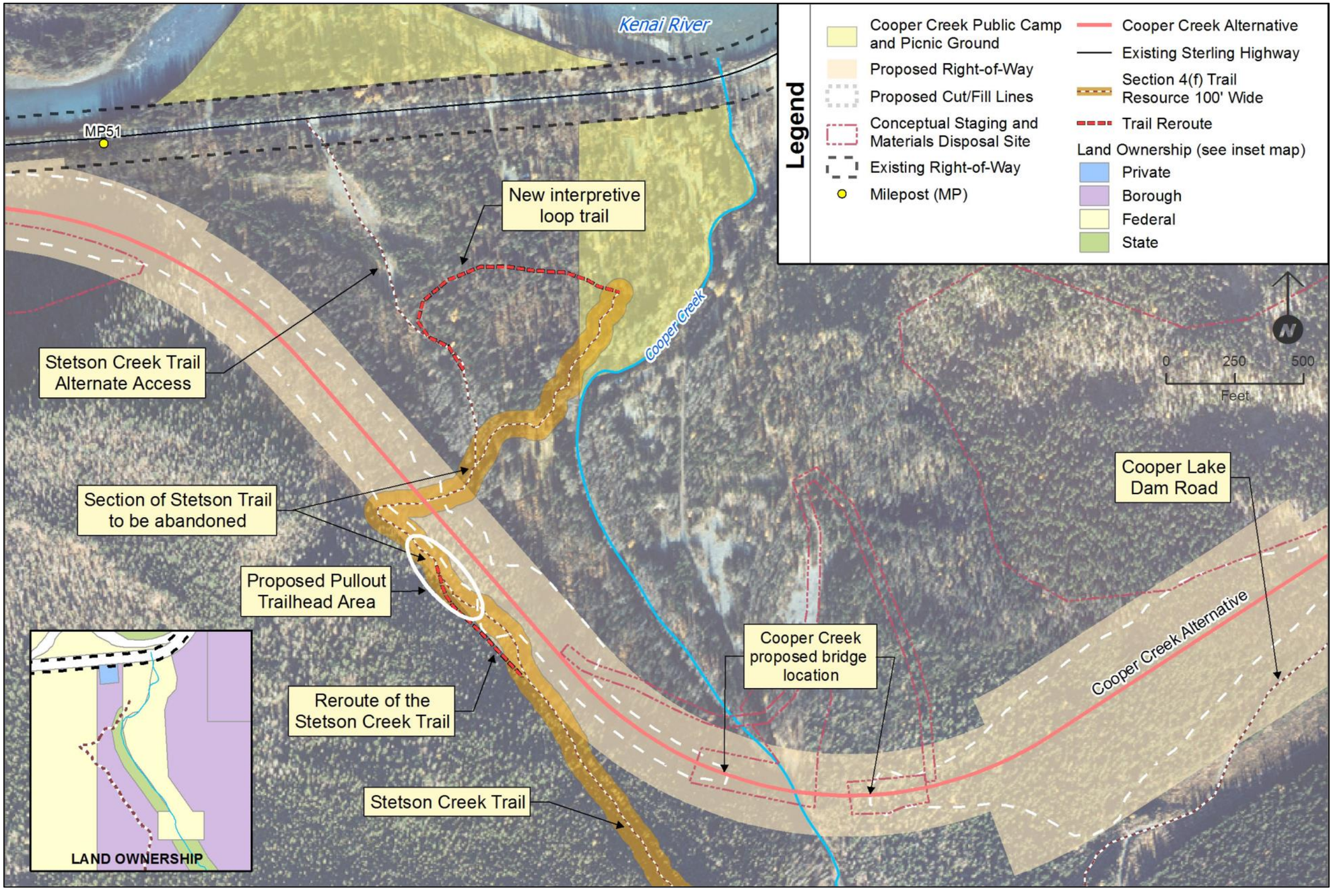

Map 4-8. Stetson Creek Trail and Cooper Creek Campground

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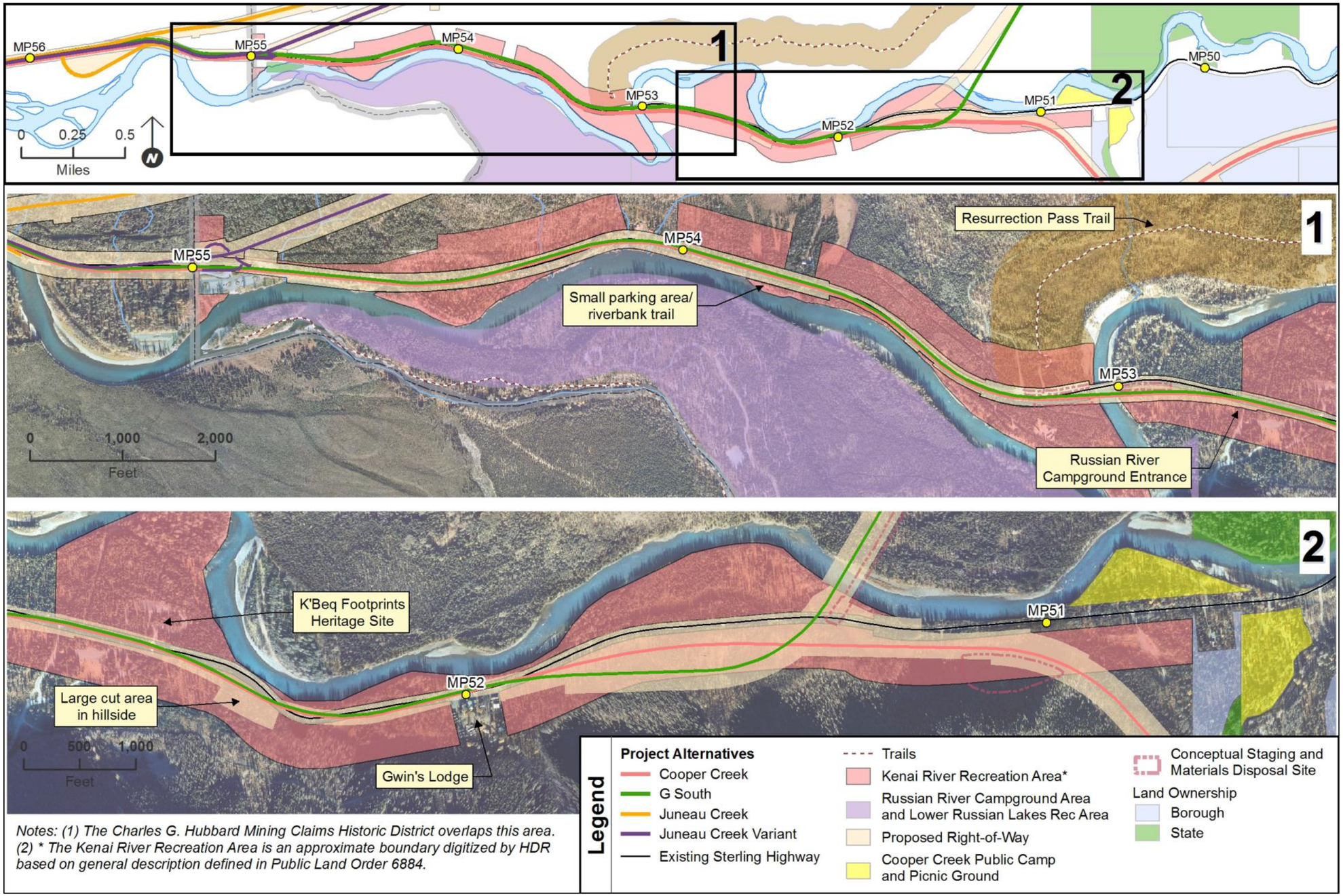

Map 4-9. USFS Kenai River Recreation Area

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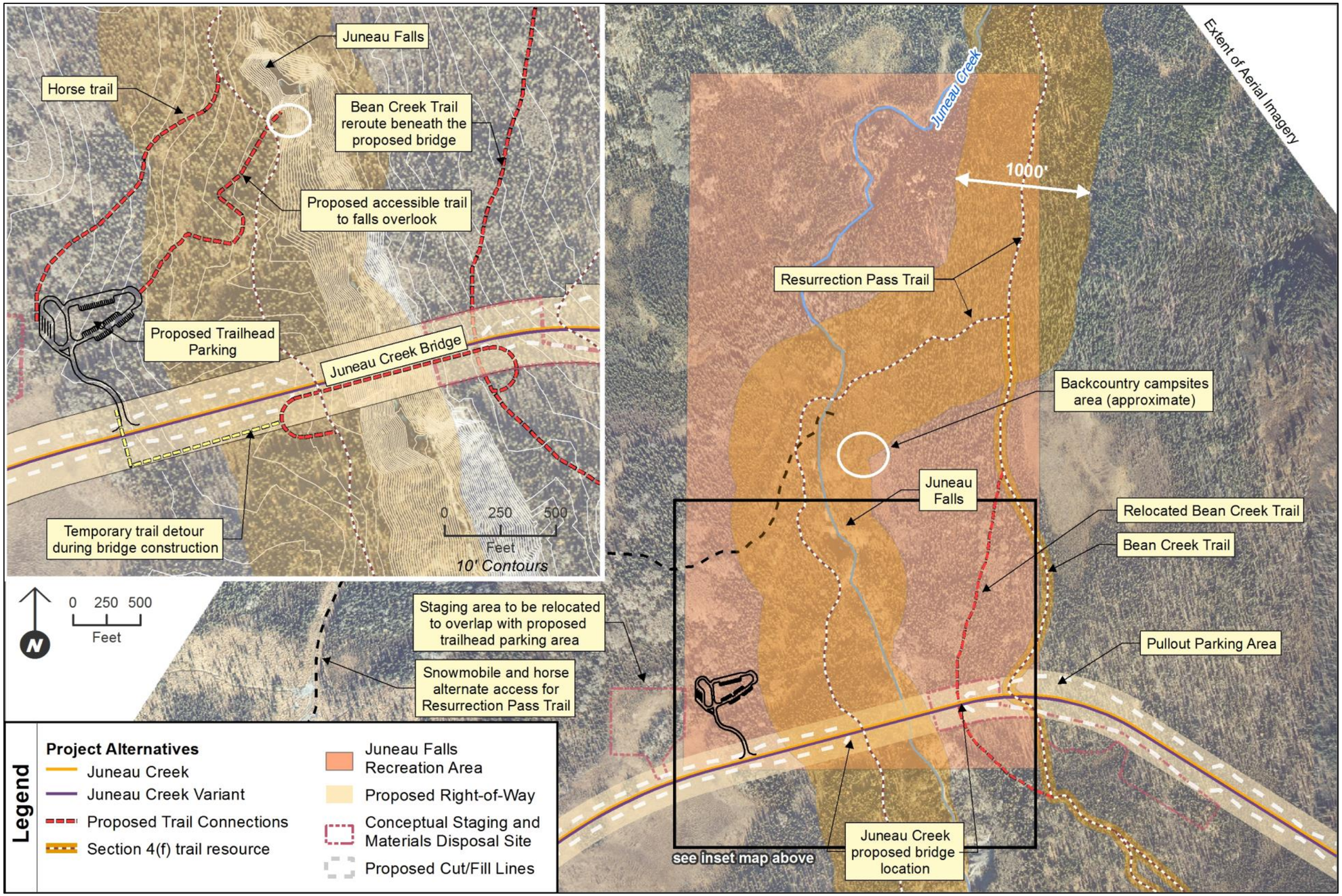

Map 4-10. Juneau Falls Recreation Area

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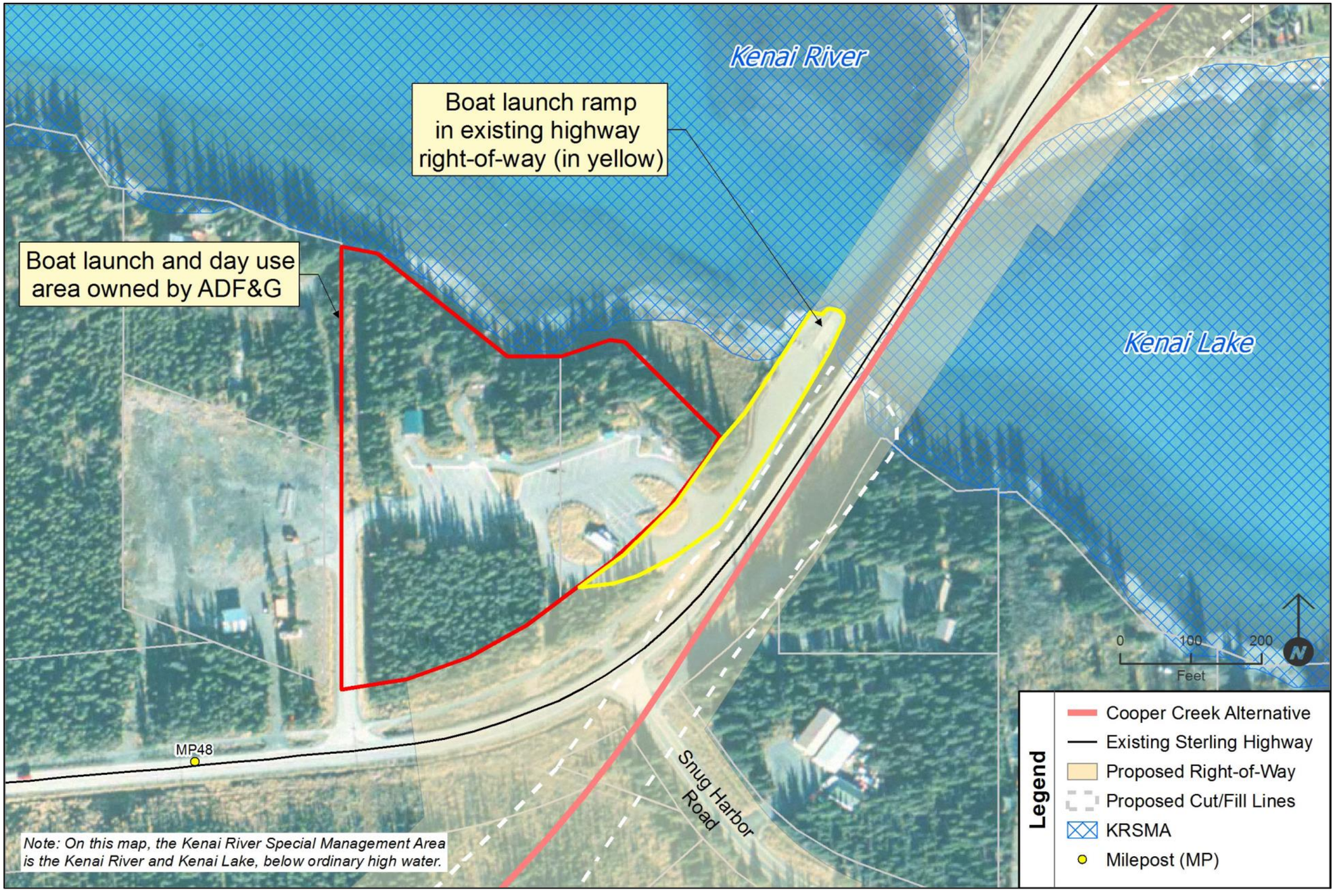

Map 4-11. Cooper Landing Boat Launch and Day Use Area

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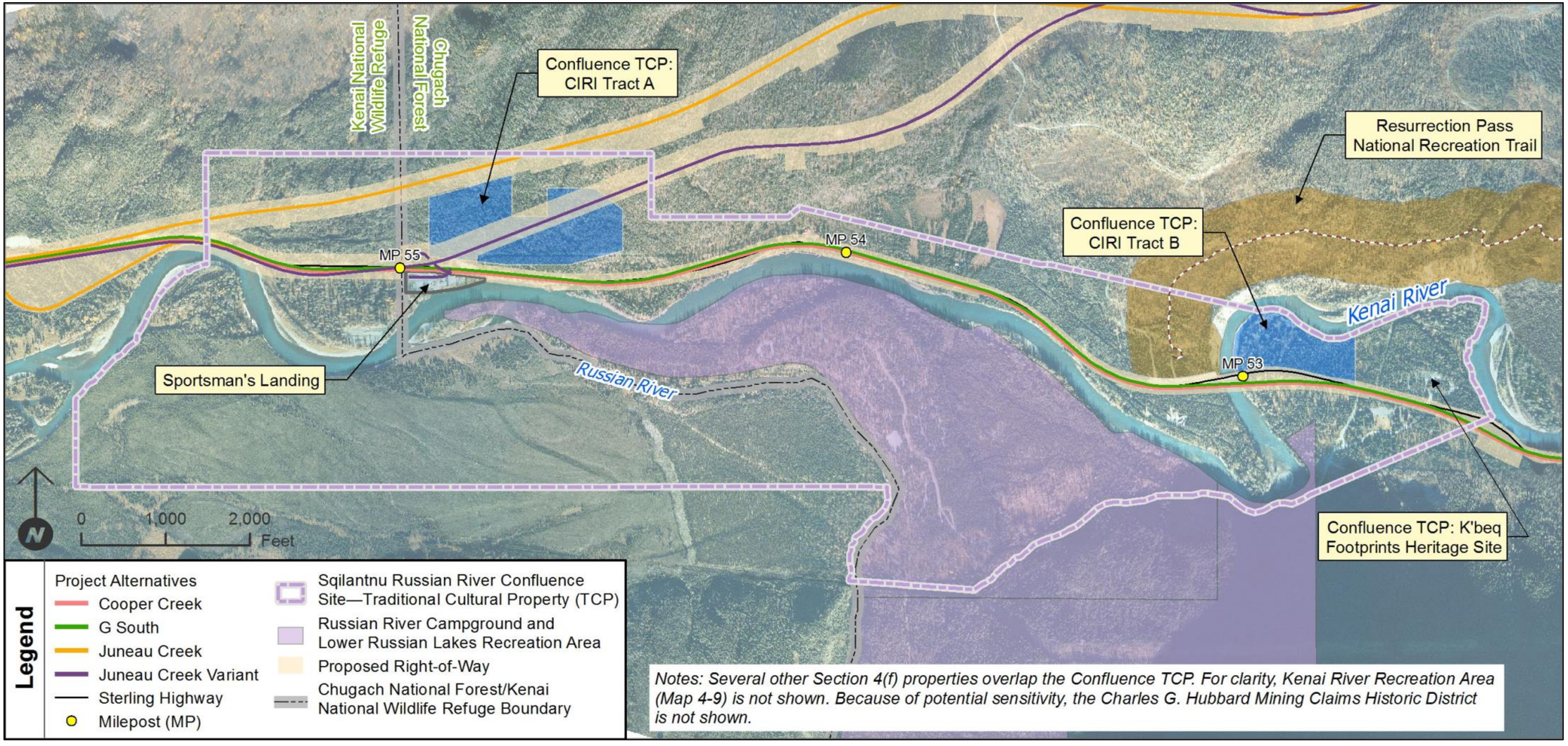

Map 4-12. Confluence TCP

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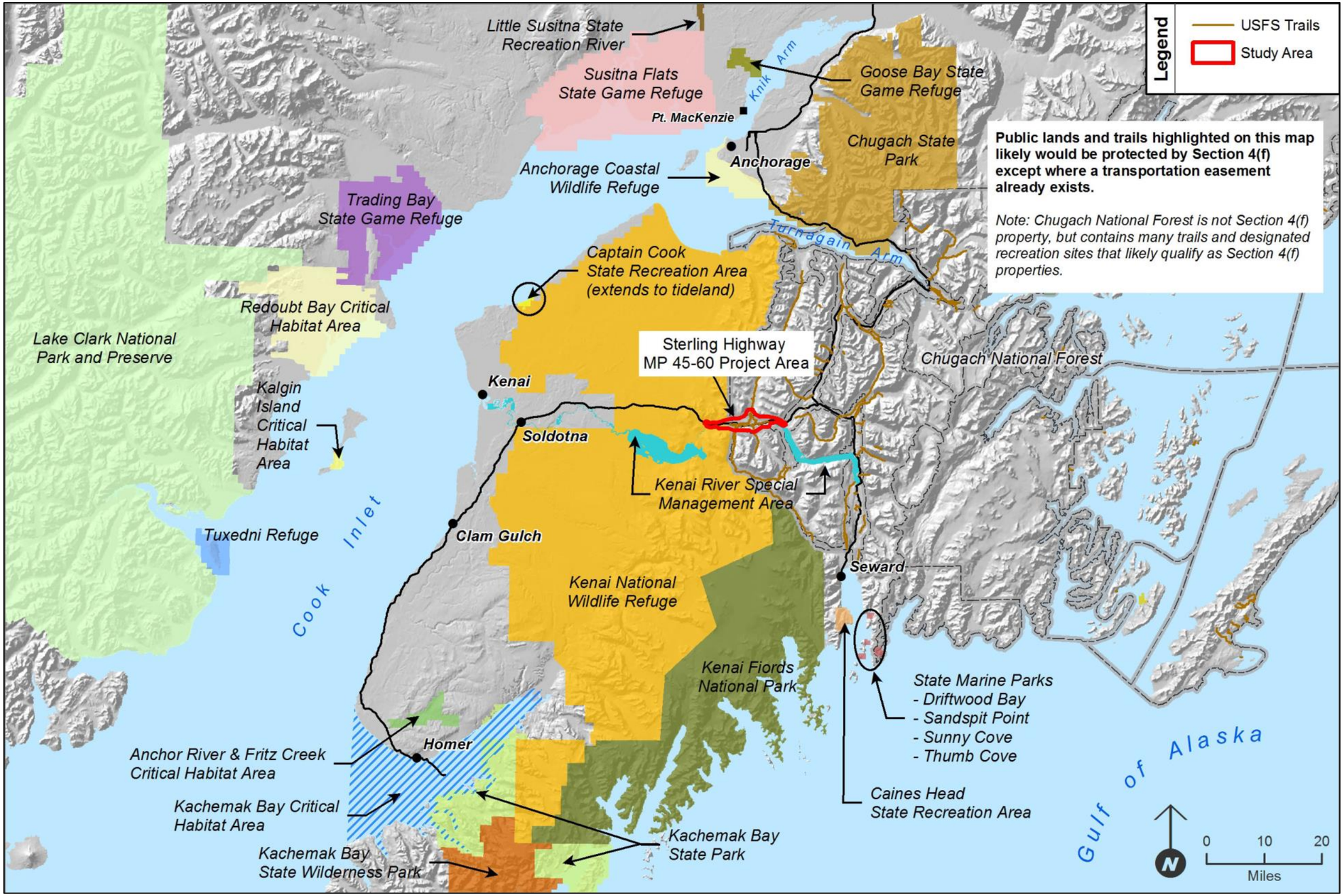

Map 4-13. Likely Section 4(f) properties in the Cook Inlet area

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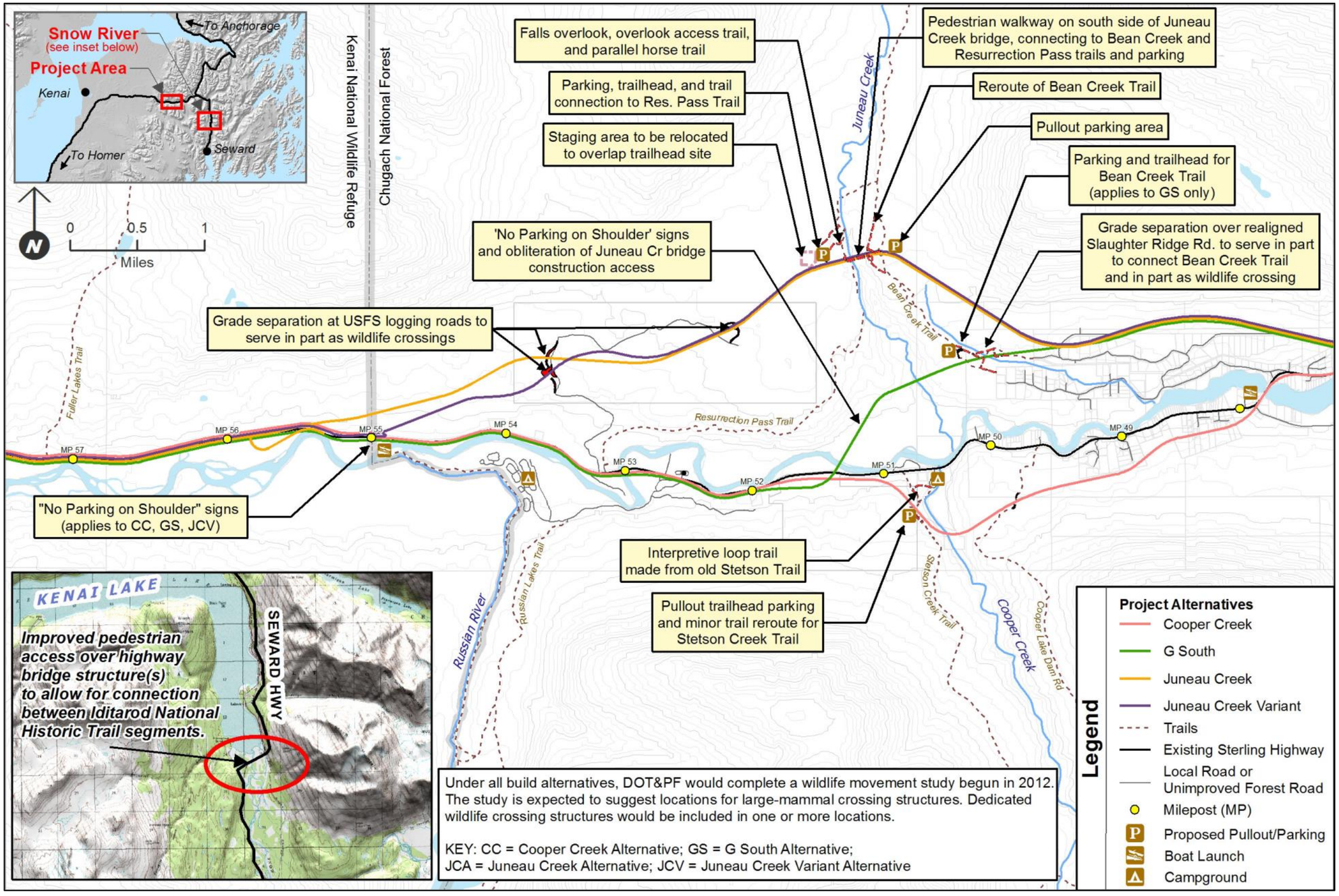

Map 4-14. Measures to minimize harm

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Sterling Highway MP 45–60
Draft SEIS and Draft Section 4(f) Evaluation

Chapter 5
Comments and Coordination

STERLING
HIGHWAY MILE POST 45 TO 60
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5 Comments and Coordination

A primary component of the proposed Sterling Highway Milepost (MP) 45–60 Project Supplemental Environmental Impact Statement (SEIS) has been involvement of key stakeholders and the consideration of comments, concerns, and input into the analysis. This chapter summarizes the coordination process, including scoping (see Section 5.1), the integrated program of agency coordination (Section 5.2.1), and public coordination and involvement activities (Section 5.3) conducted during development of the Draft SEIS to assist in determining the issues to be addressed. Tribal consultation under Section 106 of the National Historic Preservation Act (NHPA) is described in Section 5.4. This chapter includes descriptions of meetings with community groups and individuals as well as a summary of key issues and pertinent information received from the public, Alaska Native Tribes, and government agencies.

5.1 Environmental Scoping Process

Project "scoping" is a National Environmental Policy Act (NEPA) requirement in which project planners initiate a dialog with the public, Tribes, and agencies. Scoping solicits participants' views, informs them about the proposed project, and documents public outreach activities and the input of all participants. Before scoping began, project planners developed a draft scoping plan (HDR 2010e) to specify the proposed scoping activities and to guide the project team throughout the scoping process. The scoping plan laid out the process to obtain input on the project purpose and need, identification of cooperating agencies, input on what technical studies would be undertaken and by whom, and establishment of a project schedule, including dates and locations of scoping meetings. The plan described the anticipated scoping tasks and techniques, specified the scoping work products, and established a schedule of scoping activities.

Purpose of Scoping

- Provide early notification to local, State, and Federal agencies and the public of the NEPA process being undertaken by DOT&PF and FHWA
- Provide an opportunity for agencies and the public to discuss the project with DOT&PF and FHWA staff
- Provide forums and other means to gather input and ideas, answer questions, identify data needs, and understand concerns
- Data gathering from agencies and other entities (e.g., utilities)
- Engage stakeholders in identifying and reviewing the project's purpose and need and alternatives.

In accordance with the scoping plan (HDR 2010e), the Alaska Department of Transportation and Public Facilities (DOT&PF) and the project team solicited comments from affected communities (Anchorage, Cooper Landing, Kenai/Soldotna) and coordinated with government agencies, members of the public, business representatives, special interest groups, and Alaska Tribes and Native organizations[1]. The purpose of this coordination effort was to produce a Draft SEIS based on the best available information and reflective of the input received from interested parties. The information presented in this chapter provides a summary of the public and agency involvement

[1] More detailed information is available in the Scoping Summary Report (HDR and JLA 2006).

process during scoping (March 2001 through May 2003) and post-scoping, including the techniques used and their purposes. The project team obtained public comments and coordinated with agencies primarily through five important processes: public and agency scoping, stakeholder interviews, stakeholder sounding boards, listening posts, and agency coordination (primarily through an Agency Consultation Committee [ACC]). At the completion of scoping, all scoping activities were summarized in the *Scoping Summary Report* (HDR and JLA 2006) that documents the input received from scoping activities.

5.1.1 Notice of Intent

For the Sterling Highway MP 45–60 Project, the Federal Highway Administration (FHWA) (in cooperation with DOT&PF) published a Notice of Intent (NOI) To Prepare a Draft SEIS and Section 4(f) Evaluation in the *Federal Register* on May 19, 2003 (Volume 68, Number 96).[2] The purpose of the NOI was to notify the public, Tribes, agencies, and local governments of the plan to prepare an SEIS due to the passage of time since the Draft Environmental Impact Statement (EIS) for Sterling Highway MP 37 to 60 Project had originally been formally noticed. The NOI presented the project purpose and invited public comment.

5.1.2 Coordination and Outreach Techniques

Extensive project scoping activities were conducted from July 2000 to May 2003[3]. Four types of meetings were used because of the range of agencies and stakeholders affected by the Sterling Highway MP 45–60 Project.

- ACC meetings
- Individual stakeholder interviews
- Stakeholder Sounding Board (SSB) meetings
- Public Listening Posts

Additional scoping techniques included small group meetings, public notices, newsletters, formal solicitation of written comments, and the creation of a project Web site.

- Presentations
    - *Small group meetings*: Small group and one-on-one agency meetings were conducted on an as-needed basis at key points during scoping. These meetings were held in the fall of 2002 and the spring of 2003. The meetings gave the project team an opportunity to work more in-depth with particular agencies on issues of particular interest to those agencies. Such meetings included briefings to the Kenai River

[2]FHWA determined that an SEIS was required because of the amount of time that had passed since the original 1994 Draft EIS. In that span, field conditions had changed, new regulations were passed, new land use plans adopted and new analytical methods developed.

[3]Agencies, the public, and Alaska Native Tribes had opportunities to comment on the project during a traditional NEPA scoping comment period early in the project, but also through development and analysis of alternatives. For example, project evaluation criteria focused on priority issues to aid in developing a range of reasonable alternatives were developed with input from the agencies, the Tribes, and the public.

Special management Area Board, the Cooper Landing Planning Advisory Council, and Kenai River Center staff meetings.

- Newspapers and newsletters
  - *Media coordination and coverage*[4]: The media were actively involved in the scoping process. The press was notified prior to every Listening Post session and SSB meeting. Display ads were placed in the *Anchorage Daily News*, *Peninsula Clarion*, *Seward Phoenix Log*, and *Homer News* prior to each Listening Post. Reporters were present at numerous scoping meetings, and project team members conducted interviews throughout scoping.
  - *Newsletters*: Newsletters published project planning activities and status. Two newsletters were developed, one in the summer of 2001 and the second in the fall of 2003.
- Additional activities
  - *Mailing lists*: A mailing list of more than 3,000 individuals was developed and maintained. The list included property owners in Cooper Landing, special interest groups, businesses, local and State agencies, seasonal residents, and national organizations.
  - *E-mail distribution lists*: E-mail was used as an efficient method for communicating with stakeholders. The e-mail distribution list contained 266 names.
  - *Web site:* A major element of the public involvement program was the development and maintenance of a project Web site (www.sterlinghighway.net). The Web site functioned as an electronic notice board and library. Project study reports; background information; project status, schedule, and recent activities; route maps of each proposed alternative; contacts and an e-mail address for sending comments and requesting further information; links to the DOT&PF Web site; and other project information were included on the site. A sample page from the Web site is shown in Figure 5.1-1 (see also Appendix C, Project Web site, of the *Scoping Summary Report*).
  - *Internet survey*: An Internet survey was developed and posted in March 2002 to gather input on the alternatives evaluation criteria and the range of alternatives. The survey was advertised through a postcard mailing to more than 2,500 people, through e-mail distribution lists, and through press releases to the local newspapers. More than 230 people participated, and the results were posted on the project Web site (see also Appendix I, Web Survey, of the *Scoping Summary Report*).

[4]Appendix J, Media, of the *Scoping Summary Report* contains newspaper articles related to the Sterling Highway MP 45–60 Project.

Figure 5.1-1. Sample Web page

5.1.3 Scoping Outcome

Through the scoping process, agencies had the opportunity to provide input on the project's purpose and need, on the criteria for evaluating the alternatives, and on developing and screening of alternatives. The input from affected communities and regulatory agencies resulted in the following project outcomes:

- A defined project scope of study
- Consulted and informed local, State, and Federal agencies and Tribes
- Consulted and informed residents, property owners, businesses, Native corporations, and interest groups
- A variety of forums to discuss issues, develop ideas, and gather input
- Input on the project's purpose and need statement

- Input on development and screening of project alternatives
- A mailing list and e-mail distribution list of interested parties and property owners

Purpose and Need. The purpose and need for the Sterling Highway MP 45 to 60 Project was shared and refined through the agency coordination process, and is as follows:

> *The DOT&PF has identified a need to improve the Sterling Highway in the Cooper Landing and Kenai River area (MP 45 to 60) to "rural principal arterial" standards. The purpose is to serve through-traffic, local community traffic, and traffic bound for recreation destinations in the area efficiently and safely, now and in the future...*

Evaluation Criteria. The evaluation criteria were first introduced to the ACC in December of 2001 and January of 2002, respectively. The criteria presented were developed largely around issues identified in the previous ACC sessions beginning in March 2001, six Listening Posts—local community informational sessions held in March and August 2001, input received through the project Web site, and public/agency comments submitted during the 1994 Draft EIS for the Sterling Highway MP 37 to 60 Project.

The criteria also included elements of the project's purpose and need and DOT&PF policy on capacity and demand, highway characteristics, and system linkage. The criteria were amended and refined after agency and public meetings in January and February 2002 and public meetings in January 2002. The criteria were made available in draft form on the project Web site survey from January 2002 through March 2002. In total, 236 people participated in the Web site survey and offered their input on the criteria. The criteria were finalized at the April 2002 meetings of the ACC. Complete documentation of the development of evaluation criteria and the application for determining the range of reasonable alternatives can be found in the report entitled Evaluation Criteria and Reasonable Alternatives Analysis (HDR 2003a).

Alternatives' Development and Preliminary Evaluation. The alternatives for improving MP 45 to 60 of the Sterling Highway were developed through agency and public scoping, technical studies, and engineering analysis that included highway design requirements. The Evaluation Criteria and Alternatives Analysis document (HDR 2003a) was developed to provide a detailed comparison of 10 preliminary build alternatives: Kenai River Walls Alternative, Kenai River Alternative, Cooper Creek Alternative, Russian River Alternative, the "G" Alternatives (two), the Juneau Creek "F" Alternatives (two), and the Juneau Creek Alternatives (two), along with the No Build Alternative.

The evaluation criteria and alternatives analysis were made available for ACC and SSB comment beginning in December 2001 and January 2002, respectively. The criteria were amended and refined after agency and public meetings in January and February 2002 and SSB meetings in January 2002. The criteria were made available to the public through a Web-based survey posted for a four-week period from mid-March through mid-April 2002. From that review, 104 comments (letter, e-mail, comment forms) were received (see Summary of Public Comments, May 2003–June 2003). Concerns were raised about harm to the Kenai and Russian rivers from roadway and bridge construction in or around these waters and from potential spills of hazardous materials from roadway accidents on sections of the existing highway in close proximity to the Kenai River. Other concerns were voiced about potential impacts to wildlife and recreation and designated Wilderness lands. Comments noted that development of new road alignment in

previously undisturbed areas could fragment wildlife habitat, with the brown bear habitat being of special concern, as well as a potential increase in vehicle/wildlife collisions.

The alternatives presented in the SEIS respond to and explore impacts and benefits related to these issues. The Juneau Creek alternatives remove much of the highway and traffic from locations near the Kenai River, the G South Alternative somewhat less, and the Cooper Creek Alternative less still, but each build alternative removes highway traffic from the river corridor. Conversely, the alternatives that remove more traffic from locations near the river are more likely to fragment habitat and disturb existing backcountry recreation. Again, the alternatives present a range from less impact (Cooper Creek Alternative) to relatively greater impact (Juneau Creek alternatives).

Comments specific to alternatives are summarized in the following paragraphs.

Kenai River Walls Alternative. Public and agency input received placed "protection of the Kenai River" as the highest priority criterion. The potential for wall failure and the resulting impacts places the river at risk in the Kenai River Walls Alternative, which the public and agencies indicated was a concern. Public and agency input included concerns about impacts to historical, cultural, and recreational areas along the river; increased travel speed through the community; local access safety issues; and construction impacts during the peak tourist seasons.

Kenai River Alternative. The public and agency input received places "protection of the Kenai River" as the highest priority criteria. The public and agency input received included concerns about visual impacts where the highway traverses the river; potential risks to the river by moving all peninsula traffic closer to and over the river; impacts to historical, cultural, and recreational areas; increased travel speed through the community; local access safety issues; and construction impacts during the peak tourist seasons. There was not support in the community or from the broader public and agencies for moving the highway closer to the river.

Cooper Creek Alternative. Public and agency input received included concerns about visual and private property impacts of a highway south of town. Although the Cooper Creek Alternative addresses some issues of moving through-traffic out of town, there were concerns about the way in which this alternative rejoins the existing alignment and the impacts associated with improving sections of highway that remain close to the river. Agency input indicated some interest in this alternative because part of the new alignment is through a partially built environment, although there are outstanding concerns about the impacts to cultural and recreational resources and to the Kenai River for those sections of improved highway along the river, as well as overall habitat concerns.

Russian River Alternative. Public and agency input received indicated very little support to pursue the Russian River Alternative. Impacts to the Russian River recreational areas seem to be unacceptable in the public's opinion, and few members of the public gave this alternative further consideration. The public and agencies were most concerned about wildlife, cultural and recreational areas, and the economic impact of moving through-traffic away from town.

G Alternatives. Public and agency input received included concerns about visual impacts, impacts to the Kenai River with additional bridge crossings, and impacts to wildlife habitat. The "G" alternatives address some concerns of moving through-traffic out of town, but public concern was expressed about the ways in which these alternatives rejoin the existing alignment and the ability to improve the road along sections that are close to the river without adversely

affecting water quality and habitat. There was also concern from the community about the potential economic impacts of moving through-traffic away from town. The "G" alternatives resolve the local access and safety issues raised by the community in that through-traffic does not cross the Cooper Landing Bridge, thus minimizing mixing through- and local traffic.

Agency input indicated some interest in these alternatives because part of the new alignment is through a partially built environment. There were concerns about the impacts to cultural and recreational resources, to the Kenai River for those sections of improved highway along the river, and to brown bear habitat. The "G" alternatives came from agency and public input as a way to avoid the Resurrection Pass National Recreation Trail and minimize recreation area and indirect or cumulative impacts.

Juneau Creek "F" Alternatives. Public and agency input received regarding the Juneau Creek "F" alternatives included concerns about construction in a relatively undisturbed area, wildlife impacts, visual impacts, potential impacts to the Resurrection Pass Trail, and potential indirect and cumulative impacts associated with Kenai Peninsula Borough (Borough) land selections. In addition, there were concerns about how the "F" Forest Alternative would rejoin the existing alignment at Sportsman's Landing (MP 54.5) and the potentially unsafe conditions that could result during the seasonal peak time. There also was concern from the community about the potential economic impacts of moving through-traffic away from town. The Juneau Creek "F" alternatives do resolve local access and safety issues raised by the community because through-traffic does not cross the Cooper Landing Bridge, thereby minimizing mixing through- and local traffic. Agencies highlighted habitat concerns (particularly brown bear), impacts to the Resurrection Pass National Recreation Trail, and impacts of a new transportation system being built through the area. The Juneau Creek "F" alternatives were developed from agency and public input as an alternative to the Juneau Creek alternatives to move the road away from the Juneau Creek Falls and reduce recreation area impacts.

Juneau Creek Alternatives. Public and agency input received regarding the Juneau Creek alternatives included concerns about impacting a relatively undisturbed area, wildlife impacts, visual impacts, potential impact to the Resurrection Pass Trail and the potential for secondary and cumulative impacts from both the Borough land selections and the potential ease of access to the Juneau Creek Falls area. There were concerns from the public and agencies about how the Juneau Creek Alternatives would rejoin the existing alignment at Sportsman's Landing (MP 54.5) and the potential traffic that could result during the seasonal peak time. There was also concern from the community about the potential economic impacts of moving through-traffic away from town. Agency input highlighted habitat concerns, particularly for the Kenai Peninsula brown bear, the impact to the Resurrection Pass Trail, and the impacts of a new transportation system being created through the undisturbed area.

No Build Alternative. Based on public input received, the community of Cooper Landing and through-travelers from other parts of the region feel that the No Build Alternative does not improve the road to address their identified concerns of improved traffic flow, pedestrian safety, reducing traffic speed in town, and fixing identified problem areas such as tight curves and intersections. Concerns about the efficient and safe movement of freight through Cooper Landing would not be addressed. Freight movements would be impacted over time by increasing congestion.

Screening Results. The 10 preliminary build alternatives and the No Build Alternative were developed and screened as a result of the comments received, technical studies, and engineering analysis. Each was evaluated for 1) consistency with the purpose of and need for the project, 2) potential physical and social environmental effects, 3) transportation-related effects, and 4) life cycle costs. Details of the Alternatives Development and Screening Process can be found on the project Web site at:

- Analysis: http://www.sterlinghighway.net/Documents/1008/Alt_Analysis.pdf.
- Recommendations: http://www.sterlinghighway.net/Documents/1008/Alt_Memo.pdf

The above documents contain the project team's evaluation of alternatives. Based on these analyses, DOT&PF in consultation with FHWA identified three reasonable build alternatives (Cooper Creek, G South, and Juneau Creek) plus the No Build Alternative (existing highway without reconstruction) for consideration in the Draft SEIS.

Following this study, DOT&PF developed a variant to the Juneau Creek Alternative in an effort to avoid the Mystery Creek Wilderness in the Kenai National Wildlife Refuge (KNWR). This fourth build alternative, the Juneau Creek Variant Alternative, has been added for further study to the Draft SEIS.

5.2 Agency Coordination

This section presents coordination and outreach completed with regulatory agencies to understand agency concerns related to impacts on the reasonable alternatives and avoidance, minimization, and mitigation of key issues for those alternatives.

5.2.1 Cooperating Agencies

The FHWA is the lead Federal agency for NEPA compliance on the Sterling Highway MP 45–60 Project. Following the Council on Environmental Quality's (CEQ) NEPA guidelines, in 40 CFR § 1501.7, FHWA and DOT&PF invited cooperation on the project from Federal and State agencies having jurisdiction by law or special expertise related to environmental issues addressed in the Draft SEIS. Coordination activities included one-on-one and small group meetings and briefings, participation on the ACC, and agency review of study documents and the Draft SEIS.

In a December 19, 2005, letter from FHWA, the U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (USACE), and U.S. Forest Service (USFS) were invited to serve as cooperating agencies in accordance with FHWA regulation 23 CFR § 771.111(d). A letter dated December 21, 2005 with the same invitation was sent to the Alaska Department of Natural Resources (DNR) and U.S. Coast Guard (USCG). USFWS declined the invitation in a January 13, 2006, letter, while confirmation of acceptance was received from USACE and DNR on February 7 and June 16, 2006, respectively. A second request to participate as a cooperating agency was sent by FHWA to USFS and USCG on October 12, 2006; USCG accepted the invitation on the same day. FHWA requested USFS participation as a cooperating agency again in a June 2011 letter, and USFS accepted the invitation on June 21, 2011. FHWA again invited USFWS to participate as a cooperating agency in a July 22, 2011 letter, and acceptance was received in a USFWS letter dated August 9, 2011.

Cooperating agencies are listed in Table 5.2-1. As cooperating agencies, CEQ regulations allow a cooperating agency to adopt (without recirculating) the EIS of a lead agency when the cooperating agency concludes that its comments and suggestions have been satisfied. This provision is particularly important to permitting agencies, such as the USACE.

Table 5.2-1. Cooperating agencies and their areas of jurisdiction/expertise

Cooperating agency	Jurisdiction/Expertise
USCG	Approves the location and plans of bridges and causeways constructed across navigable waters of the United States.
USFS	Approves special use permits in National Forest Service units, and manages land in the Chugach National Forest that may be needed for right-of-way.
USFWS	Administers the Endangered Species Act, manages migratory bird populations, and manages land in the Kenai National Wildlife Refuge that may be needed for right-of-way.
USACE	Issues permits under Section 404(b)1 of the Clean Water Act for impacts to wetlands or waters of the United States and under Section 10 of the Rivers and Harbors Act of 1899, for areas subject to the ebb and flow of the tides.
DNR, including: • Office of History & Archaeology/SHPO • State Parks	Manages and permits activities on State land and manages many natural resources: • SHPO is consulted during the National Historic Preservation Act Section 106 process. • State Parks manages State park land.
ADF&G, including: • Division of Wildlife Conservation • Division of Habitat	Manages the use and development of fish, game, and aquatic plant resources in the State.

Note: SHPO = State Historic Preservation Officer; USCG = U.S. Coast Guard; USFS = U.S. Forest Service; USFWS = U.S. Fish and Wildlife Service; USACE = U.S. Army Corps of Engineers

5.2.2 Agency Scoping Summary

Agency comments were provided through stakeholder interviews, through participation in ACC meetings in 2001 and 2002, individual agency meetings in 2002 and 2003, and through agency letters received. Details of the scoping process are included in the Scoping Summary Report available on the project Web site at:

http://www.sterlinghighway.net/Documents/SSRFinal/10.06_SSR.pdf.

5.2.3 Agency Interviews

Between July and October 2001, the project team interviewed the agency representatives listed in Table 5.2-2. The purpose of the interviews was to assess expectations for their agency's involvement in the SEIS process and to begin identifying issues and concerns regarding the project.

Table 5.2-2. Agency interviews

Date	Name	Title	Affiliation, Location
July 18, 2000	Brian Anderson	Wildlife Biologist	USFWS, Anchorage
July 19, 2000	Max Best	Planning Director	Borough, Soldotna
July 19, 2000	John Czarnezki	Planner	Borough, Soldotna
July 19, 2000	Christina Degernes	Superintendent	DNR-DPOR, Kenai Peninsula Area, Soldotna
July 19, 2000	Susan Fisler	Ranger	DNR-DPOR, Kenai Peninsula Area, Soldotna
July 21, 2000	Chuck Frey	Planning Officer	USFS, Anchorage
July 19, 2000	Dean Hughes	Habitat Biologist	ADF&G, Habitat and Restoration Division, Soldotna
July 19, 2000	John Mohorcich	Resource Planner	Borough, Soldotna
August 15, 2000	Phil North	Biologist	EPA
July 21, 2000	Don Rivers	Engineering, Fire and Lands Staff Officer	USFS, Anchorage
July 18, 2000	Bill Schuster	Ranger, Biologist	USFS, Seward
July 21, 2000	Doug Stockdale	Public Affairs Officer	USFS, Anchorage
July 19, 2000	Lance Trasky	Regional Supervisor, Division of Habitat	ADF&G, Anchorage
(via e-mail)	Ken Vaughan	Natural Resource Manager	USFS

A full account of the interview questions and summary responses can be found in the Stakeholder Interview Summary (HDR 2001) - http://www.sterlinghighway.net/Documents/SSRFinal/Appendix%20D%20Stakeholder.pdf

Note: ADF&G = Alaska Department of Fish and Game; Borough = Kenai Peninsula Borough; DNR = Alaska Department of Natural Resources; DPOR = Alaska Department of Park and Outdoor Recreation; EPA = U.S. Environmental Protection Agency; USFS = U.S. Forest Service; USFWS = U.S. Fish and Wildlife Service

5.2.4 Agency Consultation Committee

Fourteen agencies and Native entities were invited to participate in an ACC as part of scoping. The purpose of the ACC was to foster communication and coordination between and among the agencies, Native groups, and DOT&PF/FHWA. Members of the ACC are shown in Table 5.2-3. The DOT&PF met with the ACC six times between 2001 and 2006. A summary of these meetings is included in Table 5.2-4.

Table 5.2-3. Members of the Agency Consultation Committee

ADEC	ADF&G
Alaska Division of Governmental Coordination	Cook Inlet Region, Inc.
DNR/SHPO	EPA
Kenai Peninsula Borough	Kenaitze Indian Tribe
Kenai Native Association, Inc.	National Marine Fisheries Service
Salamatof Native Association, Inc.	USACE
USFS	USFWS

ADEC = Alaska Department of Environmental Conservation; ADF&G = Alaska Department of Fish and Game; DNR = Alaska Department of Natural Resources; EPA= U.S. Environmental Protection Agency; SHPO = State Historic Preservation Officer; USACE = U.S. Army Corps of Engineers; USFS = U.S. Forest Service; USFWS = U.S. Fish and Wildlife Service

Table 5.2-4. Agency Consultation Committee meetings

ACC Meeting Date	Purpose
Meeting 1: March 30, 2001	The meeting was held in Anchorage with 27 agency representatives in attendance. The purpose of the meeting was to provide an overview of the project process and schedule and begin to develop a list of issues.
Meeting 2: May 31, 2001	The meeting was held in Cooper Landing with 21 agency representatives in attendance. The purpose of the meeting was to focus on identifying constraints and opportunities.
Meeting 3: September 13, 2001	The meeting was held in Soldotna with 21 agency representatives in attendance. The purpose of the meeting was to begin developing evaluation criteria and discuss the emerging range of alternatives.
Meeting 4: October 29, 2001	The meeting was held in Anchorage with 24 agency representatives in attendance. The purpose of the meeting was to discuss the evaluation criteria and the range of alternatives and to present associated technical information.
Meeting 5: April 17, 2002	The meeting was held in Cooper Landing with 15 agency representatives in attendance. The purpose of the meeting was to finalize the evaluation criteria and the range of alternatives.
Meeting 6: December 13–14, 2004	The meeting was held in two locations: Soldotna on December 13 and Anchorage on December 14. There were a total of 28 agency representatives in attendance. The meeting covered updates on the rapid assessment process (wildlife impacts/ crossings), technical analysis, fish report, refining alternatives, mitigation measures. Question topics included road grade; wildlife and visual considerations; rock, soil, and groundwater characteristics; bridge details; level of service; 3R alternative; costs; fill, gravel, and disposal sites.

5.2.5 Summary of Agency Issues Identified During Scoping

The following is a summary of important issues identified by agency participants during the scoping process:

- Minimize impacts to identified archeological sites and cultural resources
- Minimize impact on the Kenai River fishery
  - Direct/indirect impact of bridges—roads (abutments, etc.)
- Assess/resolve water quality issues:
  - Construction impacts
  - Maintenance impacts
  - Impact on flood plain
  - Impact on main stem of the Kenai
  - Impact on tributaries
  - Management of run-off—spills as well as storm water runoff
  - Spill risk analysis
  - Wetland impacts
  - Hydrology—recharge/discharge
  - Extent of cut and fill/disposal of material
- Vegetation impacts:
  - Impacts on plants—invasive species; noxious weeds
  - Disturbance regimes on plant species
- Fish and wildlife impacts - assess level of impact on:
  - Eagles
  - Sheep
  - Moose
  - Fish
  - Bears
  - Vegetation
  - Overall issue of habitat fragmentation
  - Overall issue of wildlife crossings—likelihood of collisions
  - Overall issue of displacement effects
- Minimize/manage secondary impacts—induced development
  - Impact on land ownership patterns
  - Minimization of the developed footprint
  - Direction from adopted plans
- Assess/address range of recreation impacts:
  - Trails—Resurrection Trail, Bean Creek Trail, skiing and hiking
  - Fishing
  - Camping
  - Hunting
  - Create a balance of access opportunities
  - Assess number of new areas open for access
  - Effect on existing recreation patterns
  - Extent of impact to sensitive areas
  - Impact to the Cooper Landing boat launch
  - Opportunities to enhance existing facilities
  - Alaska National Interest Lands Conservation Act implications
- Assess/minimize viewshed impacts
  - Issues associated with opening new viewsheds
- Maintain/promote landscape ecology integrity
- Cost—stewardship of public funds
- Socioeconomic impacts:
  - Local businesses
  - Water supply
  - Tax base
  - Quality of life
  - Mining claims
  - Community impacts
  - Private property
  - Business property
  - Community property (i.e., schools, library, etc.)
  - Noise

5.2.6 Topic Specific Consultation

DOT&PF and FHWA engaged in a number of more detailed consultation efforts with individual agencies and subgroups of agencies to develop a more thorough understanding of the issues, potential impacts, opportunities to avoid and minimize impacts, and to identify potential mitigation related to the reasonable build alternatives. This section discusses key topics of specific consultation.

5.2.6.1 Agency Consultation Efforts

A summary of these agency meetings is included below in Table 5.2-5.

Table 5.2-5. Agency meetings with DOT&PF from 2002 to 2015, excluding meetings focused on National Historic Preservation Act Section 106 topics

Date	Topics
September 24, 2002 (Anchorage)	Project alternatives, process and preliminary technical findings, outstanding questions, issues and information needs
September 24, 2002 (KNWR)	Project alternatives, process and preliminary technical findings, outstanding questions, issues and information needs
September 25, 2002	Project alternatives, process and preliminary technical findings, outstanding questions, issues and information needs
September 26, 2002	Project alternatives, process and preliminary technical findings, outstanding questions, issues and information needs
March 20, 2003	Brown bear use of the project area and the cumulative effects model
October 16, 2003	Project update to KRSMA Board
April 15, 2004	Regulatory issues decision meeting, clarify agency authority, assure process requirements are met, elements of a memorandum of understanding
June 21-23, 2004	Workshop with Bill Ruediger (USFS) to discuss “Rapid Assessment” approach relating to wildlife crossings and other impacts to sensitive habitat, and ways to mitigate impacts to brown bears and other wildlife; list of “species of concern” and “areas of concern” for project generated
February 9, 2005	LOS calculated for SEIS alternatives.
November 29, 2005	USACE effort to re-map the 100-year floodplain on the Kenai River near Cooper Landing
May 23, 2006	Reasonably foreseeable future actions and potential developments, including potential subdivision right-of-way acquisitions
May 9, 2007	NEPA process, technical findings, and engineering options, and outstanding questions and information needs from agencies
September 25, 2007	Wildlife issues workshop, species of most concern, brown bear impacts, mitigation, indirect impacts
November 28, 2007	Resurrection Pass National Recreation Trail, Juneau Falls Recreation Area, Kenai River Recreation Area Chugach Forest Plan consistency
April 8, 2009	USFS recreational Section 4(f) resources, and potential mitigation measures, including Slaughter Gulch Trail, Bean Creek Trail, Stetson Creek Trail, Resurrection Pass National Recreation Trail, Juneau Falls Recreation Area, ANILCA Title XI, and Kenai River Recreation Area

Date	Topics
April 9, 2009	Section 4(f) Resources under management of Alaska DPOR, KRSMA, Cooper Landing boat launch, Bean Creek Trail, and construction staging and timing, and temporary facility closure considerations
April 30, 2009	Section 4(f) Resources, KNWR, Sportsman's Landing, Wilderness impacts, ANILCA Title XI, CIRI land selection, KRSMA, brown bears
April 30, 2009	Section 4(f) Resources under ADF&G jurisdiction, Sportsman's Landing access and facilities, Cooper Landing boat launch, construction timing and considerations
June 2, 2009	Recreational resources impacts, and potential mitigation measures (Stetson Creek Trailhead, Cooper Creek Campground, Bean Creek Trailhead, Resurrection Pass National Recreation Trail, ski and snowmachine access, Juneau Falls Recreation Area, Snow River bridge/Iditarod National Historic Trail, Kenai River Recreation Area)
August 19, 2010	Kelly Petersen and Alvin Talbert as new members of the DOT&PF project team as of September 2009, potential Section 4(f) mitigation options for project alternatives, Least Overall Harm Analysis, IRAs, Juneau Falls Recreation Area and compelling need document, Snow River bridge, Resurrection Pass National Recreation Trail, Unit 395, ANILCA Title XI, visual impact analysis
September 9, 2010	Project updated for new staff at the KNWR
September 27, 2010	Section 4(f) properties under USFWS management, right-of-way and compatibility determination, ANILCA Title XI, brown bears, wildlife study, Sportsman's Landing, No Build or variant preference
February 9, 2011	Potential project mitigation for alternatives, Section 4(f), Resurrection Pass National Recreation Trail and new trailhead, Kenai River Recreation Area, Juneau Falls Recreation Area, Geotechnical Report, Juneau Creek bridge, right-of-way easement, Compelling Need Document, Travel Analysis Process, IRAs, Russian River Lands Act Tract A, and ANILCA Title XI (Standard Form 299)
September 1, 2011	Juneau Creek bridge, Resurrection Pass National Recreation Trail impacts, Juneau Falls Recreation Area, Kenai River Recreation Area, Compelling Need Document, and potential mitigation for Stetson Creek Trail
April 10, 2012	Potential mitigation for trail impacts
August 6, 2012	Project updates, new Variant Alternative, controlled access, grade separations for trails and USFS roads, Units 394B and 395, Compelling Need Document, Roadless Rule, Russian River Lands Act CIRI Tract A access, trail mitigation, recreational use, Chugach National Forest Plan consistency, and SF 299
August 27, 2012	Project updates, new Variant Alternative
August 30, 2012	Project alternatives and new Variant Alternative, ANILCA, and KNWR Compatibility Determination
September 6, 2012	Waterbody and Section 404 permit meeting, project alternatives and new Variant Alternative, water quality topics and requirements
September 27, 2012	Project history, involvement of various wildlife agencies, project updates including the present alternatives and proposed mitigation for impacts to wildlife resources
November 29, 2012	Project alternatives, ANILCA Title XI procedures and agency roles, SF 299, next steps
November 30, 2012	Project status, Borough land selections, land use plans, and development plans

Date	Topics
January 22, 2013	Presented the project alternatives to the Borough Assembly, Resolution 2013-006 discussed (establishing borough priorities for Federal legislation and funding for the year 2013)
February 6, 2013	Briefed agencies on the SEIS development, reviewed and discussed agency issues to date, project-related impacts and benefits, identification of outstanding issues, confirm important procedural and content important to or required by each agency, and reviewed proposed mitigation.
April 16, 2013	Project team discussion on ANILCA Title XI, agency concerns, agency roles and responsibilities, and further actions
June 5, 2013	Project status, major milestones, schedule of public review of Draft SEIS, locations of future formal public hearings
February 12, 2014	Project status, consultation process, alternative updates, key outstanding issues, mitigation efforts, project schedule and release of the Draft SEIS
September 25, 2014	Meeting with cooperating agencies during the cooperating agency review period of preliminary draft SEIS to discuss agency concerns and assist agencies in their review of the preliminary draft document.
October 4, 2014	Project presentation to the USFS Chugach National Forest management team during the cooperating agency review period of preliminary draft SEIS to discuss their concerns and assist in their review of the preliminary draft document.
January 20, 2015	Discussion of Section 4(f) applicability, wildlife impacts, and indirect impacts to KNWR with USFS and USFWS.

ANILCA = Alaska National Interest Lands Conservation Act; Borough = Kenai Peninsula Borough; CIRI = Cook Inlet Region, Incorporated; DOT&PF = Alaska Department of Transportation and Public Facilities; DPOR = Department of Parks and Outdoor Recreation; IRA = Inventoried Roadless Area; LOS = Level of Service; KNWR = Kenai National Wildlife Refuge; KRSMA = Kenai River Special Management Area; NEPA = National Environmental Policy Act; SEIS = Supplemental Environmental Impact Statement; SF = Special Use Form; USACE = U.S. Army Corps of Engineers; USFS = U.S. Forest Service; USFWS = U.S. Fish and Wildlife Service.

Wildlife Consultation. Potential impacts to wildlife, particularly brown bears, have been discussed at multiple meetings with USFWS, USFS, and Alaska Department of Fish and Game (ADF&G). The project team held workshops in June and December of 2004 regarding wildlife crossings and potential project impacts to sensitive habitat, as well as ways to mitigate impacts to brown bears and other wildlife.

A Rapid Assessment Meeting was held between June 21 and 23, 2004 in Anchorage and Cooper Landing (HDR 2004a). The purpose of the meeting was to bring natural resource agencies together to work with Bill Ruediger, USFS, to discuss a “Rapid Assessment” approach relating to wildlife crossings and other impacts to sensitive habitat in relation to the Sterling Highway MP 45–60 alternatives. Attendees represented natural resource agencies with jurisdiction on the Kenai Peninsula and discussed innovative ways to mitigate impacts to brown bear populations

In September 2007, a wildlife issues workshop was held with USFS, USFWS, FHWA and DOT&PF. The meeting was designed to gather wildlife specialists from agencies with regulatory responsibility in the project area and engage them on project specific issues and mitigation. Attendees worked together to outline commitments related to wildlife and habitat connectivity that could be conducted before final design and construction and post-construction monitoring.

Consistently, agencies have requested a more detailed field study of wildlife movement be conducted to understand potential effects and develop appropriate design measures (e.g., underpasses). As a result of the consultation effort, DOT&PF committed to initiating a study during the Draft SEIS process and will use the result to design appropriate wildlife mitigation into the project design.

A Wildlife Study Team, headed by Northern Ecologic, began meeting in February 2013 to create a Wildlife Study Implementation Plan for the project. The Wildlife Study Team consists of biologists from the following agencies: USFS, ADF&G, USFWS, and representatives from DOT&PF. As a result of the team's efforts, a draft plan to study six species was devised and later accepted by DOT&PF. The study is being implemented by Northern Ecologic in consultation with the Wildlife Study Team. The results of this study will be used for identifying wildlife mitigation efforts during the design phase of the project. Results from the study, to the extent they are available, will be used to inform the final SEIS and Record of Decision.

Alaska National Interest Lands Conservation Act. Title XI of ANILCA addresses "Transportation and Utility Systems in and Across, and Access Into, Conservation System Units." Conservation system units (CSUs) in the project area include KNWR and the Resurrection Pass National Recreation Trail. The project team has held multiple consultation meetings to understand potential impacts to these CSUs, discuss potential mitigation, and understand ANILCA's procedural requirements.

As a result of the consultation, DOT&PF has developed mitigation measures for the crossing of the Resurrection Pass National Recreation Trail and development of a trailhead parking area. In addition, DOT&PF will provide summer pedestrian walkways on the Snow River bridges on the Seward Highway and allow the USFS to construct trail segments in the highway right-of-way. DOT&PF will provide such accommodations in the future when the Snow River bridges are replaced. This mitigation will create a connection to another long-distance trail in the National Trails System in the Kenai River Watershed to offset impacts to the Resurrection Pass National Recreation Trail resulting from this project.

Due to procedural constraints associated with impacting Mystery Creek Wilderness, DOT&PF and FHWA have determined they would not pursue the Juneau Creek Alternative as the preferred alternative if the Wilderness designation remains intact.

Section 4(f). The project area includes a considerable number of parks, refuges, recreational areas, and cultural and historic properties that have been determined to be protected by Section 4(f) of the U.S. Department of Transportation Act. DOT&PF and FHWA consulted with managing entities to develop an understanding of the location and boundaries of Section 4(f) sites, to understand the management direction governing those sites, and to discuss potential avoidance and measures to minimize harm to Section 4(f) resources.

Indirect and Cumulative Impacts. Agencies expressed concern regarding indirect and cumulative growth effects that could result from the project's reasonable alternatives. In particular, indirect growth on large State and Borough land selections were of concern to wildlife management agencies due to the projected defense of life and property kills of brown bears. Additionally, Cooper Landing businesses noted concern about a second business district forming and competing with existing businesses. Based on the goal of preserving the function of this National Highway System route, DOT&PF made a decision to implement controlled access on

new sections of highway. Controlled access will reduce indirect growth impacts associated with the project and is consistent with addressing concerns expressed to the project team. DOT&PF and FHWA met with the Borough and DNR to develop an understanding of their respective land selection plans and to identify reasonably foreseeable future actions. As a result, project alternatives were designed to minimize adverse affects to those land management plans.

EFH Consultation. In accordance with the Magnuson-Stevens Fisheries Conservation and Management Act, which directs Federal agencies to consult with the National Marine Fisheries Service (NMFS) when any of their activities may have an adverse effect on essential fish habitat (EFH), DOT&PF, in cooperation with FHWA, submitted an EFH Assessment to NMFS to initiate consultation in February 2013. The EFH report assesses the likely effects of each project alternative on EFH within the Kenai River watershed (Kenai Lake, Kenai River, Bean Creek, Juneau Creek, Cooper Creek, Russian River, and Fuller Creek) and includes a description of the project, a summary of EFH in the project area, an assessment of the EFH, and proposed conservation measures.

DOT&PF received a response from NMFS stating that the described project actions will have no more than a minimal impact and will not result in any substantive adverse effect to EFH; therefore, no further EFH consultation or assessment is required. NMFS did not offer additional EFH Conservation Recommendations beyond those proposed in the EFH Report, and stated they have no objections to the project.

Wetlands and Water Bodies. Primary jurisdiction of the USACE related to the project includes Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, and ANILCA. Section 404 of the Clean Water Act requires permit authorization to discharge dredged or fill material into the waters of the United States, including wetlands. Section 10 of the Rivers and Harbors Act requires approval prior to the initiation of any work in, over, or under navigable waters of the United States, or which affects the course, location, condition or capacity of such waters.

DOT&PF has consulted with USACE on numerous occasions both in writing and in person since 2001. USACE representatives have attended nine agency meetings between 2001 and 2013 that addressed various topics including project purpose and need, evaluation criteria, project alternatives, level of service, information needs, remapping of the 100-year floodplain on the Kenai River, the NEPA process, engineering options, outstanding agency questions, waterbody and wetland permitting, and ANILCA.

DOT&PF conducted detailed field work and wetland mapping along each of the reasonable alternatives to identify wetlands under USACE jurisdiction. DOT&PF completed draft jurisdictional determinations and draft functional assessments along each of the reasonable alternatives which were reviewed and approved by the USACE. Final copies of these documents were published on the project Web site: http://www.sterlinghighway.net/documents.html. A meeting was held on September 6, 2012 to discuss effects to water bodies and Section 404 of the Clean Water Act, the ANILCA process, as well as various water quality topics and requirements.

5.3 Public Coordination

This section presents specific coordination and outreach completed with the public, including a summary of key issues identified for development of reasonable alternatives.

5.3.1 Stakeholder Interviews

Stakeholder interviews conducted in 2000 provided an early, informal opportunity to meet with community representatives to assess their expectations for involvement and to begin identifying issues and concerns regarding the project. Individual public stakeholders are listed in Table 5.3-1; agency stakeholders were listed previously in Table 5.2-1. Following the interviews, input received from the stakeholders was summarized in the *Stakeholder Interview Summary* (HDR 2001b).

Table 5.3-1. Individual stakeholders interviewed

Date	Name	Title	Affiliation, location
July 21, 2000	Candace Beery	Land Manager	CIRI, Anchorage
July 19, 2000	Mona Painter	Chair, resident	Cooper Landing Community Club, Cooper Landing
July 19, 2000	Jim and Pinky Richardson	Residents	Cooper Landing
July 19, 2000	George Siter	Business owner, resident	Cooper Landing
July 19, 2000	Dodie Wilson	Chair, business owner, resident	Cooper Landing Advisory Council, Cooper Landing

Note: CIRI = Cook Inlet Region, Incorporated

5.3.2 Stakeholder Sounding Board

The SSB was an open advisory committee of community members and local or regional interest group representatives.

Table 5.3-2 presents stakeholder groups invited to participate in the SSB. The purpose of the SSB was to provide the project team with a regular forum to discuss the development of the SEIS with the community and other interested stakeholders. Anyone interested was able to participate. A set of participation rules allowed new participants to join anytime, yet enabled the group to build on work completed at previous meetings. Meetings were facilitated and conducted in a workshop format with presentations from the project team and hands-on work with participants. The role of the group was to review technical information, provide advice and direction, and develop recommendations for potential impacts associated with the project.

Table 5.3-2. Groups invited to participate in the Stakeholder Sounding Board

Alaska Bowhunters Association, Inc.	ADF&G, Kachemak Bay National Estuarine Reserve
Alaska Center for the Environment	Alaska Commercial Fishermen
Alaska Flyfishers Association	Alaska Miners Association, Inc.
Alaska Truckers Association	Alaska Waterfowl Association
Alaska Wildlife Alliance	Alaska Wildlife Society
Anchorage Audubon Society	Anchorage Daily News

Caribou Hills Snowmachine Club	Carlisle Trucking
Chamber of Commerce, Anchor Point	Chamber of Commerce, Funny River
Chamber of Commerce, Homer	Chamber of Commerce, Ninilchik
Chamber of Commerce, Seldovia	Chamber of Commerce, Soldotna
Chase Trucking	Cheechako Ski Benders
City of Homer	City of Soldotna
CIRI	Cooper Landing Community Club
Cooper Landing Homeowner's Association	Cooper Landing Parent Advisory Committee
Cooper Landing property owners, residents, and businesses	Eastern Kenai Environmental Action Association
Friends of Cooper Landing	Grouse Creek Village Corporation
Homer News	Homer Nordic Ski Club
Kachemak Nordic Ski Club	Kenai Peninsula Borough
Kenai Peninsula Borough Assembly	Kenai Peninsula Borough Cooper Landing Advisory Planning Committee
Kenai Peninsula Borough Kachemak Bay Advisory Planning Committee	Kenai Peninsula Borough Trails Commission
Kenai Peninsula Borough SD Trails Commission	Kenai Peninsula Fishermen's Association
Kenai Peninsula Tourism Marketing Council	Kenai River Property Owners Association
Kenai River Sportfishing Association	Kenai Watershed Forum
Knik Canoers and Kayakers	Kenai River Special Management Area Advisory Board
Lynden Transport	Mountaineering Club of Alaska
National Audubon Society	Natural Resources Conservation Service
Ninilchik Native Association, Inc.	Nordic Skiing Association
National Park Service, Division of Environmental Quality	Office of Representative Pete Kelly
Osprey Alaska, Inc.	Pristine Products
Quartz Creek Homeowners Association	Republican Party of Alaska
Shep Air Services	Sierra Club, Alaska Chapter
Sierra Club, Knik Group	Snomads Snowmachine
South Central Sportsmen Association	Soil and Water Conservation District, Homer
Soil and Water Conservation Board	Sportsman Club
The Milepost	The Nature Conservancy
The Wilderness Society	Trout Unlimited
United Fishermen of Alaska	Volunteer Fire Dept./Ambulance of Cooper Landing
West Side Development Task Force	Wildlife Federation of Alaska

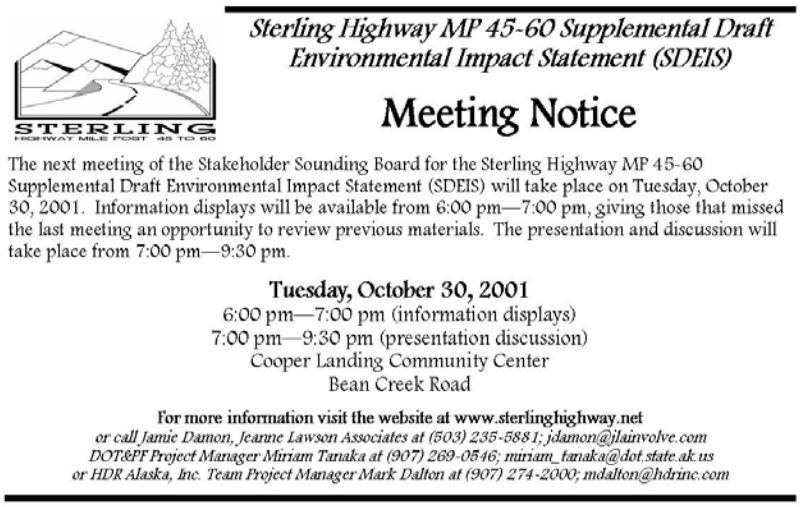
Note: ADF&G = Alaska Department of Fish and Game; CIRI = Cook Inlet Region, Incorporated

The SSB met five times between May 2001 and April 2002 as discussed below and summarized in Table 5.3-3. All meetings were held in Cooper Landing and included an "Open House" for one hour preceding the meeting. The Open House had displays of information and project team members were available to answer questions. The purpose of the Open House prior to each meeting was to help new participants prepare to participate in the meeting and to remind participants of the previous information reviewed. The Open House time also served as an informal opportunity to talk one-on-one with area residents who did not feel comfortable speaking in a large group.

Table 5.3-3. Stakeholder Sounding Board meetings

Meeting Number and Date	Purpose
Meeting 1: May 30, 2001	The meeting was attended by 43 people. The project team presented the process and schedule and discussed the project's purpose and need.
Meeting 2: September 11, 2001	Forty-six people signed in as attending the meeting with more than 60 actual participants. Participants discussed data collected to date and evaluation criteria and looked at the emerging range of alternatives. The world events that day made it difficult to accomplish the planned agenda.
Meeting 3: October 30, 2001	Forty-four people signed in as attending the meeting with more than 55 actual participants. Draft evaluation criteria were developed and alternatives discussed at the meeting.
Meeting 4: January 16, 2002	Forty-eight people signed in as attending the meeting with more than 60 individuals actually participating. The purpose of the meeting was to refine the draft evaluation criteria, hear a technical work update and begin talking about how the range of alternatives could be modified to address issues/criteria.
Meeting 5: April 16, 2002	Fifty-one people signed-in with more than 65 actual participants. Participants discussed how to reach a reasonable array of alternatives and the outcome of the Web survey. "Priority" criteria were identified.

To encourage participation of interested parties in the SSB, notices of meetings were sent to all Cooper Landing property owners, business owners, and residents, as well as the project mailing list. Figure 5.3-1 provides an example of the meeting notice. While participation on the SSB was open to anyone who was interested, DOT&PF made sure to invite organizations,


STERLING
HIGHWAY MILE POST 45 TO 60

Sterling Highway MP 45-60 Supplemental Draft Environmental Impact Statement (SDEIS)

Meeting Notice

The next meeting of the Stakeholder Sounding Board for the Sterling Highway MP 45-60 Supplemental Draft Environmental Impact Statement (SDEIS) will take place on Tuesday, October 30, 2001. Information displays will be available from 6:00 pm—7:00 pm, giving those that missed the last meeting an opportunity to review previous materials. The presentation and discussion will take place from 7:00 pm—9:30 pm.

Tuesday, October 30, 2001
6:00 pm—7:00 pm (information displays)
7:00 pm—9:30 pm (presentation discussion)
Cooper Landing Community Center
Bean Creek Road

For more information visit the website at www.sterlinghighway.net
or call Jamie Damon, Jeanne Lawson Associates at (503) 235-5881; jdamon@jlainvolve.com
DOT&PF Project Manager Miriam Tanaka at (907) 269-0546; miriam_tanaka@dot.state.ak.us
or HDR Alaska, Inc. Team Project Manager Mark Dalton at (907) 274-2000; mdalton@hdrinc.com

Figure 5.3-1. SSB meeting invitation

agencies, interest groups, and others who might be impacted by the project to ensure that they were informed about the project and encouraged to participate in the process.

5.3.3 Listening Posts

Project "Listening Posts" were conducted during the scoping period to identify issues, define the project purpose and need, develop options for alternatives, and identify reasonable alternatives. The purpose of the Listening Posts was to provide information directly to the communities that would be affected by the project.

Figure 5.3-2. July 12, 2002 Cooper Landing Listening Post

The distances between communities that are affected by the project required a "take it to the people" approach to public meetings. Listening Posts were held in Anchorage, Cooper Landing, Soldotna, and Kenai over 2- to 3-day periods with the same information presented at each location. The events were announced through the project update mailers, display ads, and the project Web site. Comments were taken on comment forms and by written notes from conversations. Nine Listening Posts were held between March 2001 and May 2003, with more than 300 people participating in total. Table 5.3-4 provides a summary of Listening Posts held during scoping.

Table 5.3-4. Listening Posts held during Scoping

	Date	Location	Purpose
Round 1	March 28, 2001	Cooper Landing Community Center	Ideas for NEPA process. Issues identification.
	March 28, 2001	Soldotna Peninsula Center Mall	
	March 29, 2001	Anchorage DOT&PF	
Round 2	August 20, 2001	Anchorage DOT&PF	Issues identification from seasonal residents and travelers. Ideas for alternatives.
	August 21, 2001	Soldotna Visitors Center	
	August 22, 2001	Cooper Landing Boat Launch	
Round 3	June 2002	Kenai River Festival	Range of alternatives. Prioritization of evaluation criteria.
Round 4	May 21, 2003	Cooper Landing Princess Lodge	Preliminary assessment of alternatives based on evaluation criteria to determine range of reasonable alternatives.
	May 22, 2003	Anchorage DOT&PF	

Note: DOT&PF = Alaska Department of Transportation and Public Facilities; NEPA = National Environmental Policy Act

5.3.4 Public Scoping Comments

Public comments were largely divided into two groups—for and against an alternative removed from the Kenai River and Cooper Landing city center. The comments received in favor of a removed alternative most frequently cited protection of the Kenai River and community livability as the top reasons for their opinion. The comments received against such an alternative frequently cited economic and environmental impacts as reasons for their opinion. Many of those who commented stated that the Kenai River should be protected, but there was disagreement over how best to provide protection. Those who commented from the communities south of Cooper Landing most often highlighted the need for safe, efficient travel on the Kenai Peninsula and were supportive of an alternative that served through-traffic by bypassing the city center. Those who lived in Anchorage, other parts of Alaska, or out of state voiced their concerns about the environment and were more in favor of exploring options along the existing highway. The community of Cooper Landing was divided about what is the best for their community and for the traveling public.

The following issue areas were identified by the public during the process:

- Minimize impact on the Kenai River Fishery
  - Remove existing bridge
  - Spills from road
  - Proximity of road to river
  - Impediments to fish migration
- Assess/resolve water quality issues
  - Flooding
  - Number of river crossings
  - Impacts to wells, springs
  - Water table
- Assess level of impact on fish and wildlife
  - Bears
  - Sheep
  - Moose
  - Eagles
  - Fish
- Assess/address range of recreation impacts
  - Size of curve at Resurrection Pass National Recreation Trail
  - Access to Quartz Creek
  - Impacts to boat launch
  - Mix of tourist/local traffic
  - Foot traffic
  - Access to Resurrection Trail
  - Access to campgrounds
  - Parking
- Maintain/Promote landscape ecology integrity
  - Impacts to wilderness
  - Avalanche danger
  - Mud slides
  - Access to developable land
  - Avoid roadless areas and eligible wilderness
  - Avoid habitat fragmentation
- Minimize/Manage secondary impacts—induced development
  - Blind driveways
  - Pulling away from pull-outs
  - Safety at school bus stops
  - Future road capacity (beyond 2025)
  - Affect of natural disaster
  - Maintenance costs
  - Future development along new roadway(s)
  - Logging
  - Hunting access
  - Construction access/staging
  - Gravel pit development
- Determine cost—stewardship of public funds
  - Cost of Canyon Creek Bridge
  - Cost to retrofit Juneau Creek Bridge
  - Maintenance costs, particularly if multiple roads

  - Impacts to trail areas (hiking/skiing)
  - Waste collection at pull-outs
  - Roadside enhancements and improvements for public use
  - ANILCA implications
  - Bike trails
  - Motorized use
  - Slaughter Gulch trail crossing
  - Cooper Creek campground
  - Trout Lake
  - Juneau Lake
- Assess/Minimize view shed impacts
  - Scenic qualities
  - Light pollution
  - Landscape design
  - Impacts to Juneau Falls
- Assess socioeconomic impacts
  - Noise
  - Traffic speed and road crossings
  - Pedestrian/bike parking
  - Property values
  - Access
  - Impacts to businesses
  - Accident rates
  - Enforceability (of speed limits)
  - Coordinate with Kenai area plan, other land use plans
  - Community isolation
  - Privacy
- Other
  - Soil conditions
  - Weather conditions
  - Sun/shade on road

5.3.5 Ongoing Public Outreach

Festival of the Forest. In August 2004 and August 2005, a project booth was established and staffed at the third and fourth annual Chugach Days Festival of the Forest at the Pioneer Village in Cooper Landing. The purpose of the booths was to present up-to-date information about the project and NEPA process. More than 100 people stopped by the booth to ask questions and offer their input. A number of individuals expressed frustration at the length of the review process and the desire to have the project completed. The following is a list of additional comments heard:

- Which alternative has the least environmental impact?
- Which alternative is best for habitat?
- Check with the Borough about the planning for the shooting range.
- Gwin's corner is where all of the problems are in the winter—regardless of the alternative this will need to be fixed.
- Partial bypasses are a waste of time.
- Cooper Creek affects too many people.
- What about moving the north side option closer to the mountain and away from the housing developments.
- Keep a 35 mph speed limit through town and double the fines in town to slow people down.
- There will be grid lock in Cooper Landing in five years. Stop wasting time and fix the problem now.
- Concerned about the impact of the "F" Alternative on cross country skiing.
- Which alternative costs the most?
- Which alternative has the most road cuts?
- What does the business community think? Which alternative do they support?

Public Meetings. In 2012, additional public outreach efforts were made to inform surrounding communities of the project's progress. Public Open Houses were held on March 29 at the Cooper Landing Community Center, September 12 at the Cooper Landing Community Center and on September 18 in Anchorage at the DOT&PF main conference room. These Open Houses provided an informal opportunity for the public to meet project staff, learn about the project's status and next steps, and provide feedback on alternatives and proposed mitigation. At each meeting, members of the project team gave detailed presentations followed by question and answer sessions. Advertisements included various print publications, residential postcards, e-mails, online public notices, project distribution lists, and the project Web site. Approximately 70 people signed in to attend these two meetings.

Figure 5.3-3. Cooper Landing Public Meeting September 12, 2012

5.4 Section 106 Consultation

This section describes the process of ongoing consultation and the results with Tribal entities and other groups identified in Section 106 of the NHPA as consulting parties. There were two primary areas under which FHWA and DOT&PF engaged Tribes in the project:

- ***Government-to-Government Consultation.*** As Federal agencies and departments undertake activities affecting Tribal rights and/or trust resources, they must recognize Tribal sovereignty and conduct consultation with respect to the Government-to-Government relationship with Federally recognized Tribal governments (pursuant to EO 13175). FHWA sent letters to Federally recognized Tribes within the project area (Kenaitze Indian Tribe and Salamatof Native Association, Inc.) to initiate consultation for Section 106 consultation under the Government-to-Government relationship.
- ***NHPA Section 106 Consultation.*** Between 2000 and 2013, numerous meetings were held with agencies and Tribal government representatives focused on cultural resources and historic properties, following Section 106 of the NHPA. FHWA and DOT&PF coordinated with State and Federal agencies, Tribes, and other identified consulting parties to identify and evaluate potential impacts to identified cultural resources, and to work toward resolving identified adverse effects[5]. FHWA has continually coordinated with the Advisory Council on Historic Preservation (ACHP) regarding the EIS and Section 106 processes, the area of potential effect, the eligibility of properties for the National Register, and findings of effect. In particular, FHWA has notified ACHP of the potential for adverse effects. To date, the ACHP has determined that its participation is not necessary. FHWA will continue to consult throughout the EIS process.

[5]Specific concerns and suggestions regarding cultural sites are only generally summarized, as information on the location of archaeological sites is kept confidential in accordance with State and Federal law.

5.4.1 Section 106 Initiation

On April 7, 2005, FHWA sent a letter initiating consultation (pursuant to 36 CFR § 800) for the project to Federally recognized Tribal governments and other Native groups (such as Native Corporations and Associations), inviting them to participate in the Draft SEIS process and to consult in the process of identifying historic properties (prehistoric, historic and traditional cultural resources) and determining the effects of the alternatives on such properties. A follow-up phone call was made to each letter recipient, and interviews were held with entities that expressed interest in further participation. Tribal entities contacted were:

- Kenaitze Indian Tribe
- Salamatof Native Association Tribal Council
- Kenai Native Association
- CIRI

5.4.2 Tribal Participation

A series of meetings were held between September 2002 and November 2013 related to cultural resources and Section 106. Consultation meetings addressed the identification of historic properties, fieldwork methodologies, area of potential effect (APE), eligibility of properties for listing in the National Register of Historic Places (NRHP), findings of effect, and potential mitigation. Table 5.4-1 presents a summary of these meetings.

Table 5.4-1. Section 106 consultation meetings

Meeting Date	Purpose
September 26, 2002	The meeting was held in Kenai with representatives from DOT&PF, HDR, Kenaitze Indian Tribe and Salamatof Native Association present. The purpose of the meeting was to update the participants about the process and preliminary technical findings and hear their outstanding questions, issues and information needs.
November 17, 2004	The meeting was held in Anchorage in the USFS Conference Room with representatives from DOT&PF, the Kenaitze Indian Tribe, the Salamatof Native Association, OHA, USFWS, CIRI, USFS, FHWA, CRC, and HDR in attendance. The purpose of the meeting was to provide an overview of the project and the Section 106 process. Participants identified potential gaps in information regarding historic properties in the area and discussed preferred methods of consultation.
May 25, 2005	The meeting was held in Anchorage with representatives from DOT&PF, Kenaitze Indian Tribe, CIRI, OHA, FHWA, USFS, CRC, and HDR in attendance. Participants reviewed the potential impacts to historic properties for each alternative and identified additional field survey work needed. Participants discussed the next steps of the Section 106 process.

Meeting Date	Purpose
November 2, 2005	The meeting was held with representatives from DOT&PF, CIRI, OHA, USFS, CRC, Reger Archaeological, USFWS, and HDR present. The purpose of this meeting was to review preliminary findings of impacts for each alternative and discuss DOT&PF's initial recommendations on the eligibility of sites for listing in the National Register of Historic Places. DOT&PF addressed the timing of plans to move forward in the Section 106 process with the development of Determinations of Eligibility and the Finding of Effect documents.
November 2, 2007	This meeting was held in Anchorage with representatives from DOT&PF, CIRI, and HDR. The purpose of this meeting was to inform CIRI about the status of the SEIS process and for DOT&PF to learn more about plans for CIRI-owned land within the project area.
September 5, 2008	The meeting was held in Anchorage with representatives from DOT&PF, USFS, FHWA, USFWS, OHA, CIRI, CRC, and HDR in attendance. Participants were updated on the potential impacts to historic properties for each of the project alternatives and discussed the potential indirect impacts to eligible sites. Participants agreed that an agreement document would be developed to resolve adverse effects. Discussion regarding APE was included.
July 30, 2009	The meeting was held in Kenai with representatives from the DOT&PF, Kenaitze Indian Tribe, CRC, and HDR in attendance. DOT&PF presented proposed variants of the Juneau Creek Alternative for avoidance of historic properties. Kenaitze Indian Tribe members articulated concerns regarding potential impacts to historic properties and posed questions regarding future field survey and evaluation efforts. Kenaitze Indian Tribe members agreed to discuss the variants and provide recommendations to DOT&PF.
April 2, 2010	The meeting was held in Kenai with representatives of the Kenaitze Indian Tribe and DOT&PF. The purpose of the meeting was to update the Kenaitze Indian Tribe on the proposed Juneau Creek Alternative variants and potential impacts on historic properties. DOT&PF and the Kenaitze Indian Tribe agreed to drop Variants 1 and 2 from further consideration due to impacts to historic properties and technical infeasibility, and carry Variant 3 forward through the EIS.
October 13, 2010	The meeting was held in Anchorage with representatives of DOT&PF, CIRI, USFWS, USFS, and Kenaitze Indian Tribe to discuss the Russian River Lands Act MOU. The Act grants CIRI the authority to exchange land that lies within the titled archeological resource "limited estate" that lies partially within the KNWR. There is interest in pursuing the exchange, and USFWS was agreeable to discussion. CIRI was to provide a graphic showing the parcels to be transferred and expressed intent to write a letter of support for the Juneau Creek Alternative to demonstrate their commitment to the exchange.
November 14, 2011	The meeting was held in Anchorage with members the following organizations present: DOT&PF, FHWA, CIRI, USFS, USFWS, and OHA. DOT&PF and FHWA were invited to the Russian River MOU Meeting to discuss the group response received to the Finding of Adverse Effect letter for the project sent from FHWA on May 23, 2011.

Meeting Date	Purpose
September 28, 2012	The meeting was held in Anchorage with representatives of USFWS, USFS, DOT&PF, FHWA, CIRI, OHA, HDR and Kenaitze Indian Tribe. The purpose of the meeting was to discuss the Russian River Land Act MOU Group Letter and follow-up on the Kenaitze consultation. The Section 106 Eligibility Evaluation for identified TCPs was also discussed.
January 24, 2013	The Consulting Parties Meeting was held in Kenai with representatives invited from USFWS, USFS, OHA, DNR, Salamatof Native Association, Kenaitze Indian Tribe, CIRI, FHWA, DOT&PF and HDR. The project team gave an overview of the Section 106 process. The group discussed the ANILCA Title XI Process Letter (DOT&PF to USFWS), the draft evaluation of the Sqilantnu Archaeological District and identified TCPs and Findings of Effect.
November 26, 2013	DOT&PF, FHWA, and SHPO met with the Russian River Land Act MOU Group (Kenaitze Indian Tribe, CIRI, USFWS, and USFS) in Kenai and all other consulting parties were invited to attend. DOT&PF and FHWA presented answers to comments and questions some entities had posed in writing. There was no disagreement on FHWA's findings of adverse effects, and attendees agreed the process could move ahead to discussion of an agreement to mitigate impacts.

APE = Area of potential effect; CIRI = Cook Inlet Region, Incorporated; CRC = Cultural Resource Consultants; DOT&PF = Alaska Department of Transportation and Public Facilities; FHWA = Federal Highway Administration; HDR = HDR Alaska, Incorporated; KNWR = Kenai National Wildlife Refuge; MOU = Memorandum of Understanding; OHA = Alaska Office of History and Archaeology; SEIS = Supplemental Environmental Impact Statement; SHPO = State Historic Preservation Officer; TCP = Traditional Cultural Property; USFS = U.S. Forest Service; USFWS = U.S. Fish and Wildlife Service

Following consultation, DOT&PF and FHWA received concurrence from the Kenaitze Indian Tribe, CIRI, the State Historic Preservation Officer, and other consulting parties on the APE, identified eligibility of properties within the APE (including archaeological and historic districts, and traditional cultural properties) and effects on identified historic properties. FHWA determined the project would have adverse effects on properties that are eligible for the listing in the NRHP. At this time, consulting parties are expecting to move into discussion of mitigation of impacts with an agreement intended before the final EIS is published.

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7 Draft Supplemental EIS Distribution List

This Draft Supplemental Environmental Impact Statement (SEIS) is available for review and comment by the public and agencies. See the signature page for comment deadlines.

The document is available both in the form of an Executive Summary and in the form of the full Draft SEIS with appendices. The full document has been published mostly in electronic form and is available for viewing on the project web site, or for downloading. It also is available on compact disk for viewing. See the signature page for contacts.

The Draft SEIS has been distributed as follows for public and agency review.

7.1 Public Access

On the Internet at www.sterlinghighway.net

Alaska Resources Library and Information System, Anchorage

Alaska State Library, Juneau

Cooper Landing Community Library

Federal Highway Administration (FHWA) Headquarters, Washington, DC

FHWA Alaska Division, Juneau

Kenai Community Library

Soldotna Public Library

Z.J. Loussac Public Library (Alaska Collection), Anchorage

7.2 Federal Agencies

Advisory Council on Historic Preservation

National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NOAA Fisheries)

U.S. Army Corps of Engineers, Regulatory Branch, Alaska District

U.S. Coast Guard, Office of Bridge Programs, 17th Coast Guard District (Alaska)

U.S. Department of the Interior, Office of Environmental Policy and Compliance

U.S. Department of Transportation, FHWA

U.S. Environmental Protection Agency

- Office of Federal Activities, EIS Filing Section
- Region 10 Offices

U.S. Fish and Wildlife Service

- Alaska Regional Office
- Kenai National Wildlife Refuge

U.S. Forest Service

- U.S. Forest Service, Alaska Region Office
- U.S. Forest Service, Chugach National Forest, Supervisor's Office
- U.S. Forest Service, Chugach National Forest, Seward District Office

7.3 State Agencies

Alaska Department of Commerce, Community and Economic Development

Alaska Department of Environmental Conservation

Alaska Department of Fish and Game

- Division of Habitat
- Division of Sport Fish

Alaska Department of Natural Resources

- Division of Mining Land and Water
- Division of Parks and Outdoor Recreation
- Office of History and Archaeology (State Historic Preservation Officer)
- Project Management and Permitting

Alaska Department of Public Safety

Alaska Department of Transportation and Public Facilities

7.4 Local Governments

City of Soldotna

City of Kenai

Cooper Landing Advisory Planning Commission

Cooper Landing Community Club

Kenai Peninsula Borough

- Kenai River Center
- Office of the Mayor

7.5 Native Organizations

Cook Inlet Region, Incorporated

Kenai Native Association, Inc.

Kenaitze Indian Tribe

Salamatof Native Association, Incorporated

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