Essential Fish Habitat Assessment

STERLING
HIGHWAY MILE POST 45 TO 60
ALASKA

Prepared for:

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Department of Transportation and
Public Facilities

and

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SECTION 1 INTRODUCTION

This technical report provides an assessment of the essential fish habitat (EFH)[1] on the Kenai Peninsula that may be affected by the Sterling Highway Milepost (MP) 45–60 project. The Alaska Department of Transportation and Public Facilities (DOT&PF) is preparing a Supplemental Environmental Impact Statement (SEIS) as part of the National Environmental Policy Act (NEPA) process to supplement the 1994 Draft EIS. DOT&PF, on behalf of the U.S. Federal Highway Administration, has determined that this project may cause temporary and permanent adverse effects on EFH resources in the project area.

The Magnuson Stevens Fishery and Conservation and Management Act (MSFCMA) directs federal agencies to consult with the National Marine Fisheries Service (NMFS) when any of their activities may have an adverse effect on EFH. An adverse effect is defined as "any impact which reduces quality and/or quantity of EFH. 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.

In accordance with the EFH requirements of the MSFCMA, the following information is presented in this EFH Assessment: (1) a project description; (2) a summary of the EFH in the project area; (3) an analysis of the effects on EFH; and (4) proposed conservation measures.

SECTION 2 PROJECT DESCRIPTION

2.1 Project Area

The Sterling Highway is part of the National Highway System (NHS) and Interstate Highway System. The highway was constructed in the 1950s to serve the traffic, vehicle types, and the population of the Kenai Peninsula at that time. While the rest of the highway has seen substantial upgrades since the 1950s, the highway between mileposts (MP) 45 and 60 has not been upgraded to modern highway design standards. This portion of the highway is located in the Kenai River Valley and is constrained by the Kenai River, steep mountainsides, salmon spawning areas, private property, and several trails, campgrounds, and other recreational developments that have hindered highway upgrades. The DOT&PF and the FHWA are proposing to improve this remaining portion of the Sterling Highway. The proposed project is located about 100 highway miles south of Anchorage in the Kenai Peninsula Borough (KPB). The project vicinity is shown in Map 1.

The project area hosts many popular recreational sites for fishing, camping, and hiking. In addition, the areas surrounding the highway provide habitat for numerous wildlife species, including moose, bald eagle, Dall sheep, and brown bear. Project area water bodies support a world-class fishery for five salmon species, rainbow trout, and Dolly Varden. Major water bodies within the project area include Kenai Lake, Kenai River, Bean Creek, Juneau Creek, Cooper Creek, Russian River, and Fuller Creek. All of these water bodies are considered to be EFH, since they have been determined to be waters necessary for fish spawning, breeding, feeding or growth to maturity for those species managed under a federal Fishery Management Plan (FMP), in accordance with the MSFCMA. While these waters have been found to also support populations of Dolly Varden and rainbow trout, these species are not included in an FMP subject to EFH consideration under the Act, and are therefore are not discussed further in this assessment. Dolly Varden and rainbow trout, among others species, are included in the Fish and Wildlife discussion in Section 3.17 of the SEIS.

[1] The Magnuson Stevens Fishery and Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996, defines essential fish habitat (EFH) as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

2.2 Proposed Action

The DOT&PF, in cooperation with the Federal Highway Administration (FHWA), is seeking to improve the Sterling Highway in the Cooper Landing and Kenai River area between MP 45 and MP 60 to "rural principal arterial" standards (see box at right) to efficiently and safely serve through-traffic, local community traffic, and traffic bound for recreation destinations in the area, so that it may provide an acceptable "level of service" now and in the future. In achieving this purpose, DOT&PF and FHWA recognize the desire to serve the traveling public, while doing their part to protect the Kenai River corridor.

> **Rural principal arterial** is the Federal Highway Administration's highest roadway functional classification for a rural area. The rural principal arterial system consists of a connected rural network of continuous routes having the following characteristics:
>
> 1. Serve corridor movements having trip length and travel density characteristics indicative of substantial statewide or interstate travel.
> 2. Connect urban areas.
> 3. Provide an integrated network without stub connections except where unusual geographic or traffic flow conditions dictate otherwise.
>
> *FHWA Functional Classification Guidelines*, 1989

Specifically, the proposed project improvements would address the following three interrelated needs: (1) reduce highway congestion; (2) upgrade the highway to meet current highway design standards; and (3) improve highway function.

Need 1: Reduce Highway Congestion. The construction of multiple driveways and side street accesses over time, a sinuous, constrained alignment with little passing opportunity, and increasing traffic volumes have led to unacceptable congestion that is forecast to worsen in future years. As a result, the highway performs below an acceptable level of service standards for a rural principal arterial that is an important part of the NHS.

Need 2: Upgrade Highway to Meet Current Highway Design Standards. Existing characteristics of the Sterling Highway do not meet current "rural principal arterial" standards. In the section between MP 45 to MP 60, the curves, grades along Kenai Lake, shoulders, guardrail and clear zones, and multiple access points for driveways and intersections all contribute to a highway that does not meet current design standards.

Need 3: Improve Highway Function. The NHS serves as the essential connector between population centers, economic centers, and intermodal centers (such as airports, shipping ports, and ferry terminals) of the state. The Sterling Highway is an NHS route and the only road link between the western portion of the Kenai Peninsula and the rest of the state's and nation's road system. The highway also serves numerous local destinations that have become established along the highway over time. The result is considerable turning movements, slow speeds, and the NHS being used for local trips which inhibits the function of the NHS for through-traffic. Road sections on either end of this project have been improved, leaving a gap in the NHS functionality.

2.3 Reasonable Alternatives

For this recent effort, sixteen alternatives were initially considered by DOT&PF and the FHWA for this project. These alternatives were brought forward from previous EIS efforts in 1982 and 1994, suggested during the Draft SEIS public process, or developed specifically for the current Draft SEIS in an effort to satisfy the project purpose and need. Based on the results of screening and public input, the DOT&PF identified five alternatives for further study: the No Build Alternative, Cooper Creek Alternative, G South Alternative, Juneau Creek Alternative, and the Juneau Creek Variant Alternative. These alternatives are shown on Map 2, Reasonable Alternatives.

Each of the proposed alternatives would consist of a two-lane highway with paved shoulders, passing lanes, and turning lanes. Travel lanes would be 12 feet wide; paved shoulders would be 8 feet wide (adequate for safe bicycle and pedestrian use); passing lanes would be 12 feet wide; and all major intersections would have right and left-turn lanes. Standard right-of-way for all alternatives would be 300 feet wide with slight variations at large cut and/or fill areas. All build alternatives assume that the existing highway alignment would be retained for local community traffic. Bridge sites and structures are conceptual at this stage. Additional detail on the alternatives currently under consideration by DOT&PF is provided below.

2.3.1 No Build Alternative

NEPA requires an EIS to describe and analyze the impacts of no action, or no build, as a benchmark that allows for comparison of the degree of environmental effects of the various project alternatives (CEQ 1981). Under the No Build Alternative, no changes would be made to the highway in the project area. The highway would remain a two-lane highway with 11-foot lanes. Shoulders would continue to be between 0 and 2 feet wide. Clear zones and side slopes would remain as they are and would not achieve current safety standards. Normal highway maintenance would continue. The three existing bridges along this section of the Sterling Highway—the Cooper Landing, Cooper Creek, and Schooner Bend bridges—would be replaced as part of DOT&PF's normal bridge replacement program.

2.3.2 Cooper Creek Alternative

The Cooper Creek Alternative would construct approximately 4 miles of new road skirting a portion of Cooper Landing to the south. Under the Cooper Creek Alternative, approximately 10 miles of roadway would be improved on the existing alignment to meet current standards and incorporate passing lanes. This alternative would replace two bridges over the Kenai River (one at Cooper Landing and the other at Schooner Bend) and would construct a new bridge over Cooper Creek:

- **Cooper Landing Bridge Replacement.** The Cooper Landing Bridge would be replaced on an alignment that is slightly upstream (east) of the existing bridge to improve its geometry and to allow for use of the existing bridge (or of a temporary bridge) during construction. The bridge length would increase to approximately 670 feet because the new alignment would be offset from the existing fill that currently supports the northern end of the bridge. A retaining wall, instead of fill placement, would likely be used on the north side of the Kenai River. The total bridge width would be 78 feet. Based on preliminary bridge design (HDR 2011b), three to four piers (depending on the design) would need to be placed below the ordinary high water mark (OHWM) to construct the replacement bridge.
- **New Cooper Creek Bridge.** The proposed new Cooper Creek Bridge would be sited approximately one-half mile upstream of where the existing highway crosses Cooper Creek, and would cross over Cooper Creek in a curve at a 6 percent grade. The total bridge length would be approximately 840 feet, with a width of 62 feet. Based on preliminary bridge design options (HDR 2011b), four to six piers would need to be constructed but it is anticipated that the bridge would clear-span the EFH. Based on the design at this time, no structures below the OHWM would be required for this bridge.
- **Schooner Bend Bridge Replacement.** The Schooner Bend Bridge would be replaced approximately 80 feet downstream from the existing bridge. Relocating the new bridge would allow for better road geometry, avoid an eroding bend in the Kenai River, and allow the old bridge to accommodate traffic during construction. The proposed bridge would be approximately 325 feet long and 50 feet wide. Based on preliminary bridge design options (HDR 2011b), one to two in-water piers would be required for this bridge.

2.3.3 G South Alternative

The G South Alternative would construct approximately 5.5 miles of new road skirting Cooper Landing to the north. Under the G South Alternative, approximately 8 miles of roadway would be improved on the existing alignment to meet current standards and incorporate passing lanes. This alternative would replace one bridge over the Kenai River and would construct two new bridges: one over lower Juneau Creek and one over the Kenai River.

- **New Juneau Creek Bridge.** The Juneau Creek Bridge would be about 1,300 feet long and 62 feet wide. This crossing would be constructed where the canyon begins to open into the Kenai River Valley. At its highest point, the bridge would be approximately 200 feet above the canyon floor. Based on preliminary bridge design (HDR 2011b), a bridge in this location would require three to eight piers; though it is anticipated that pier placement could be designed so that no structures would be located below the OHWM.
- **New Kenai River Bridge.** The new Kenai River Bridge would be about 500 feet long and would be 78 feet wide. Based on preliminary bridge design (HDR 2011b), a bridge in this location would require two to three piers that would impact EFH.
- **Schooner Bend Bridge Replacement.** The Schooner Bend Bridge would be replaced for the G South Alternative the same as for the Cooper Creek Alternative.

2.3.4 Juneau Creek Alternative

The Juneau Creek Alternative locates the highway entirely north of the Kenai River to avoid conflict with the river, and to minimize involvement with the archaeological resources located near the river. The Juneau Creek Alternative would construct approximately 9.5 miles of new road skirting Cooper Landing to the north. Under the Juneau Creek Alternative approximately 4 miles of roadway would be improved on the existing alignment to meet current standards and incorporate passing lanes. This alternative would not replace any existing bridges and would construct one new bridge over Juneau Creek.

- **New Juneau Creek Bridge.** The proposed new bridge would be 62 feet wide with two 12-foot traffic lanes, one 12-foot westbound passing lane, 8-foot shoulders, and a 6-foot pathway on the south side of the bridge. The bridge length would be approximately 1,200 feet with a main span of 825 feet. Preliminary bridge design indicates abutments and piers would not be required in the canyon. For purposes of this document, the top (rim) of the canyon is defined as elevation 1,060 feet. DOT&PF has made a commitment that no structure or work would occur in the Juneau Creek canyon below elevation 1,060 feet in this area.

2.3.5 Juneau Creek Variant Alternative

The Juneau Creek Alternative and Juneau Creek Variant Alternative are similar. The major difference between the two alternatives is that the Juneau Creek Alternative was created on the best alignment for engineering and traffic purposes, but crossed Wilderness in the Refuge. The Juneau Creek Variant Alternative was developed to avoid KNWR Wilderness.

At the time of publication of this EFH Assessment, the DOT&PF have not identified a preferred alternative.

SECTION 3 EFH IN THE PROJECT AREA

All waters that support anadromous fish species are considered EFH by NMFS. According to the Anadromous Waters Catalog (ADF&G 2012), personal communication with agency personnel, and field-verification, ten streams and one lake within the project area are considered EFH for one or more species of Pacific salmon, managed under the MSFCMA. These include:

- Kenai Lake (ADF&G 244-30-10010-0020)

- Kenai River, upper reach (ADF&G 244-30-10010)
- Bean Creek (ADF&G 244-30-10010-2169)
- Juneau Creek (ADF&G 244-30-10010-2165)
- Cooper Creek (ADF&G 244-30-10010-2162)
- Russian River, lower reach (ADF&G 244-30-10010-2158)
- Fuller Creek (ADF&G 244-30-10010-2151)
- Unnamed Creek (1) (ADF&G 244-30-10010-2166)
- Unnamed Creek (2) (ADF&G 244-30-10010-2160)
- Unnamed Creek (3) (ADF&G 244-30-10010-2159)
- Unnamed Creek (4) (ADF&G 244-30-10010-2157)

3.1 Importance of EFH Species Stocks within the Study Area

The Kenai River system supports major recreational and commercial fisheries. Additionally fish resources of the Kenai River provide for subsistence and cultural uses. The Kenai River supports one of the largest recreational fisheries for Chinook, sockeye, and coho salmon in Alaska. Additional information on the characteristics of these EFH water bodies is discussed in Section 3.17.2 of the SEIS.

3.2 Habitat Conditions within the Study Area

Kenai Lake. Kenai Lake provides spawning, rearing and migratory habitat for all five salmon species. Principal salmon spawning tributaries are located along the northeast shore of Kenai Lake and at the extreme east end. Kenai Lake is approximately 13,800 acres in area. The lake drains to the Kenai River and then flows west, discharging to Cook Inlet at Kenai. All five of Alaska's salmon species – sockeye salmon (*Oncorhynchus nerka*), Chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), and chum salmon (*O. keta*) – are present in Kenai Lake. Adult Chinook salmon spawn in Kenai Lake in late May through July. By mid-July, late-run sockeye salmon begin to spawn in the near shore areas of Kenai Lake. Juvenile sockeye and Chinook salmon overwinter in Kenai Lake. The juveniles can spend up to 2 years rearing in the lake environment before migrating to the sea (Marsh 2006).

Kenai River. The Kenai River begins at the western outfall of Kenai Lake and flows 82 miles west to Cook Inlet. The Kenai River is considered to be exceptional fish habitat including floodplains, wetlands, and vegetated riparian zones. The ADF&G *Anadromous Waters Catalog* (2012) documents the upper reaches of Kenai River as spawning habitat for sockeye salmon, king salmon, and coho salmon. Chum salmon occur in small numbers in the Kenai 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 2006) because of their distinct odd- and even-year spawning populations. Chinook salmon have two spawning runs in the Kenai River. The first 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, ADNR 1998). 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 crossing as late as February (Marsh 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). Currently, the entire Sterling Highway alignment between MP 45 and 60 is adjacent to the Kenai River, with two bridge crossings within this area.

Bean Creek. Bean Creek joins the Kenai River from the north near the origin of the river at Kenai Lake. The main stem of Bean Creek has moderate flow and a 5 percent gradient. The creek is composed of small to large gravels and small cobbles. The average channel width is 4.9 feet and the depth ranges from 8 to 10 inches. Bean Creek tributary also has moderate flow and a 7 percent gradient. The stream bed contains small to large gravels and small cobbles. The channel averages 3.3 feet wide and from 3.5 to 8.4 inches deep. The habitat is mainly riffles and pools. There is abundant overhanging vegetation and woody debris with some undercut bank habitat. The upper and lower reaches of Bean Creek are documented as rearing habitat for Chinook and coho salmon (ADF&G 2012).

Juneau Creek. Juneau Creek is a major stream in the project area and drains areas north of Kenai River. Juneau Creek joins the Kenai River from the north, between MP 50 and 51. The habitat consists of riffles with small cascades and plunge pools with a bottom substrate of small to large gravels and small cobbles. There is abundant overhanging vegetation and woody debris with some undercut bank habitat (HDR 2006a). Salmon do not migrate above the 128-foot-high Juneau Creek Falls, located about 4 miles from the Sterling Highway. The upper and lower reaches of Juneau Creek, below these falls are documented as spawning habitat for sockeye salmon, and spawning and rearing habitat for Chinook salmon (ADF&G 2012). HDR conducted surveys in 2004 and 2005 in this stream and no fish were captured during the surveys (2011).

Cooper Creek. Cooper Creek begins at Cooper Lake and flows 4.7 miles north to the Kenai River, dropping 750 feet along the way. In the project area, channel width is 32 to 49 feet and the average stream gradient is 3 percent. Stream habitat consists of pools, riffles, and glide. Cooper Creek has moderate flow comprised primarily of boulder and gravel substrate. The upper and lower reaches of Cooper Creek are documented as rearing habitat for coho salmon (ADF&G 2004). The upper creek has several falls, which are impassable to salmon. The lower 4-mile stretch of the creek before its confluence with the Kenai River has a 2.7 percent gradient with no substantial fish barriers (Dorava and Ness 1999). The lower one-half mile flows out onto a wide alluvial fan. In addition, previous field surveys conducted by HDR fish biologists in Cooper Creek found sockeye salmon present (HDR 2004). Coho and sockeye salmon spawning (2011) have also been identified. Cooper Creek provides limited spawning habitat for a small number of Chinook salmon (FERC 2006). Since the construction of the Cooper Lake dam in 1959, all normal outflow from Cooper Lake is directed into Kenai Lake via a tunnel, significantly reducing flows at the mouth of Cooper Creek (FERC 2006). An approved diversion of Stetson Creek, a Cooper Creek tributary below the dam, is anticipated to create 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, joining at approximately MP 55. The 12-mile-long Russian River travels from elevation 700 feet at Upper Russian Lake down to the confluence of the Kenai River at elevation 350 feet. Most of the length of the river is floodplain channel type with a gradient of less than one percent and only very low banks that may not contain flood waters. The tributaries draining into the Russian River are high-gradient, contained-channel types. The Russian River is EFH for Chinook, coho, sockeye, and pink salmon (Marsh 2006, ADF&G 2012). The Russian River accounts for an average of 25 percent of late-run sockeye escapement to the Kenai River. However, the Russian River makes up only 3 percent of the drainage area of the Kenai River. This means that the Russian River is approximately 8.5 times more productive for late-run sockeyes than the rest of the 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 2006).

Fuller Creek. Fuller Creek is a tributary of the Kenai River, located within the Refuge that crosses beneath the Sterling Highway near MP 57. The streambed is 11.5 feet wide, contains large gravels and small cobbles, and has a 12 percent gradient. The stream has moderate flow consisting of riffles, small pools, and cascades. During unusually dry seasons, this stream has been known to go dry. The upper and lower reaches of Fuller Creek are documented as rearing habitat for coho salmon (ADF&G 2012). This stream was verified as flowing in September 2003 and is on the list of anadromous fish streams. The 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 tributary (ADF&G #244-30-10010-2166) flows along the Sterling Highway and passes under Snug Harbor Road, just south of the Cooper Landing Bridge, where it joins the Kenai River. This is a small low flow stream, running between approximately 1.6 inches to a one 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 2012). 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 2012) recorded presence of juvenile Chinook and coho salmon on both the east side of Snug Harbor Road as well as about 100 feet west of Snug Harbor Road.

Unnamed Creek 2. This tributary (ADF&G #244-30-10010-2160) of the Kenai River has moderate flow and is located immediately north of the Sterling Highway, at approximately MP 51.5. The stream is approximately 3.3 feet wide and 1.97 to 7.87 inches deep at a 5 percent gradient. Stream substrate is organics and silts. The ADF&G *Anadromous Waters Catalog* (2012) documents this stream as rearing habitat for coho salmon. Coho salmon were captured during the fish survey for this project (HDR 2011a).

Unnamed Creek 3. This tributary (ADF&G# 244-30-10010-2159) is located at approximately MP 54.0 and passes underneath the Sterling Highway before joining the Kenai River. This tributary is approximately 660 feet in length and was documented as an anadromous stream in 2012 (ADF&G 2012). Juvenile coho salmon were captured and identified at approximately 25 and 75 feet above the Sterling Highway culvert.

Unnamed Creek 4. This tributary (ADF&G #244-30-10010-2157) of the Kenai River is approximately 350 feet long and flows underneath the Sterling Highway at approximately MP 54.3. This creek has been documented as rearing habitat for coho salmon in surveys conducted in 2004. Additionally, Chinook salmon were documented in this stream in 2005 (HDR 2011a). The ADF&G *Anadromous Waters Catalog* (2012) documents this stream as rearing habitat for coho salmon.

3.3 EFH Species

All five Pacific salmon species are present in the project area and almost all life stages occur (see Table 3-1). Geographically, this system is contained within a large-scale terrain setting comprised of lakes, streams, wetlands, mountains, and glaciers that are connected to Cook Inlet and the greater Gulf of Alaska ecosystem.

The Kenai River ecosystem has consistent high flows for extended periods that provide salmon ample time for spawning and migration. Kenai and Skilak Lakes regulate stream flow fluctuations in the Kenai River system, 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 (Dorava and Liepitz 1996); see Table 3-2. In many areas of the Kenai River ecosystem the stream banks consist of low-gradient zones with slower currents and back eddies. These areas provide streamside vegetation of grasses, roots, and overhanging trees. Streamside vegetation has an important function, providing bank stabilization, cover, and feeding zones for juvenile fish.

Table 3-1: Essential Fish Habitat Designations in the Project Area

Pacific Salmon Species	Larvae and Egg Stage	Rearing	Spawning	Adults Present
Chinook salmon	x	x	x	x
Coho salmon	x	x	x	x
Sockeye salmon	x	x	x	x
Pink salmon	x		x	x
Chum salmon	x		x	x

Source: Johnson and Weiss 2006; HDR 2004; HDR 2006a; Marsh 2006

Table 3-2: Project Area Anadromous Fish Streams and Related Species

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

[a] Field-verified anadromous fish streams (HDR 2011a)

[b] Upper reach

[c] Upper and lower reaches

[d] Lower reach

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

Source: Marsh 2006; ADF&G 2012; Johnson and Blanche 2011.

Chinook Salmon. Chinook salmon are the least abundant and largest of the Pacific salmon (NPFMC 1998). Chinook salmon have demonstrated variable ocean migration patterns and timing of spawning migration. The variability in life history strategies has caused researchers to divide Chinook salmon into two separate races: stream and ocean fish. Stream-type fish utilize long freshwater residences as juveniles (1–2 years). They then migrate quickly to oceanic habitats, enter freshwater as immature or "bright" fish, and spawn far upriver in late summer or early fall. Alternatively, ocean-type fish have short, highly variable freshwater residency (from a few days to 1 year), extensive estuarine residency, enter freshwater at a more advanced state of maturity, and spawn within a few weeks of freshwater entry in the lower portions of the watershed. Within these two types of life styles, there is also considerable variability due to a combination of phenotypic plasticity and genetic selection to local conditions (NPFMC 1998). For example, adult run-timing is strongly influenced by in-river flow volumes and temperature levels.

Chinook salmon populations in the Kenai River system consist of two distinct spawning runs: an early run and a late run (Burger et al. 1983, 1985). The early run consists of Chinook salmon that enter the Kenai River prior to June 30. Chinook salmon entering the Kenai River after June 30 are considered part of the "late run" (Boggs et al. 1997). 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 et. al. 1983; Bendock and Alexandersdottir 1992). In addition to the mainstem Kenai River, upper river tributaries used for spawning by Chinook salmon include the Russian River, Juneau Creek, Quartz Creek, Crescent Creek, and Ptarmigan Creek.

Chum Salmon. Chum salmon often spawn in small side channels and other areas of large rivers where upwelling springs provide excellent conditions for egg survival. Chum fry feed on small insects in the stream and estuary before forming into schools in salt water. 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 timing of this out migration can occur between February and June, but most fry leave the streams during April and May. Chum salmon tend to linger and forage in the intertidal areas at the head of bays (ADF&G 1994).

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

Coho salmon enter spawning streams from July to November, usually during periods of high runoff. Adults hold in pools until they ripen, then move onto spawning grounds; spawning generally occurs at night. 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 May or June. The emergent fry occupy shallow stream margins, and, as they grow, establish territories which they defend from other salmonids. They live in ponds, lakes, and pools in streams and rivers, usually among submerged woody debris – quiet areas free of current – from which they dart out to seize drifting insects (ADF&G 1994).

Pink Salmon. Pink salmon exhibit strong spawning runs in the Kenai River system during even-numbered years. Pink salmon, like chum salmon, do not over winter in streams but migrate out of the streams directly to the sea shortly after emergence. Compared to other salmon species, pink salmon spend the least amount of time in freshwater environments. Spawning and egg development take place in the lower reaches of streams and inter-tidal areas (PSMFC 2002).

Sockeye Salmon. Sockeye salmon return to freshwater systems from the ocean during the summer months. Spawning usually occurs in streams associated with lakes or in the lakes themselves where the juveniles rear.

Similar to coho and Chinook salmon, sockeye salmon enter the Kenai River as two temporally distinct stocks (Boggs et al. 1997). The early run enters the river near the middle of May, and 50 percent of the late run has usually entered the Kenai River by the middle of July (Davis et al. 1994).

SECTION 4 ANALYSIS OF EFFECTS ON EFH

This section presents an analysis of the effects the proposed project would have on EFH with the proposed conservation measures.

Spawning and rearing of salmonid species is the function of the Kenai River most often cited as being of highest concern. Natural events and human uses currently impact the quality of fish habitat, including critical near-shore areas. Near-shore areas are prone to vegetation loss and erosion by trampling and to degradation due to bank de-stabilization (Liepitz 1994). The most recent updates to the Kenai River Comprehensive Plan and Kenai Peninsula land use zoning address development and other land management activities that affect fish habitat.

The following subsections provide an analysis of potential impacts to EFH for each of the project alternatives including the no build alternative and are based on data compiled from ADF&G's *Anadromous Waters Catalog* (ADF&G 2012) and project-specific field studies (HDR 2011a). Impacts to EFH were calculated using GIS, and determined by comparing the acreage of overlap between the alignments' cut-and-fill boundaries and the mapped EFH.

4.1 No Build Alternative

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 accidents, and concentrated fishing pressure which is linked to stream bank erosion would be expected to increase relative to population and recreational use increases.

4.2 Build Alternatives

4.2.1 Summary and Impacts Common to Build Alternatives

The number of bridges and culverts crossing streams with resident or anadromous fish is a contributing factor to adverse affects to EFH. While culverts would be designed to meet the ADF&G-DOT&PF Memorandum of Agreement (DOT&PF and ADF&G 2002) requirements for fish passage, construction in or near EFH habitat would temporarily impair the normal habitat functions. Additionally, the area of new impermeable surfaces (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. The Cooper Creek, G South, Juneau Creek, and Juneau Creek Variant alternatives would adversely affect 1.2, 1.0, 0.8, and 0.8 acres of EFH, respectively. Additional information related to affects to EFH can be found in Chapter 4 of the SEIS. Map 2 (attached) depicts the locations of anadromous stream crossings for the various alternatives described in the sections specific to each alternative below.

Changes to access and reduction in congestion could indirectly affect the desirability of the area for sport fishing, creating additional pressure for access to fishing resources. The increase in traffic, predicted to be approximately 2 percent per year, is anticipated to be the same for all alternatives and is a good proxy for the anticipated growth pressure that could affect the project area. 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 affect the sustainability of the fishery. The Kenai 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 is not anticipated to cause a long-term adverse effect on EFH. For additional information on indirect effects closely related to EFH, see Section 4.6 Subsistence. Recreational changes related to the numerous sport fish access and recreation facilities are described in Section 4.5, Parks and Recreation, and Section 4(f), and Chapter 5, Section 4(f) impacts in the SEIS.

Measures to avoid and minimize adverse impacts to EFH include specifications on the placement of culverts and construction of bridges to retain existing hydrology and culvert sizing to maintain fish passage. Construction work in anadromous streams will avoid critical fish spawning and migration timing windows to be established by the ADF&G's Division of Habitat (generally during peak spawning runs from mid-June to mid-August). A Title 16 Fish Habitat Permit will be obtained from the ADF&G Division of Habitat. The ADF&G Title 16 permit process further ensures that construction and operation of any of the build alternatives would be conducted using best management practices (BMPs) to minimize the amount of time in-water work is conducted, minimize siltation of waterbodies during construction, and to provide for fish passage during construction and operation. With mitigation, described in more detail in Section 4.31 of the SEIS, no long term adverse affects on EFH or species that rely on that habitat are anticipated.

4.2.2 Cooper Creek Alternative

Direct and Indirect Impacts. The Cooper Creek Alternative would affect the four unnamed streams and two bridge replacements across the Kenai River. A bridge over Cooper Creek would be more than 100 feet above the stream itself. 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 need not 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 will be used to cross three unnamed creeks and Fuller Creek, which all have been field-verified as EFH, for rearing coho salmon. Unnamed Creek number four is also known to have Chinook salmon present. Unnamed Creek number one would be re-routed into an open channel adjacent to the road. In accordance with the Memorandum of Agreement between DOT&PF and ADF&G, the culvert crossings will be designed to maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency. Impacts to EFH would be temporary and related to culvert installation. Temporary impacts could include increased turbidity and sedimentation. There would be no permanent loss of EFH resulting from the culvert crossing because the required culvert design features noted above would preserve EFH.

Sockeye, Chinook, coho, and pink salmon all spawn in upper reaches of the Kenai River. Chum salmon are also present. This alternative requires two separate locations where riprap or retaining walls may be required to widen and reconstruct the existing roadway to upgrade the highway to current standards.

The Cooper Creek Alternative would move approximately 44 percent of the highway more than 500 feet away from the Kenai River. In this relocated section, approximately 70 percent of the traffic would be removed from the area closest to the Kenai River, reducing automobile traffic in the river corridor (and associated contaminates) providing a benefit compared to the No Build Alternative. This additional separation would reduce the risk of hazardous substance spills into the Kenai River from fuel tanker trucks and other vehicles which would help to protect EFH.

Table 4-1 depicts the anticipated construction activities and impacts associated with the Cooper Creek Alternative that could affect EFH. Impacts noted are permanent and only include effects below the OHWM.

Table 4-1: Cooper Creek Alternative EFH Impacts

Anadromous Waters	Sockeye	Chinook	Coho	Pink	Chum	Structure/ Length (ft)	EFH Impact (permanent, acres)	EFH Impact (yds^3)
Kenai River	S	S	S	S	P	Cooper Landing Replacement Bridge	0.15	4,825
						Schooner Bend Replacement Bridge	0.075	2,413
						Retaining Wall/Riprap	0.76	2,465
						Retaining Wall/Riprap	0.057	65
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	R	—	—	Culvert (95 feet long)	0.022	290
						Total	**1.24**	**13,138**

Source: Marsh 2006, ADF&G 2012, HDR 2011a, Johnson and Blanche 2011
S = Spawning; R = Rearing; P = Present

4.2.3 G South Alternative

<u>*Direct and Indirect Impacts*</u>. The G South Alternative affects known EFH waterbodies including the Kenai River, Bean Creek, Juneau Creek, Fuller Creek, and unnamed creeks 2, 3, and 4. Expect for replacement of the bridge at Kenai Lake, direct affects to the Kenai River would be similar to those under the Cooper Creek Alternative.

Based on preliminary design conducted for bridge structure options (HDR 2011b), because of the creek width, 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 three unnamed creeks and Fuller Creek, which have been field verified as providing rearing habitat for coho salmon. Unnamed Creek number four is also known to have Chinook salmon present. All fish stream conveyances would be sized to meet the ADF&G-DOT&PF Memorandum of Agreement requirements (DOT&PF and ADF&G 2002). Impacts to EFH would be minimized through BMPs. No substantial permanent adverse long term impacts are expected as a result of culvert installation and replacement.

This alternative requires two separate locations where riprap or retaining walls may be required to widen and reconstruct the existing roadway to bring the highway up to current standards. Table 4-2 provides estimated impacts to EFH associated with this alternative.

The G South Alternative would move approximately 53 percent of the highway more than 500 feet away from the Kenai River. In this relocated section, approximately 70 percent of existing traffic would be removed from the area closest to the Kenai River, resulting in reduced traffic in the river corridor (and associated contaminates) providing a benefit compared to the no build. This additional separation would reduce the risk of hazardous substance spills into the Kenai River from fuel tanker trucks and other vehicles. Table 4-2 depicts the anticipated construction activities and impacts associated with the G South Alternative that would affect EFH.

Table 4-2: G South Alternative EFH Impacts

Anadromous Waters	Sockeye	Chinook	Coho	Pink	Chum	Structure/ Length (ft)	EFH Impact (permanent, acres)	EFH Impact (yds^3)
Kenai River	S	S	S	S	P	New Kenai River Bridge	0.15	4,825
						Schooner Bend Replacement Bridge	0.075	2,413
						Retaining Wall/Riprap	0.76	2,465
						Retaining Wall/Riprap	0.057	65
Juneau Creek	*S*	S/R	R			New Bridge	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	**1.17**	**12,658**

Source: Marsh 2006, ADF&G 2012, HDR 2011a, Johnson and Blanche 2011
S = Spawning; R = Rearing; P = Present

4.2.4 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts. The mapped anadromous waters affected by the Juneau Creek Alternative (and Variant) are the Kenai River and Fuller Creek. Preliminary bridge structure options anticipate 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 need to be placed in the water or riparian area (no work would occur below elevation 1,060 on the canyon rim); as a result no EFH impact is anticipated at that crossing. A crossing of Bean Creek would utilize a culvert placed above the 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. All fish stream conveyances would be sized to meet the ADF&G-DOT&PF Memorandum of Agreement requirements (DOT&PF and ADF&G 2002). No substantial permanent adverse long term impacts are expected as a result of culvert installation and replacement.

In the relocated sections of the Juneau Creek alternative, approximately 75 percent of the highway would be relocated more than 500 feet away from the Kenai River and in the Juneau Creek Variant alternative approximately 74 percent would be routed away from the Kenai River corridor. In these relocated sections of highway, approximately 70 percent of the traffic would be removed from the area closest to the Kenai River, reducing automobile traffic in the river corridor (and associated contaminates) providing a benefit comparable to the No Build Alternative. This additional separation would reduce the risk of hazardous substance spills into the Kenai River from fuel tanker trucks and other vehicles.

This alternative requires one location where riprap or retaining walls may be required to widen and reconstruct the existing roadway to bring the highway up to current standards. Table 4-3 depicts the anticipated construction activities and impacts associated with the Juneau Creek Alternative and Juneau Creek Variant Alternative that would affect EFH.

Table 4-3: Juneau Creek and Juneau Creek Variant Alternatives EFH Impacts

Anadromous Waters	Sockeye	Chinook	Coho	Pink	Chum	Structure/ Length (ft)	EFH Impact (acres)	EFH Impact (yds^3)
Kenai River	S	S	S	S	P	Retaining Wall/Riprap	0.76	2,465
Fuller Creek	—	—	R	—	—	Culvert (130 ft long)	0.030	1,150
						Total	**0.79**	**3,615**

Source: Marsh 2006, ADF&G 2012, HDR 2011a, Johnson and Blanche 2011
S = Spawning; R = Rearing; P = Present

4.3 Temporary Construction Impacts

For all build alternatives, roadway construction would require crossing anadromous and resident fish streams. Temporary diversions of these streams may be required during culvert installation and possibly during construction of small bridges, which would temporarily alter stream flow. Temporary diversions will be subject to permitting stipulations and will be designed so that stream flow will not be impeded and fish passage would not be compromised. Placement of culverts in fish-bearing streams could temporarily affect anadromous fish by eliminating eggs incubating in the streambed or by creating turbid water, instream scour or sedimentation. Sedimentation could suffocate incubating eggs as well as affect rearing and foraging of juvenile salmon. To reduce temporary impacts to the extent practicable, in-stream diversions would be limited to late October through end of December to avoid salmon spawning and rearing life cycles, although this timing window would be subject to permit stipulations (Marsh 2006).

In-water work would be required for the replacement and construction of bridges over the Kenai River. Pile driving, auguring, or both would be necessary for placement of bridge pier foundations. While temporary impacts on the water quality of the Kenai River would occur during construction, including increased turbidity and sedimentation, no long-term EFH impacts are expected as a result of bridge construction.

The potential effects of construction activities upon resident fish in project area streams would be similar to those described for EFH in Section 4.17.2 of the SEIS. Impacts to resident and anadromous fish species would be minimized through environmentally appropriate installation criteria and BMPs.

4.4 Cumulative Impacts

4.4.1 Past Trends

The watershed within the project area is important for spawning and rearing of several anadromous and resident fish species. Alaska’s largest sport fishery is on the Kenai River. The most heavily fished tributary of the Kenai River is the Russian River, which is within the project area boundary, though not within the footprint of the project. Outdoor recreational use in the project area has grown substantially with popular recreational sites and businesses for fishing, rafting, camping, sight-seeing and hiking. In addition, the areas surrounding the highway have provided viewing opportunities for numerous wildlife species, including moose, bald eagle, Dall sheep, and brown bear.

4.4.2 Future Trends: No Build Alternative

No direct impacts to aquatic species or EFH are anticipated as a result of the No Build Alternative. However, leaving the highway in its current alignment would do nothing to alleviate the risk of a hazardous substance spill into the Kenai River, which could negatively impact aquatic species.

Future area development could have adverse cumulative impacts on aquatic species and EFH from sedimentation, channelization, and increased runoff intensity that could alter the natural stream flow. Reconstruction of the bridges along the existing Sterling Highway would replace piers in EFH and potentially affect aquatic species; however, all construction projects would comply with the Fishway Act and Anadromous Fish Act, thereby mitigating potential impacts. During construction, a Storm Water Pollution Prevention Plan (SWPPP) and BMPs would be implemented to reduce impacts to water quality. All appropriate regulatory permits would be acquired from federal and state resource agencies and stipulations followed to protect aquatic species and EFH. Future projects in the Cooper Landing area, such as the Skilak Wildlife Recreation Area Improvements, could positively affect aquatic species and EFH in the project area by increasing awareness of the causes of bank erosion, habitat degradation, and the need to maintain the natural flow of rivers and streams. Increased human activity around project area streams could have a detrimental effect on streamside habitats and stream banks which could in turn impact aquatic species. However, most sport fishing activities would continue to be concentrated around the Kenai and Russian river areas, which are heavily managed by ADF&G for sustainable harvest. The cumulative impact on aquatic species as a result of the No Build and the reasonably foreseeable future actions (RFFAs) are anticipated to be minimal.

4.4.3 Future Trends: Build Alternatives

The Build alternatives would all replace culverts that are not up to current standards on reconstructed sections of the existing highway, thereby improving water flow and fish passage habitat conditions. The Build alternatives would move vehicles away from the Kenai River to different extents, which would reduce the risk of a hazardous substance spill reaching the Kenai River and reduce the impact from highway runoff. The impacts of past, present, and future actions (RFFAs) combined with the impacts from any of the Build alternatives would have a minimal contribution to cumulative impacts to aquatic species and EFH.

SECTION 5 CONSULTATION TO DATE

The MSFCMA directs federal agencies to consult with the NMFS when any of their activities may have an adverse effect on EFH.

In early 2001 DOT&PF along with HDR Alaska, Inc. created an Agency Consultation Committee (ACC) for the Sterling Highway Mile 45–60 project. The ACC, comprised of agency representatives with regulatory and/or policymaking authority regarding the project or who have an interest in the project vicinity, served as a forum for agency staff to work together with the project team. NMFS was notified of the formation of the ACC in a letter sent February 7, 2001, thus initiating project scoping. In addition to inviting NMFS's participation in the project, the letter noted that the ACC meetings would focus on project process, purpose and need, base alternative concepts, and the identification of project issues to address. NMFS attended one meeting in Soldotna (September 13, 2001), and the agency remained on the ACC mailing list and was made aware of additional meetings — a total of six were held.

In a September 8, 2006 letter, the FHWA and DOT&PF initiated a consultation with NMFS on the current Draft SEIS. The letter requested concurrence on the determination that there are no ESA protected species, in accordance with Section 7 of the ESA, under the jurisdiction of NOAA and the NMFS in the project area. On September 13, 2006 NMFS responded and, having reviewed the letter and the work of DOT&PF and FHWA, concurred with their determination.

Following additional work on the Sterling Highway Mile 45–60 project's alternatives analysis, field studies and engineering, a follow up agency meeting was held in May of 2007. The meeting provided an update on the project and on the status of the Draft SEIS. NMFS was invited to the agency meeting, but did not attend.

The project team's most recent outreach to NMFS was an email inviting Agency representatives to attend an August 2012 agency meeting. NMFS responded via email on August 8, 2012 that, due to staffing limitations, they were currently unable to participate in the project.

SECTION 6 PROPOSED CONSERVATION EFFORTS

Construction of this project would require a U.S. Army Corps of Engineers (Corps) Section 404 Permit, ADF&G Title 16 Fish Habitat Permit, Alaska Department of Environmental Conservation (ADEC) Section 401 Certificate of Reasonable Assurance, and Kenai Peninsula Borough (Borough) Flood Hazard Permit. The following conservation and mitigation measures would be incorporated to avoid, minimize, and mitigate impacts to EFH during design and construction. 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:

- Based on available preliminary engineering done to date (HDR 2011b), the new bridge crossings would be designed to minimize impacts to EFH by placing as few piers as feasible within or below ordinary high water. As further engineering occurs, DOT&PF will continue to evaluate bridge designs to reduce impacts to EFH.
- 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 2012), pile driving or bridge removal activities may be limited to late October to the end of December to avoid spawning impacts (per recommendations in Marsh 2006; 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 to provide passage to both anadromous and resident fish. All road structures crossing anadromous habitat would be designed to meet the ADF&G-DOT&PF Memorandum of Agreement requirements for fish passage; EFH stream culverts would be bottomless arch or fully embedded with streambed material where possible.
- 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 2006b). Replacement of existing culverts that are undersized or perched could improve fish passage to upstream habitat on portions of the highway that are reconstructed.
- No vehicles or equipment will 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 shall be provided detailing the process for fueling this equipment within 100 feet of wetlands or the fish bearing streams. Fueling and service vehicles shall 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 shall 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 ADOT&PF Standard Specifications for Seeding.

- 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. Material used within 12 hours of placement is not considered a temporary material storage pile.
- Slopes with the potential to impact the Kenai River would be stabilized as soon as practicable.
- 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."
- At no time would the construction activities result in a migration barrier for adult or juvenile salmonids. An in-water work window would be defined during permitting to regulate times that work would be performed within the vegetative limits of a river creek, or stream. 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. Following completion of construction, all streams would be restored to natural conditions.
- BMPs developed in accordance with DOT&PF's *Alaska Storm Water Pollution Prevention Plan Guide* (DOT&PF 2011) and DEC's *Alaska Storm Water Guide* (ADEC 2011a) 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 (such as 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 revegetated plants can bind the soil and stabilize it) (ADEC 2011b), and sustaining predevelopment flow rates to protect stream habitat (ADEC 2011a).
- Construction would be timed to minimize adverse effects to salmon during critical life stages. Timing windows would be established through agency consultation and incorporated into construction specifications for all in-stream work and would be determined by permit stipulations.

SECTION 7 CONCLUSION

All five salmon species are documented as EFH within the study area. Adverse effects to EFH are unavoidable and largely associated with temporary construction activities. The use of the proposed conservation measures will help to mitigate these impacts.

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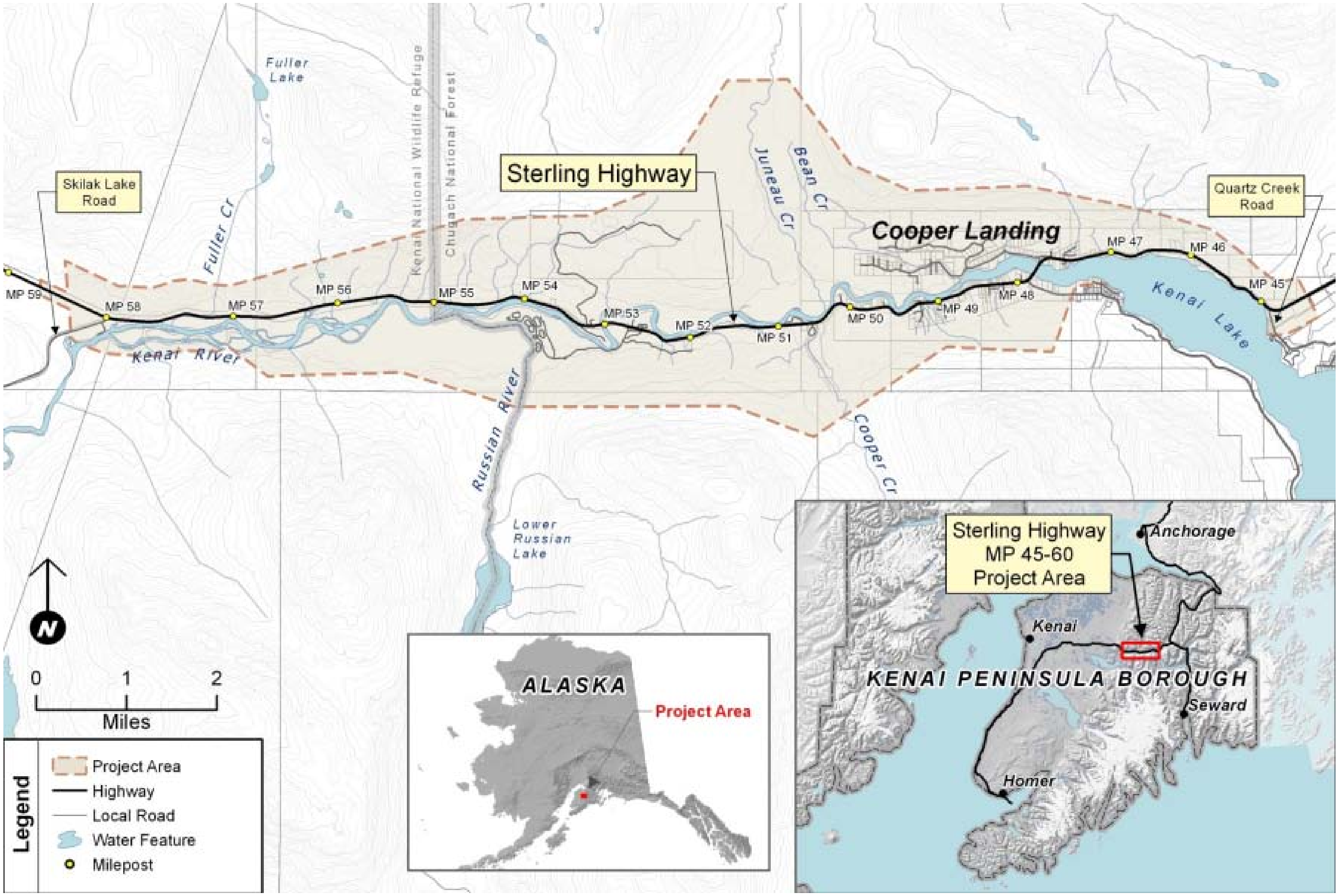
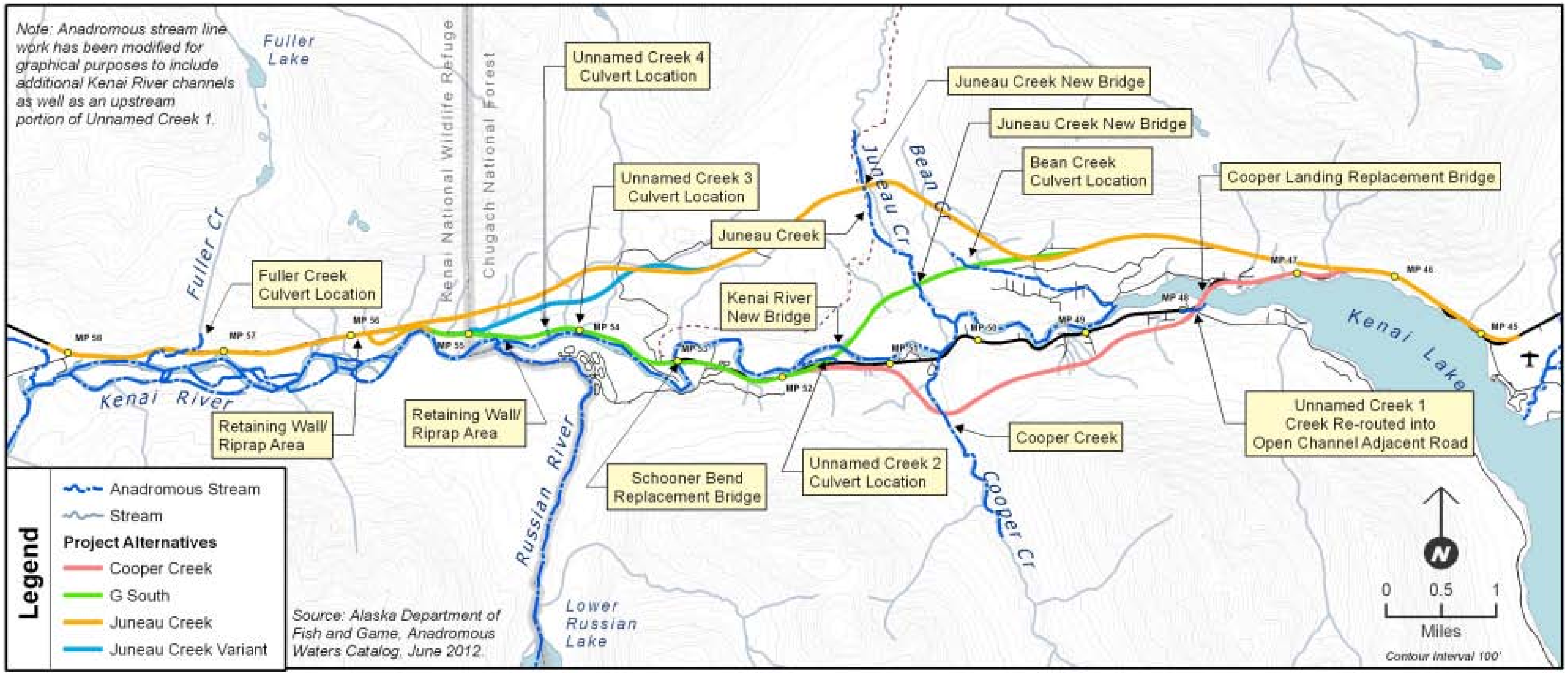


Map 1: Project Vicinity

Source: HDR, Alaska



Map 2: Reasonable Alternatives

Source: HDR Alaska