5.4 Fisheries Resources

This section describes fisheries resources in the proposed Port MacKenzie Rail Extension study area and potential impacts from the project on these resources. Section 5.1 describes the regulatory setting for fisheries, Section 5.4.1 defines the study area, Section 5.4.2 describes the analysis methodology, Section 5.4.3 describes the affected environment (existing conditions), and Section 5.4.4 describes potential environmental consequences (impacts) to fisheries resources from the proposed rail line.

5.4.1 Study Area

The study area for fisheries resources is the surface waters within the Susitna River basin that are bounded on the west by the Susitna River, on the south by Cook Inlet, on the east by Knik Arm, and on the north by the existing Alaska Railroad Corporation main line (Figure 5.4-1).

5.4.2 Analysis Methodology

SEA analyzed potential impacts to fisheries resources from proposed rail line construction and operations for each rail line crossing based on current and potential anadromous and resident fish use; existing habitats; anadromous and resident fish habitat requirements; anadromous and resident fish seasonal movement patterns; proposed crossing or conveyance types and sizes; potential stream blockage; and the stream contributions to important recreational, commercial or subsistence/personal-use fisheries. SEA based the analysis of potential instream fish habitat on the review of stream-crossing characteristics as described in Section 4.2, Surface Water; reported anadromous fish presence and habitat use data (Johnson and Daigneault, 2008); and fish habitat data collected at or near proposed stream crossings during SEA field investigations in 2008 (Noel *et al.*, 2008). Streams are determined to be fish-bearing if they are cataloged anadromous waters (Johnson and Daigneault, 2008), if they are connected to a cataloged anadromous water, or if fish habitat was determined to be present during SEA stream-crossing investigations in 2008 (Noel *et al.*, 2008).

As described in Section 4.2, the Applicant performed a hydrologic review of the study area to identify surface water resources, including pre- and post-project drainage patterns, flow rates, and floodplain limits and encroachments. This review also included a preliminary determination of the types and sizes of conveyance structures for many of the anticipated water crossings. As indicated in Section 5.4.4, channel-width data collected during SEA's 2008 field studies at fish-bearing stream crossings were found to not always match the size of the conveyance structure identified by the Applicant during the earlier preliminary design. SEA determined that it would not be reasonable to use the potential impacts that would be anticipated for these undersized structures to distinguish between alternatives because the hydrologic review and Applicant-proposed conveyance structures are preliminary, and the final conveyance structure types and sizes would be determined during final permitting and design. ARRC would base final conveyance structure designs on the reasonable terms, conditions, and design criteria that would result from the ADF&G Fish Habitat permit that would likely ensure a conveyance structure size similar to the channel width to maintain flow conditions suitable for fish passage.

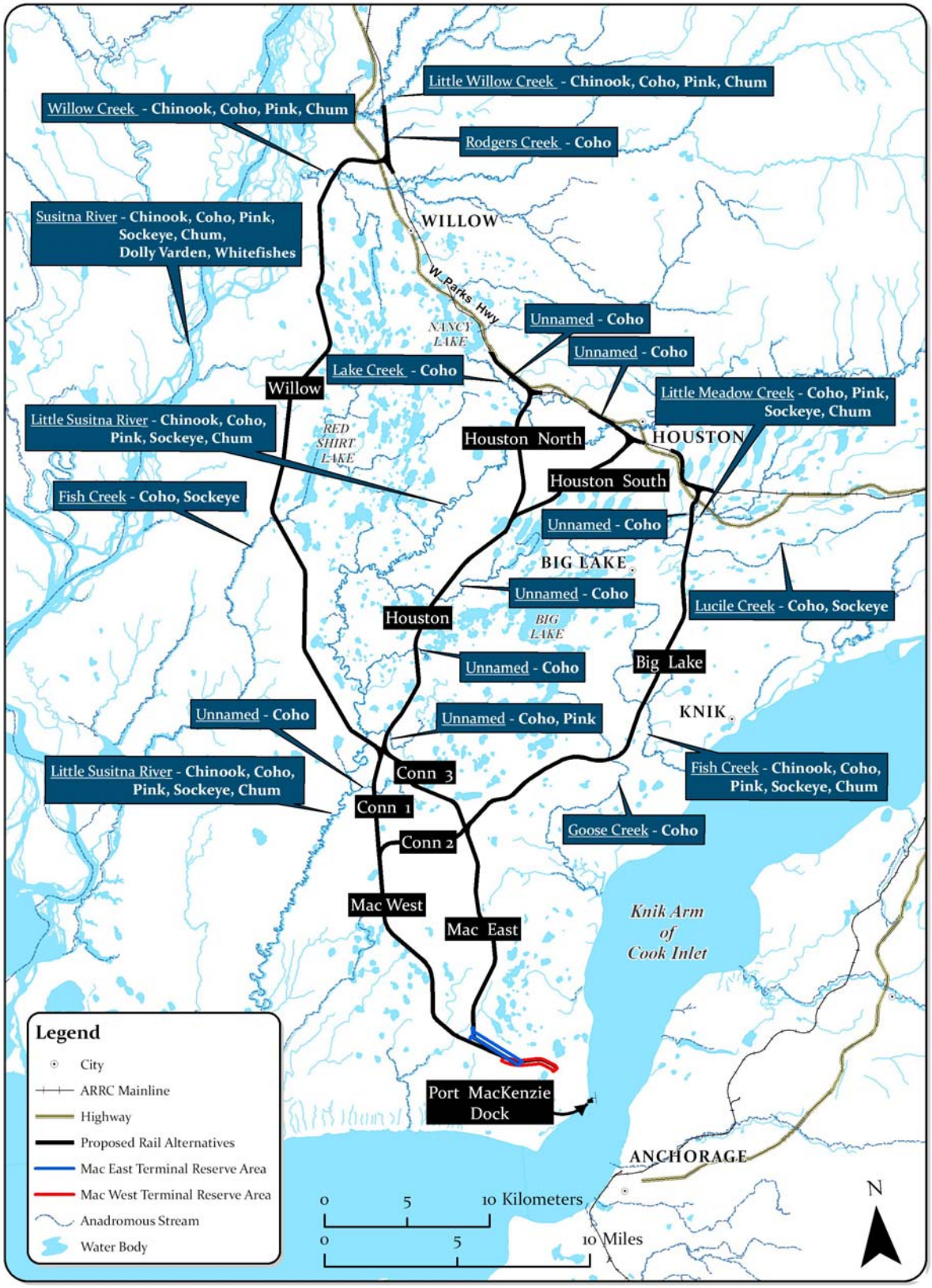

Figure 5.4-1. Waters in the Study Area Documented as Important for Chinook, Chum, Coho, Pink, and Sockeye Salmon under Alaska Statute 16.05.871(a) (Johnson and Daigneault, 2008)

5.4.3 Affected Environment

Lakes, rivers, and perennial and intermittent streams along the proposed rail extension alternatives provide habitat for fish either throughout or during portions of the year. Most streams in the study area are likely to contain resident and/or anadromous fishes, and some streams could contain fish of conservation concern as identified in Alaska's Comprehensive Wildlife Conservation Strategy (Table 5.4-1). Study area waters might support spawning, foraging, rearing, refuge, and/or migratory use by fish. The proposed project would affect notable fish-bearing waters in this area, including the Little Susitna River, Fish Creek, Willow Creek, Rodgers Creek, Lake Creek, Goose Creek, Lucile Creek, Little Meadow Creek, and several unnamed tributary streams (Figure 5.4-1). Fish present in the study area include resident (life cycle does not include migration into marine waters) and anadromous (life cycle includes migrations to marine waters) species. Anadromous fishes commonly present in the study area include all five Pacific salmon; Chinook (king), chum (dog), coho (silver), pink (humpy), and sockeye (red); and eulachon (hooligan) and Dolly Varden (Johnson and Daigneault, 2008). In the study area, there could be anadromous fish populations using one or more different life-history strategies, including freshwater residents, freshwater migratory, and saltwater migratory.

Study area fresh waters support recreational, commercial, subsistence, and personal-use fisheries for salmon, rainbow trout, Dolly Varden, eulachon, and northern pike, with limited opportunities for lake trout and burbot. Northern pike are not native to Southcentral Alaska, although they are present naturally throughout most of the state. In Southcentral Alaska, northern pike are considered an invasive species, reducing or eliminating healthy populations of Chinook salmon, coho salmon, and rainbow trout in some lakes and streams (ADF&G, 2009a). There are also native fish such as sculpins, suckers, sticklebacks, and smelt in the study area that play a crucial role in the aquatic ecosystem, providing prey for terrestrial animals and freshwater and anadromous fishes (ADF&G, 2006; Groot and Margolis, 1991). Table 5.4-1 lists fish potentially present in the study area. Appendix F provides supporting information on regional recreational, commercial, subsistence, and personal-use fisheries in the study area.

Cook Inlet salmon – Chinook (king), chum (dog), coho (silver), pink (humpy), and sockeye (red) – are federally-regulated. Therefore, the freshwater resources these species use are protected under the Essential Fish Habitat provisions of the Magnuson-Stevens Fishery Management and Conservation Act. Magnuson-Stevens Act defines Essential Fish Habit as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1801-1883). Figure 5.4-1 shows streams documented as supporting Essential Fish Habitat protected fisheries in the study area (Johnson and Daigneault, 2008). Salmon runs in the study area begin in May as Chinook salmon travel upstream to spawn and continue through September when coho salmon spawn throughout area streams (Table 5.4-2). Appendices F and G provide supporting information on crossing-specific fish habitat conditions, documented fish presence, and an analysis of potential project construction and operations effects on Essential Fish Habitat and aquatic animals of conservation concern.

Table 5.4-1
Fish Potentially Present in the Port MacKenzie Rail Extension Study Area[a]

Common Name	Species	Potential Use[b]	Anadromy (Y/N)	Conservation Concern[c] (Y/N)
American Shad	*Alosa sapidissima*	–	Y	N
Arctic Char	*Salvelinus alpinus*	R,S	N	N
Arctic Grayling	*Thymallus arcticus*	R,S	N	N
Arctic Lamprey	*Lampetra camtschatica*	S	Y	N
Bering Cisco	*Coregonus laurettae*	R	Y/N	Y
Burbot	*Lota lota*	R,S	N	N
Chinook (King) Salmon	*Oncorhynchus tshawytscha*	C,R,S	Y	N
Chum (Dog) Salmon	*Oncorhynchus keta*	C,R,S	Y	N
Coastrange Sculpin	*Cottus aleuticus*	–	N	N
Coho (Silver) Salmon	*Oncorhynchus kisutch*	C,R,S	Y	N
Dolly Varden	*Salvelinus malma*	R	Y/N	N
Eulachon (Hooligan)	*Thaleichthys pacificus*	S	Y	Y
Humpback Whitefish	*Coregonus pidschian*	R,S	Y/N	N
Lake Trout	*Salvelinus namaycush*	R	N	N
Longnose Sucker	*Catostomus catostomus*	S	N	N
Ninespine Stickleback	*Pungitius pungitius*	–	N	Y
Northern Pike	*Esox lucius*	R,S	N	N
Pacific Lamprey	*Lampetra tridentata*	S	Y/N	Y
Pink (Humpy) Salmon	*Oncorhynchus gorbuscha*	C,R,S	Y	N
Pond Smelt	*Hypomesus olidus*	–	N	N
Rainbow Smelt	*Osmerus mordax*	S	Y/N	Y
Rainbow Trout	*Oncorhynchus mykiss*	R	Y/N	Y
Round Whitefish	*Prosopium cylindraceum*	R	N	N
Slimy Sculpin	*Cottus cognatus*	–	N	N
Sockeye (Red) Salmon	*Oncorhynchus nerka*	C,R,S	Y/N	N
Threespine Stickleback	*Gasterosteus aculeatus*	–	N	Y

[a] Sources: ADF&G, 2007; Johnson and Daigneault, 2008; Mecklenburg *et al.*, 2002; Morrow, 1980.
[b] Potential Use Codes: C = commercial, R = recreational, S = subsistence/personal use.
[c] Species of Conservation Concern are listed in the Alaska's Comprehensive Wildlife Conservation Strategy (ADF&G, 2006).

Table 5.4-2
Salmon Spawning Run Timing within the Port MacKenzie Rail Extension Study Area[a]

Salmon and Streams	May	June	July	August	September
Chinook Salmon					
Parks Highway Streams					
Susitna River Streams					
The Little Susitna River					
Lower					
Upper					
Chum Salmon (less abundant)					
Susitna River Streams					
Coho Salmon					
Parks Highway Streams					
Susitna River Streams					
The Little Susitna River					
Lower					
Upper					
Pink Salmon (abundant in even years)					
Susitna River Streams					
Sockeye Salmon					
Susitna River Streams					
The Little Susitna River					

[a] Source: ADF&G, 2009b.

5.4.4 Environmental Consequences

5.4.4.1 Proposed Action

Rail line construction would require multiple stream crossings at locations that have fish or fish habitat. Project construction methods and timing, the type of stream crossing structure installed, and daily operations procedures would influence the severity and types of potential impacts to fish and fish habitat at each stream crossing. The primary impacts of crossing structures to fish and fish habitat would be loss and degradation of instream habitats due to placement of structures, alteration of stream hydrology and water quality due to increased erosion and sedimentation, and blockage of movements. Section 4.2 describes potential alterations to stream hydrology and water quality from conveyance structures.

Each stream crossing would result in site-specific impacts to aquatic and riparian habitats. Stream channel characteristics such as area of runs, glides, riffles, and pools; water velocities; channel substrates such as cobble, gravel, sand, and silt; bank morphology and composition; water quality; bank vegetation; and unblocked access interact to determine fish use and habitat suitability for eggs and larvae and juvenile or adult fish. The type of crossing structure used at a crossing would also influence potential impacts to fish and fish habitat through habitat loss, alteration, degradation, and access.

Common Impacts

Construction Impacts

Rail line construction would result in short-term disturbance and long-term fish habitat loss and modification at steam crossings along the approximately 30 to 45 miles of rail line. The following paragraphs describe the types of potential construction-related impacts to fish and fish habitats that would be common to all proposed rail line stream crossings.

Loss or Alteration of Instream and Riparian Habitats

During construction, there would be a temporary loss of instream habitat where water was diverted from the existing stream channel to facilitate installation of bridge pilings, bank armoring, or culverts. Bridge abutments or instream pilings, armoring around abutments and the nearby banks, and installation of instream culverts would remove streambed and shoreline areas that would otherwise be available for fish use. Bridge and culvert installation would cause the loss of rearing, foraging, and cover habitat along the banks; scouring of spawning areas through removal of instream large woody debris; loss of overhanging bank habitat structure and vegetation; and alteration of stream flows.

During construction, the riparian corridor would be cleared of vegetation as necessary for bridge, culvert, and access road construction. Riparian corridors along stream banks provide important instream habitat protection from stream bank erosion and sedimentation. Stream bank vegetation moderates stream temperature in summer, provides cover for fish to hide from predators, and provides a velocity refuge for juvenile fish (Marcus *et al.*, 1990). Removal of riparian vegetation and disturbance of stream banks would result in increased erosion, increased sediment loading to the stream, increased turbidity, elevated water temperatures, reduced productivity, and a reduction in overall habitat complexity (Hicks *et al.*, 1991; Waters, 1995). Sedimentation resulting from construction activities would temporarily impact juvenile fish, eggs, and larvae in nearby spawning beds and invertebrate forage production (Waters, 1995).

Mortality from Instream Construction

During construction, there could be direct mortality of fish when equipment was driven through a streambed. Redds, eggs, and fry within or downstream of the construction site could be lost or their viability reduced through sedimentation, excessive vibration, and scour caused by construction equipment. Movement of construction equipment could cause compaction of the soils and gravels in the streambed, resulting in the death of larval fish and eggs. In areas where there is a soft sediment bottom, equipment movement could create areas that redirect stream flow, and portions of the streambed could become dry and isolated, resulting in mortality of fish as they become isolated from free-flowing waters. Water diversions and temporary dewatering could also impact developing eggs and pre-emergent fry (Becker *et al.*, 1982; Becker *et al.*, 1983; Holland, 1987) through desiccation or freezing. Eggs, larvae, and juvenile fish would be more susceptible to mortality from instream construction because larger fish would be expected to avoid equipment and could move away from the construction area.

Blockage of Fish Movement

Depending on timing, construction-related activities could block fish movements. Construction methods that depend on water diversions during open-water construction could create temporary physical barriers to fish passage or alter stream flows sufficiently to create either high- or low-water conditions that prevent fish movements within and between lakes, tributaries, and rivers to rearing or spawning habitats. Connectivity between tributaries and mainstem habitats is particularly important for maintaining productivity of juvenile salmonids (Bramblett *et al.*, 2002). Instream construction could temporarily reduce stream flows sufficiently to block upstream migration of adult salmon or displace juvenile or small fish from rearing and foraging habitats due to high flows. Blocked spawning fish might attempt to use inadequate spawning areas, which would result in uncertain survival of eggs, larvae, and juvenile fish, and ultimately would likely result in reduced productivity.

Degradation of Water Quality

Clearing of vegetation from the ROW, grading, construction of the access road, and placement of bridges and culverts would expose soil to erosion from wind, rain, stream-flow, and runoff. Erosion delivers sediment to streams, which can degrade water quality and reduce fish habitat quality and productivity through sedimentation and turbidity (Waters, 1995). While increased erosion and sedimentation might be temporary during construction, increased fine sediments reduce oxygen exchange, which results in lower survival of eggs and larvae in spawning gravels (Grieg *et al.*, 2005). High turbidity could result in avoidance behavior, reduced foraging success in sight-feeding fish (Barrett *et al.*, 1992), induced physiological stress, and increased mortality (Waters, 1995).

Fuel leaks from construction equipment could reduce water quality and result in toxic affects to fish and aquatic invertebrate forage. Spills and leaks could enter the water either directly as equipment crossed streams or indirectly with runoff from bridges and adjacent roadbeds or railbeds.

Alteration of Stream Hydrology and Ice Breakup

Construction activities could cause changes in flow patterns through the hyporheic zone, the region beneath a stream bed where there is mixing of shallow groundwater and surface water. Excavation and vegetation clearing would dislodge fine sediments that could infiltrate the hyporheic zone and clog interstitial spaces, and vibrations from construction equipment can cause substrates to settle and become compacted (Sear, 1995; Huggenberger *et al.*, 1998). Hyporheic flow and groundwater upwelling (springs) are important in salmonid egg development (Brown and Mackay, 1995; Baxter and McPhail, 1999). There could be permanent changes in subsurface flow from bank and substrate armoring, instream support structures, and changes in channel morphology caused by bridges and culverts interrupting lateral stream migration.

Ice dams can also form in areas where bridges and culverts constrict stream channels. Ice dams could cause scour of the streambed and erosion along the upstream side of affected streams. The movement of the ice and rush of water when the dam fails can damage spawning beds.

Noise and Vibration Impacts

Depending on the timing of construction, there could be potential impacts to salmonids from underwater pile driving noise and vibration during bridge construction. Exposure to pile driving vibration and noise could displace juvenile fish, trigger avoidance behavior, and disrupt fish sense of hearing and the function of the lateral line, the sensory organ that detects vibration (Hastings et al., 1996; McCauley et al, 2003). Whereas it is possible that fish could swim away from a sound source, thereby decreasing exposure to sound, eggs are often stationary or move very slowly and could be exposed to extensive human-generated sound if it is presented in the surrounding water column or substrate. However, data are limited or inconclusive concerning the effects of sound, including pile driving noise, on developing eggs (Hastings and Popper, 2005; California Department of Transportation, 2009). The few studies on the effects on fish eggs, larvae, and fry are insufficient to reach any conclusions with respect to the way sound would affect survival (Hastings and Popper, 2005).

Operations Impacts

Many potential impacts to stream crossings initiated during construction would continue to contribute to impacts to fisheries resources during rail line operations. Operations-related impacts would be common for all stream crossings along the proposed rail line.

Loss or Alteration of Instream and Riparian Habitats

Bridges that have abutments or pilings in the streambed cause permanent losses of fish spawning and rearing habitats, as discussed above. Instream bridge supports lead to upstream scour and downstream bed-load deposition, which extends the area of instream habitat the structure affects. Bridges and open-bottom culverts also create shade that results in degradation and loss of overhanging riparian vegetation that juvenile fish use for cover and forage. Bridges typically require placement of riprap, which permanently displaces vegetation that filters runoff, resulting in a permanent loss of juvenile rearing habitat along the hardened bank beneath the bridges (Schmetterling *et al.*, 2001; Fischenich, 2003).

Closed-bottom culverts placed directly in the streambed cause permanent loss of any existing spawning and rearing habitats, alter stream flow and stream bottoms on either end of the culverts, and change adjacent riparian habitat. When culverts are installed, fill is usually placed around the culvert, and streambanks upstream and downstream of the culvert are reinforced with riprap. During high-water events, water can bypass improperly sized culverts and create scour pools, causing additional streambank erosion. As erosion continues over time, there can be additional loss of habitat as more riprap is added.

Bridge abutments and culverts could impede the transport of large woody debris, which provides rest areas, shade, and cover for fish and substrate for aquatic vegetation and invertebrates (House and Boehne, 1986; Marcus *et al.*, 1990). When large woody debris blocks conveyance structures, the debris is typically removed from the stream system and placed beyond the flood plain, resulting in permanent loss of this habitat structure and an interruption in the downstream transport of large woody debris.

Culverts placed in the soft substrate across wetlands could sink over time, creating ponds on the upslope side of the railbed and drying on the down slope side of the railbed. If a culvert blocks water flow, nutrients would no longer be cycled through wetlands to receiving waters, which would affect nutrient input to aquatic plants and animals that provide forage for fish. If surface water exchange between wetlands and streams was interrupted, stream flows could be reduced and riparian vegetation along the stream corridor could begin to decline, which would result in erosion, bank sloughing, and increased sedimentation during high-water conditions.

Blockage of Fish Movement

Improperly imbedded and maintained culverts and the surrounding fill could change the ability of the culvert to convey water. Flooding levels exceeding the culvert design could result in the culvert becoming more deeply embedded in the streambed, and over time the culvert opening could become inefficient at passing fish to upstream habitats. Habitat loss would increase as culverts failed and fish movements were blocked, preventing fish populations from accessing upstream and downstream habitats.

Bridges and culverts could also create constrictions, restricting the downstream movement of large woody debris important for productive salmonid habitats (House and Boehne, 1986), or ice, causing ice jams and flooding. Water in undersized culverts often freezes solid and is slow to melt due to the insulation of road or rail embankments, blocking spring movements of fish to foraging and spawning habitats.

Degradation of Water Quality

Maintenance activities such as clearing drainage ditches and management of vegetation in the ROW could cause an increase in turbidity and sedimentation over natural background levels in streams. ARRC does not propose to transport hazardous materials along the proposed Port MacKenzie Rail Extension; however, spills of nontoxic bulk materials could have physical impacts if spills occurred at or near stream crossings. See Chapter 11 and Section 13.3 for a discussion of rail safety and the movement of materials.

Impacts to Fisheries by Segment and Segment Combinations

All segments and segment combinations would cross streams or waterbodies that provide habitat for fish, and this habitat could be affected by rail line construction and operations. The paragraphs below describe notable site-specific impacts to fish and fish habitats by rail line segment and segment combinations. Appendix F describes site-specific conditions at each fish or fish habitat-bearing stream crossing.

Southern Segments and Segment Combinations

The southern segments would cross streams at five locations that support fish or fish habitat (Table 5.4-3, Figure 5.4-2). The Mac West-Connector 1 is the only southern segment combination that would cross waters supporting anadromous fish (crossing C1-2.6). All crossings would use closed-bottom culverts, which would be buried to approximately 40 percent of their diameter where possible. Proposed culverts along the southern segments and segment combinations range in size from 50 percent or less of the wetted widths at the five stream

Table 5.4-3
Fish-Bearing Streams the Southern Segments would Cross[a]

Segment/ Crossing Location	Crossing Identification	Stream Name	ADF&G Anadromous Catalog Number[b]	Waterbody	Fish	Channel Width (feet)	Conveyance Type[c]	Conveyance Size (inches)[c]	Habitat[b]				Potential Blockage
									SP	R	M	OW	
Mac West													
MW-11.0	MW-084R	Inlet to Horseshoe Lake	0.8 mile upstream from COr	Stream	Resident	11	Culvert	36	--	Y	Y	--	No
MW-10.1	MW-085	Inlet to Horseshoe Lake	Edge of COr in Horseshoe Lake	Spring	Resident	9	Culvert	48	--	Y	--	--	No
MW-4.6	MW-095	Unnamed	1.3 miles upstream from COp	Stream	Resident	35	Culvert	48	--	Y	Y	--	No
Mac East													
ME-4.5	ME-078	Unnamed	2.3 miles upstream from COp	Stream	Resident	6	Culvert	36	--	Y	P	--	Yes - DS
Connecter 1													
C1-2.6	C1-026	The Little Susitna Tributary	247-41-10100-2080: COpr	Stream	Anadromous	27	Culvert	72	--	Y	Y	--	No

[a] Sources: ADF&G, 2009c; Johnson and Daigneault, 2008; Noel *et al.*, 2008

[b] Anadromous catalog codes: K = Chinook salmon, CH = chum salmon, CO = coho salmon, P = pink salmon, S = Sockeye salmon, p = present, r = rearing, s = spawning. Habitat abbreviations: Rearing (R), Migration (M), and Over-wintering (OW) habitats for either or both anadromous and resident fish species; Spawning (SP) habitat evaluated for resident trout, Arctic grayling and Dolly Varden and anadromous salmon (*i.e.*, gravels and upwelling suitable for spawning are present at crossing site). Y = verified, -- = not present, P = probable.

[c] Culverts are closed cylindrical structures; size is diameter (HDR Alaska, Inc. and TNH-Hanson, LLC, 2008; Pochop, 2008).

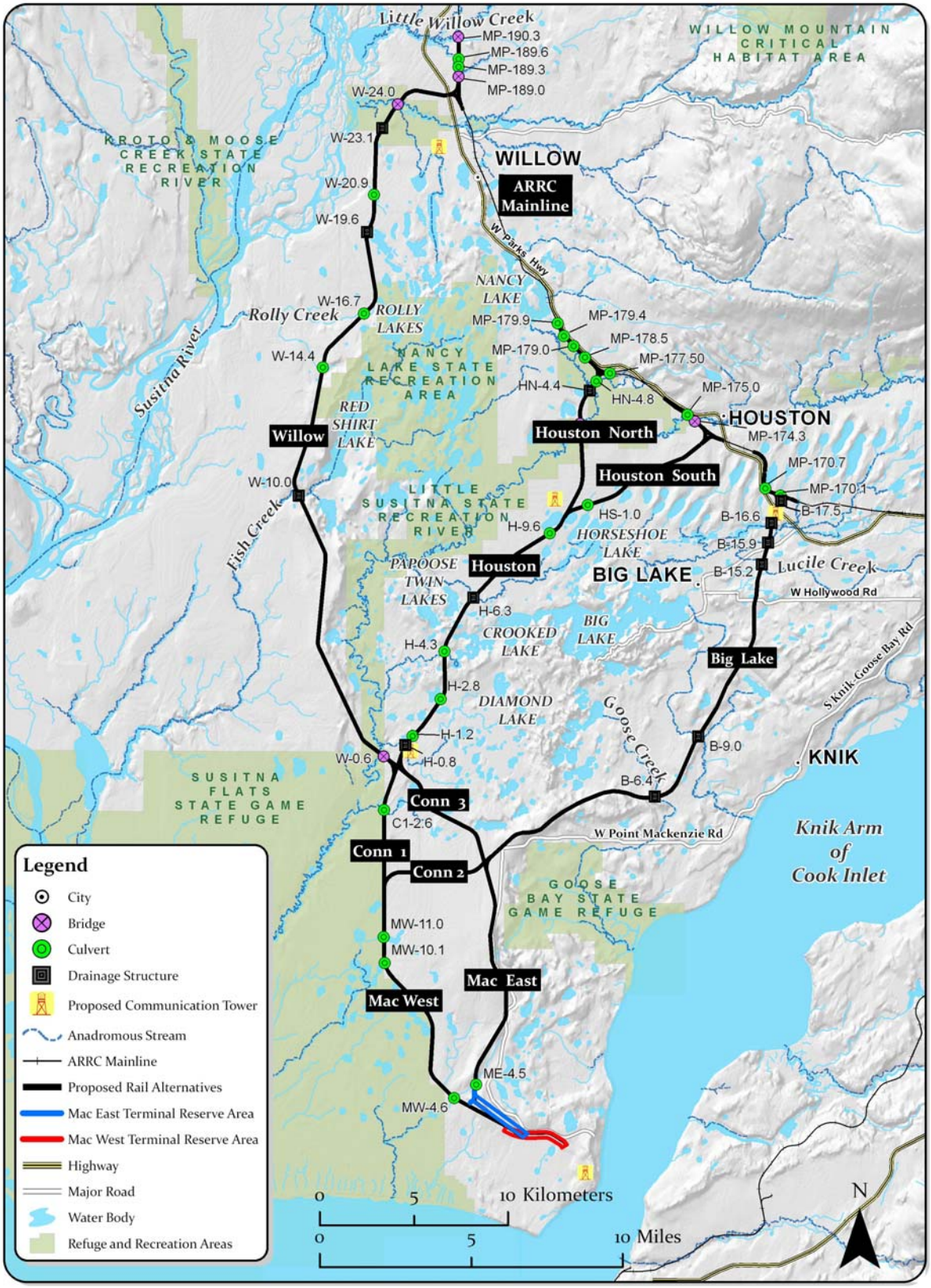

Figure 5.4-2. Fish-Bearing Streams Crossed by the Port MacKenzie Rail Extension Alternatives (Johnson and Daigneault, 2008; ADF&G, 2009c; Noel *et al.*, 2008)

crossings (Table 5.4-3). Flooding previously washed out a culvert at a road crossing near the MW-4.6 crossing (Record 95, Noel *et al.*, 2008). Of the southern segments and segment combinations, the Mac West-Connector 1 Segment Combination would cross the most fish-bearing streams, while the Mac East-Connector 3 Segment Combination and Mac East Segment would cross the fewest fish-bearing streams (Table 5.4-4). None of the crossings along the southern segments and segment combinations appear to cross habitats capable of supporting spawning or overwintering for resident game fish or anadromous fish. Stream-crossing sites along the southern segments and segment combinations primarily support summer rearing and migration of fish (Table 5.4-3).

Northern Segments and Segment Combinations

The northern segments and segment combinations would cross fish-bearing streams at 38 locations, including 14 crossings of streams with resident fish or fish habitat and 24 crossings of streams that support anadromous fish (Table 5.4-5, Figure 5.4-2). The Willow Segment would cross the Little Susitna River and Susitna River drainages, including six streams with resident fish or fish habitat and six streams that support anadromous fish (Table 5.4-5). The Houston-Houston North Segment Combination would cross the Little Susitna River and Little Susitna drainages, including six crossings of streams with resident fish habitat or providing connectivity to fish habitat and eight crossings of streams that support anadromous fish (Table 5.4-5). The Houston-Houston South Segment Combination would also cross the Little Susitna River and Little Susitna drainages, including four streams with resident fish habitat or providing connectivity to fish habitat and five streams that support anadromous fish (Table 5.4-5). The Big Lake Segment would cross the Big Lake and Goose Creek drainages, including one crossing of a stream with resident fish habitat and eight crossings of streams that support anadromous fish (Table 5.4-5).

Proposed northern segment crossings include 6 bridges, 12 drainage structures, 19 culverts, and 1 stream-bed relocation (Table 5.4-5). Of the 19 proposed northern segment culverts, 26 percent would be smaller than the wetted width of the stream crossing (Table 5.4-5). The Houston-Houston North Segment Combination would cross the most fish-bearing streams, while the Houston-Houston South Segment Combination and Big Lake Segment would cross the fewest fish-bearing streams (Table 5.4-6). Fourteen of the crossings along the northern segments would cross habitats capable of supporting spawning and 21 crossings could support overwintering for resident game fish or anadromous fish (Table 5.4-5). Most (67 percent) of the streams the Willow Segment would cross have no potential blockages, such as culverts at existing road or rail road crossings of the stream, while all of the streams the Big Lake Segment would cross have potential blockages due to ineffective culverts (Table 5.4-6).

Impacts to Fisheries by Alternative

The primary potential impacts to fisheries from construction and operation of the proposed Port MacKenzie Rail Extension alternatives would be loss and degradation of instream and riparian habitats due to placement of bridges, drainage structures, and culverts; alteration of stream and wetland hydrology; blockage of fish movements; and increased erosion and sedimentation from the removal of riparian vegetation. Section 4.2, Surface Water, and Section 4.5, Wetlands, describe alterations of stream and wetland hydrology caused by fill and conveyance structures. All crossings of fish-bearing streams would result in some loss or alteration of stream and

Table 5.4-4
Summary of Fish-Bearing Streams Crossed by the Southern Segments and Segment Combinations[a]

	Mac West-Connector 1	Mac West-Connector 2	Mac East-Connector 3	Mac East
Total Fish-Bearing Stream Crossings	**4**	**3**	**1**	**1**
Fish Communities				
Anadromous	1	0	0	0
Resident	3	3	1	1
Habitat				
Spawning	0	0	0	0
Rearing	4	3	1	1
Migration	3	2	1[a]	1[a]
Over-Winter	0	0	0	0
Potential Blockages				
None	4	3	0	0
Natural - Beaver Dams	0	0	0	0
Artificial - Up Stream	0	0	0	0
Artificial - Down Stream	0	0	1	1
Artificial - Up and Down Stream	0	0	0	0
Conveyance Structure				
Bridge	0	0	0	0
Culvert	4	3	1	1
Drainage Structure	0	0	0	0
Relocation	0	0	0	0

[a] Sources: ADF&G, 2009c; Johnson and Daigneault, 2008; Noel *et al.*, 2008.

riparian habitats. Bridged crossings would likely result in a smaller area of instream habitat loss compared to closed-bottomed culverts. In general, clear-span bridges (those without instream supports) would have less potential to create conditions that would cause loss of spawning habitats, blockage of fish movements, alteration of stream hydrology, and increased erosion and sedimentation.

The proposed project alternatives would require a minimum of 10 and a maximum of 18 crossings of streams that have been documented to contain either fish or fish habitat (Table 5.4-7; Noel et al., 2008). The alternatives requiring the minimum number of fish-bearing stream crossings (10) are the Mac East-Big Lake and Mac East-Connector 3-Houston-Houston South alternatives. The alternative requiring the maximum number of crossings (18) is Mac West-Connector 1-Houston-Houston North. Table 5.4-7 summarizes fish communities, fish habitat use, proposed conveyance structures, and potential existing stream blockages for the 43 fish-bearing stream crossings by alternative. Appendix F describes site-specific conditions at each fish-bearing stream crossing.

Table 5.4-5
Fish-Bearing Streams the Northern Segments would Cross[a] (page 1 of 3)

Segment/ Crossing Location	Crossing Identification	Stream Name	Alaska Department of Fish and Game Anadromous Catalog Number[b]	Waterbody	Fish	Channel Width (feet)	Conveyance Type[c]	Conveyance Size[c]	Habitat[a]				Potential Blockage[b]
									SP	R	M	OW	
Willow													
MP-190.3	W-098	Little Willow Creek Tributary[d]	0.2 mile upstream from COr	Stream	Anadromous	12.3	Bridge	NA	Y	Y	Y	--	No
MP-189.6	W-099	Unnamed		Stream	Resident	1 to 4	Culvert Extension	36 inches	--	Y	Y	Y	Yes - US
MP-189.3	W-100	Unnamed		Stream	Resident	1 to 2	Culvert Extension	36 inches	--	Y	Y	--	Yes - US
MP-189.0	W-101R	Rodgers Creek	247-41-10200-2130-3020: COr	Stream	Anadromous	36.3	Bridge	NA	Y	Y	Y	Y	No
W-24.0	W-106	Willow Creek	247-41-10200-2120: CHs, COsr, Ksr, Ps	Stream	Anadromous	97.5	Bridge	NA	Y	Y	Y	Y	No
W-23.1	W-107	Willow Creek Tributary	0.3 mi upstream COr	Stream	Resident	2	Drainage Structure	NA	--	Y	Y	Y	Yes - DS
W-20.9	W-110	Susitna River Tributary[e]	Nominated	Stream	Anadromous	7.4	Culvert	36 inches	Y	Y	Y	Y	Yes - US
W-19.6	W-112	Unnamed		Stream	Resident	1 to 2	Drainage Structure	NA	--	Y	Y	--	No
W-16.7	W-113	Rolly Creek Tributary	1.6 miles upstream COp	Stream	Resident	1 to 2	Culvert	72 inches	--	Y	Y	Y	No - BD
W-14.4	W-116	Rolly Creek Tributary	3.2 miles upstream COp	Stream	Resident	1 to 2	Culvert	36 inches	--	Y	Y	Y	No - BD
W-10.0	W-118R	Fish Creek	247-41-10200-2020: COr, Sp	Stream	Anadromous	15	Drainage Structure	NA	Y	Y	Y	Y	No - BD
W-0.6	W-121R	The Little Susitna River	247-41-10100: CHs, COs, Ks, Ps, Sp	Stream	Anadromous	105	Bridge	NA	Y	Y	Y	Y	No

Table 5.4-5
Fish-Bearing Streams the Northern Segments would Cross[a] (page 2 of 3)

Segment/ Crossing Location	Crossing Identification	Stream Name	Alaska Department of Fish and Game Anadromous Catalog Number[b]	Waterbody	Fish	Channel Width (feet)	Conveyance Type[c]	Conveyance Size[c]	Habitat[a]				Potential Blockage[b]
									SP	R	M	OW	
Houston North Segment													
MP-179.9	HN-056	Unnamed		Stream	Resident	3	Culvert Extension	48 inches	--	Y	Y	--	Yes - US
MP-179.4	HN-061R	Unnamed		Stream	Resident	3	Culvert Extension	60 inches	Y	Y	Y	--	Yes - US
MP-179.0	HN-063R	Unnamed		Stream	Resident	1.7	Culvert Extension	36 inches	Y	Y	Y		Yes - US
MP-178.5	HN-065R	Lake Creek Tributary	247-41-10100-2231-3026: COr	Stream	Anadromous	6.3	Culvert Extension	48 inches	Y	Y	Y	--	Yes - US
MP-177.5	None	Lake Creek Tributary	247-41-10100-2231-3018-4011: COr	Stream	Anadromous	< 2	Culvert Extension	48 inches	--	Y	--	--	Yes - US & DS
HN-4.8	HNM-122R	Lake Creek Tributary	247-41-10100-2231-3018: COr	Stream	Anadromous	9	Culvert	72 inches	--	Y	--	--	Yes - US
HN-4.4	HNM-123	Lake Creek	247-41-10100-2231: COr, Sp	Stream	Anadromous	20	Drainage Structure	NA	--	Y	Y	Y	Yes - US & DS
HN-3.2	HN-067R	The Little Susitna River	247-41-10100: CHs, COs, Kp, Ps, Sp	Stream	Anadromous	97.5	Bridge	NA	Y	Y	Y	Y	No
Houston South Segment													
MP-175.0	HS-070R	The Little Susitna Tributary	247-41-10100-2255: COr	Stream	Anadromous	14	Culvert Extension	NA	--	Y	Y	Y	Yes - US
MP-174.3	HS-071R	The Little Susitna River	247-41-10100: CHp, COs, Ks, Ps	Stream	Anadromous	46.5	Bridge	NA	Y	Y	Y	Y	No
HS-1.0	HS-075R	The Little Susitna Tributary	0.4 mi upstream from lake with COr	Stream	Resident	18	Culvert	36 inches	--	Y	Y	--	Yes - US
Houston Segment													
H-9.6	H-040R	Inlet to Colt Lake		Stream	Resident	3.6	Culvert	48 inches	--	Y	Y	Y	No
H-6.3	H-044	The Little Susitna Tributary	247-41-10100-2150: COr	Stream	Anadromous	16	Drainage Structure	NA	--	Y	Y	Y	Yes - US
H-4.3	H-046	The Little Susitna Tributary	247-41-10100-2100: COr, Kr	Stream	Anadromous	1 to 3	Culvert	72 inches	--	Y	Y	Y	Yes - US & DS
H-2.8	H-047	Unnamed		Wetland	Resident	1 to 2	Culvert	48 inches	--	--	Y	--	No
H-1.2	H-049	Unnamed		Wetland	Resident	1 to 3	Culvert	24 inches	--	Y	Y	--	No
H-0.8	H-050R	The Little Susitna Tributary	247-41-10100-2090: Ps, COsr	Stream	Anadromous	14	Drainage Structure	NA	Y	Y	Y	Y	No

Table 5.4-5
Fish-Bearing Streams the Northern Segments would Cross[a] (page 3 of 3)

Segment/ Crossing Location	Crossing Identification	Stream Name	Alaska Department of Fish and Game Anadromous Catalog Number[b]	Waterbody	Fish	Channel Width (feet)	Conveyance Type[c]	Conveyance Size[c]	Habitat[a] SP	R	M	OW	Potential Blockage[b]
Big Lake Segment													
MP-170.7	BL-001R	Outlet Loon Lake		Stream	Resident	2.5	Culvert Extension	48 inches	--	Y	Y	--	Yes - US & DS
MP-170.1	BL-003	Outlet Cheri Lake	247-50-10330-2050-3025: COr	Stream	Anadromous	1.5	Culvert Extension	60 inches	--	Y	Y	--	Yes - US & DS
B-17.5	None	Inlet to Long Lake relocated channel	247-50-10330-2050-3025: COr	Stream	Anadromous	<1	Drainage Structure	20 feet	--	Y	Y	--	Yes – US & DS
B-17.1 to B-17.6	None	Inlet to Long Lake	247-50-10330-2050-3025: COr	Stream	Anadromous	<1	Stream Relocation	2,440 feet of relocation	--	Y	Y	--	Yes - US & DS
B-16.6	BL-007R	Inlet to Long Lake	247-50-10330-2050-3025: COr	Stream	Anadromous	6.5	Drainage Structure	NA	--	Y	Y	--	Yes - US & DS
B-15.9	BL-008	Little Meadow Creek	247-50-10330-2050-3050: CHp, COrs, Pp, Ss	Stream	Anadromous	28	Drainage Structure	NA	Y	Y	Y	Y	Yes - US & DS
B-15.2	BL-010R	Lucile Creek	247-50-10330-2050-3030: Sp, COr	Stream	Anadromous	11.5	Drainage Structure	NA	--	Y	Y	Y	Yes - US & DS
B-9.0	BL-019R	Fish Creek	247-50-10330: CHp, COrs, Kp, Ps, Sp	Stream	Anadromous	28	Drainage Structure	NA	Y	Y	Y	Y	Yes - US & DS
B-6.4	BL-022R	Goose Creek	247-50-10360: COsr, Kr	Stream	Anadromous	6	Drainage Structure	NA	--	Y	Y	Y	Yes - DS

[a] Sources: Johnson and Daigneault, 2008; Noel *et al*., 2008.
[b] Anadromous catalog codes: K = Chinook salmon, CH = chum salmon, CO = coho salmon, P = pink salmon, S = Sockeye salmon, p = present, r = rearing, s = spawning. Kr = Chinook rearing observed but not noted in ADF&G Anadromous Catalog. Habitat abbreviations: Rearing (R), Migration (M), and Over-wintering (OW) habitats for either or both anadromous and resident fish species; Spawning (SP) habitat evaluated for resident trout, Arctic grayling and Dolly Varden and anadromous salmon (i.e., gravels and upwelling suitable for spawning are present at crossing site).
Y = verified, -- = not present, P = probable. Potential Blockage abbreviations: BD = beaver dam, US = artificial - up stream, DS = artificial – down stream.
[c] Culverts are closed cylindrical structures; size is diameter. Culvert Extension is an extension of an existing culvert. Drainage structures could include open bottom box culverts, multi-plate culverts, pre-cast arches, or single or multiple short-span bridges; type and size will be determined during final design and permitting. Bridges are single or multiple 23-foot short-span bridges. (HDR Alaska, Inc. and TNH-Hanson, LLC, 2008; Pochop, 2008). NA = Not Available
[d] Spawning substrates, adult coho salmon and juvenile salmonids observed (Noel *et al*., 2008).
[e] Nominated for the Anadromous Stream Catalog based on data from survey (Noel *et al*., 2008).

Table 5.4-6
Summary of Fish-Bearing Streams the Northern Segments and Segment Combinations would Cross[a]

	Willow	Houston-Houston North	Houston-Houston South	Big Lake
Total Fish-Bearing Stream Crossings	**12**	**14**	**9**	**9**
Fish Communities				
Anadromous	6	8	5	8
Resident	6	6	4	1
Habitat				
Spawning	6	5	2	2
Rearing	12	13	8	9
Migration	12	12	9	9
Over-Winter	9	6	6	4
Potential Blockages				
None	5	5	5	0
Natural - Beaver Dams	3	0	0	0
Artificial - Up Stream	3	6	3	0
Artificial - Down Stream	1	0	0	1
Artificial - Up and Down Stream	0	3	1	8
Conveyance Structure				
Bridge	4	1	1	0
Culvert	5	10	6	2
Drainage Structure	3	3	2	6
Relocation	0	0	0	1

[a] Sources: ADF&G, 2009c; Johnson and Daigneault, 2008; Noel *et al.*, 2008.

Table 5.4-7 summarizes impacts to fish-bearing streams for each of the eight alternatives. The proposed alternatives would require between 10 and 18 crossings of streams containing fish or fish habitat and between 5 and 9 crossings of anadromous fish habitats. Most streams the alternatives would cross provide for seasonal movements of fish and provide rearing habitats. There are spawning and overwintering habitats at 14 and 21 of the 43 stream crossings, respectively (Table 5.4-5). Depending on alternative, between two and six streams at crossings provide spawning habitat for resident game fish or anadromous fish and between 4 and 9 streams at crossings provide overwintering habitat. The proposed alternatives would include from 0 to 4 bridges, 2 to 6 drainage structures, and 3 to 14 closed-bottom culverts. Proposed alternatives include crossings of between 4 and 10 streams with potential blockage from previous crossings that could include ineffective culverts (Table 5.4-7).

All alternatives would cross waters containing important habitat for sustaining recreational and commercial salmon fisheries (Table 5.4-5). The greatest number of salmon-bearing streams crossed by alternatives include the Willow Segment and the smallest number crossed by

Table 5.4-7
Summary of Fish-Bearing Streams Crossed by Alternatives[a]

	Mac West-Connector 1-Willow	Mac West-Connector 1-Houston-Houston North	Mac West-Connector 1-Houston-Houston South	Mac West-Connector 2-Big Lake	Mac East-Connector 3-Willow	Mac East-Connector 3-Houston-Houston North	Mac East-Connector 3-Houston-Houston South	Mac East-Big Lake
Total Crossings	**16**	**18**	**13**	**12**	**13**	**15**	**10**	**10**
Fish Communities								
Anadromous	7	9	6	8	6	8	5	8
Resident	9	9	7	4	7	7	5	2
Habitat								
Spawning	6	5	2	2	6	5	2	2
Rearing	16	17	12	12	13	14	9	10
Migration	15	15	12	11	13	13	10	10
Over-Winter	9	6	6	4	9	6	6	4
Potential Blockages								
None	9	9	9	3	5	5	5	0
Natural - Beaver Dams	3	0	0	0	3	0	0	0
Artificial - Up Stream	3	6	3	0	3	6	3	0
Artificial - Down Stream	1	0	0	1	2	1	1	2
Artificial - Up and Down Stream	0	3	1	8	0	3	1	8
Conveyance Structure								
Bridge	4	1	1	0	4	1	1	0
Culvert	9	14	10	5	6	11	7	3
Drainage Structure	3	3	2	6	3	3	2	6
Relocation	0	0	0	1	0	0	0	1

[a] Source: ADF&G, 2009c; Johnson and Daigneault, 2008; Noel *et al.*, 2008.

alternatives include the Houston-Houston South Segment Combination. Of the three potential crossing locations on the Little Susitna River, the Houston-Houston South Segment Combination crossing (MP-174.3) would require instream pilings and would affect spawning habitat for three salmon species; the Willow Segment crossing (W-0.6) would require three or four instream pilings and would affect spawning habitat for four species of salmon (Table 5.4-5). Alternatives that include the Big Lake Segment would cross Goose Creek, a large unique fen system that would likely have to be drained or filled to provide an area for construction, resulting in the loss of about 4 acres within the 200-foot ROW and likely extending outward within the 19-acre high-value wetland and juvenile rearing habitat.

The Alaska Department of Fish and Game considers Cook Inlet radiation sticklebacks and Pacific lamprey Species of Conservation Concern (ADF&G, 2006). Of the total 43 proposed fish-bearing stream crossings, 18 contain either sticklebacks, Pacific lamprey, or both (see Appendix F). Occurrence of sticklebacks and Pacific lamprey by alternative indicates that the Mac West-Connector 1-Willow Alternative would have the most occurrences of these fish species (10) and the Mac East-Connector 3-Houston-Houston North Alternative and the Mac East-Connector 3-Houston-Houston South Alternative would have the fewest (5) (see Appendix F).

Mac West-Connector 1-Willow Alternative

Construction of the Mac West-Connector 1-Willow Alternative would potentially impact 16 stream crossings that provide fish habitat (Table 5.4-7). Spawning habitat is present at 37 percent of the stream crossings and habitats appear suitable for overwintering at 56 percent of stream crossings. Most streams this alternative would cross (94 percent) provide passage for fish during seasonal migrations (Tables 5.4-3 and 5.4-5). ARRC has stated it would construct bridges at four of the seven anadromous fish stream crossings, construct drainage structures at one of the seven crossings, and would install culverts at two of the seven crossings (Tables 5.4-3 and 5.4-5). Two of the four bridges would require instream pilings within reaches of the Little Susitna River and Willow Creek with documented spawning habitat for four of five Pacific salmon (Table 5.4-5). ARRC would use drainage structures to cross two resident fish streams, and the remaining seven crossings would be culverts of various sizes. Most stream crossings for this alternative (75 percent) would be in undeveloped areas that do not have potential unnatural blockages from ineffective culverts or other crossing structures, although three streams have potential beaver dam blockages and four stream crossings near Parks Highway have potential upstream or downstream blockages (Table 5.4-7). This alternative would cross four waters important for sustaining recreational and commercial salmon fisheries in Southcentral Alaska, including Rodgers Creek, Willow Creek, Fish Creek (Susitna River tributary), and the Little Susitna River.

Mac West-Connector 1-Houston-Houston North Alternative

Construction of the Mac West-Connector 1-Houston-Houston North Alternative would involve 18 crossings of streams that provide fish habitat (nine resident fish streams and nine anadromous fish streams) (Tables 5.4-3 and 5.4-5). There is spawning habitat at 28 percent of the stream crossings and habitats appeared suitable for overwintering at 33 percent of stream crossings.

Most streams this alternative would cross (83 percent) provide passage for fish during seasonal migrations. ARRC has stated it would construct a bridge at the Little Susitna River crossing (HN-3.2) and would use three drainage structures to cross anadromous streams. The bridge over the Little Susitna River would require instream pilings within a reach with documented spawning habitat for three of five Pacific salmon (Table 5.4-5). ARRC would use culverts to cross the remaining five anadromous fish streams and the nine streams that support resident fish or fish habitats (Tables 5.4-3 and 5.4-5). Many stream crossings along this alternative (50 percent) would be in areas where development has created potential unnatural blockages from ineffective culverts or other crossing structures. This alternative would cross waters important for sustaining recreational and commercial salmon fisheries in Southcentral Alaska, including Lake Creek and the Little Susitna River, and many unnamed tributaries to these waters. Development of this alternative could change access to the Little Susitna River and Lake Creek in the Little Susitna State Recreation River near Parks Highway.

Mac West-Connector 1-Houston-Houston South Alternative

Construction of the Mac West-Connector 1-Houston-Houston South Alternative would involve crossing 13 streams that provide fish habitat (7 resident fish streams and 6 anadromous fish streams; Tables 5.4-3 and 5.4-5). There is spawning habitat at 15 percent of the stream crossings and habitats appear suitable for overwintering at 46 percent of stream crossings. ARRC has stated it would construct a bridge at the Little Susitna River crossing (MP-174.3) next to an existing bridge. The bridge over the Little Susitna River would require instream pilings within a reach with documented spawning habitat for three of five Pacific salmon (Table 5.4-5). ARRC would use two drainage structures to cross anadromous streams. ARRC would use culverts to cross the remaining three anadromous fish streams and the seven streams supporting resident fish or fish habitats (Tables 5.4-3 and 5.4-5). Most streams this alternative would cross (92 percent) provide passage for fish during seasonal migrations and provide rearing habitat. A few stream crossings along this alternative (31 percent) are in areas where development has created potential unnatural blockages from ineffective culverts. This alternative would cross waters important for sustaining recreational and commercial salmon fisheries in Southcentral Alaska, including the Little Susitna River and several unnamed Little Susitna tributaries.

Mac West-Connector 2-Big Lake Alternative

Construction of the Mac West-Connector 2-Big Lake Alternative would involve crossing 12 streams that provide fish habitat (4 resident fish streams and 8 anadromous fish streams). There is spawning habitat at 18 percent of the stream crossings and habitats appear suitable for overwintering at 36 percent of stream crossings. Most streams this alternative would cross (91 percent) provide passage for fish during seasonal migrations and all streams provide rearing habitat. ARRC has stated it would not construct bridges along this alternative. ARRC would use six drainage structures to cross anadromous streams. ARRC would use a culvert to cross one of the anadromous streams and would relocate 2,440 feet of anadromous stream channel into two sections of new 2,460-foot-long channels (Table 5.4-3 and 5.4-5). ARRC would cross the four streams that support resident fish or fish habitats using culverts (Table 5.4-3 and 5.4-5). Most streams this alternative would cross (73 percent) are in areas where development has created potential unnatural blockages from ineffective culverts (Table 5.4-7). This alternative would cross waters important for sustaining recreational and commercial salmon fisheries in the Big

Lake and Goose Creek drainages in Southcentral Alaska, including Little Meadow Creek, Lucile Creek, Fish Creek, and Goose Creek. The crossing of Goose Creek would be within a large unique fen system that would likely be drained or filled to provide an area for construction, which would result in the loss of about 4 acres within the 200-foot ROW and likely extend outward within the 19-acre high-value wetland and juvenile rearing habitat.

Mac East-Connector 3-Willow Alternative

Construction of the Mac East-Connector 3-Willow Alternative would involve crossing 13 streams that provide fish habitat. There is spawning habitat at 47 percent of the stream crossings and habitats appear suitable for overwintering at 69 percent of stream crossings. All streams this alternative would cross provide passage for fish during seasonal migration and provide rearing habitat (Tables 5.4-3 and 5.4-5). ARRC has stated it would construct bridges at four of the six anadromous fish stream crossings, and would construct a drainage structure and a culvert at the remaining two crossings (Tables 5.4-3 and 5.4-4, Figure 5.4-2). Two of the four bridges would require instream pilings within reaches of the Little Susitna River and Willow Creek with documented spawning habitat for four of five Pacific salmon (Table 5.4-5). ARRC would use drainage structures to cross two resident fish streams, and would use culverts of various sizes for the remaining five crossings. Most stream crossings along this alternative (61 percent) do not appear to have potential unnatural blockages from ineffective culverts, although three streams have potential beaver dam blockages and five stream crossings have potential upstream or downstream blockages (Table 5.4-7). This alternative would cross four waters important for sustaining recreational and commercial salmon fisheries in Southcentral Alaska, including Rodgers Creek, Willow Creek, Fish Creek (Susitna River tributary), and the Little Susitna River.

Mac East-Connector 3-Houston-Houston North Alternative

Construction of the Mac East-Connector 3-Houston-Houston North Alternative would involve crossing 15 streams that provide fish habitat (7 resident fish streams and 8 anadromous fish streams). There is spawning habitat at 33 percent of the stream crossings and habitats appear suitable for overwintering at 40 percent of stream crossings. Most streams this alternative would cross (87 percent) provide passage for fish during seasonal migrations. ARRC has stated it would construct a bridge at the Little Susitna River crossing (HN-3.2), and would use three drainage structures to cross anadromous streams (Figure 5.4-2). The bridge over the Little Susitna River would require instream pilings within a reach with documented spawning habitat for three of five Pacific salmon (Table 5.4-5). ARRC would use culverts to cross the remaining four anadromous fish streams and the seven streams supporting resident fish or fish habitats (Tables 5.4-3 and 5.4-5). Many stream crossings along this alternative (67 percent) would be in areas where development has created potential unnatural blockages from ineffective culverts (Table 5.4-7). This alternative would cross waters important for sustaining recreational and commercial salmon fisheries in Southcentral Alaska, including Lake Creek and the Little Susitna River, and many unnamed tributaries to these waters. Development of this alternative could change access to the Little Susitna River and Lake Creek in Little Susitna State Recreation River near Parks Highway.

Mac East-Connector 3-Houston-Houston South Alternative

Construction of the Mac East-Connector 3-Houston-Houston South Alternative would involve crossing 10 streams that provide fish habitat (5 resident fish streams and 5 anadromous fish streams). There is spawning habitat at 20 percent of the stream crossings and habitats appear suitable for overwintering at 60 percent of stream crossings. All streams this alternative would cross provide passage for fish during seasonal migrations and most (90 percent) also provide rearing habitat. ARRC would construct a bridge at the Little Susitna River crossing (MP-174.3) next to an existing bridge. The bridge over the Little Susitna River would require instream pilings within a reach with documented spawning habitat for three of five Pacific salmon (Table 5.4-5). ARRC would use two drainage structures to cross anadromous streams. ARRC would use culverts to cross the remaining two anadromous fish streams and the five streams supporting resident fish or fish habitats (Tables 5.4-3 and 5.4-5, Figure 5.4-2). Half of the stream crossings along this alternative are in areas where development has created potential unnatural blockages from ineffective culverts (Table 5.4-7). This alternative would cross waters important for sustaining recreational and commercial salmon fisheries in Southcentral Alaska, including the Little Susitna River and several unnamed Little Susitna tributaries.

Mac East-Big Lake Alternative

Construction of the Mac East-Big Lake Alternative would involve crossing 10 streams that provide fish habitat (2 resident fish streams and 8 anadromous fish streams). There is spawning habitat at 22 percent of the stream crossings and habitats appear suitable for overwintering at 44 percent of stream crossings. All streams this alternative would cross provide passage for fish passage during seasonal migrations and provide rearing habitat. ARRC would not construct bridges along this alternative. ARRC would use six drainage structures to cross anadromous streams. ARRC would use a culvert to cross one of the anadromous fish streams and would block a section of an anadromous fish stream with fill. ARRC would use culverts to cross the two streams supporting resident fish or fish habitats (Tables 5.4-3 and 5.4-5, Figure 5.4-2). All streams this alternative would cross are in areas where development has created potential unnatural blockages from ineffective culverts (Table 5.4-7). This alternative would cross waters important for sustaining recreational and commercial salmon fisheries in the Big Lake and Goose Creek drainages in Southcentral Alaska, including Little Meadow Creek, Lucile Creek, Fish Creek, and Goose Creek. The crossing of Goose Creek would be within a large unique fen system that would likely be drained or filled to provide an area for construction, resulting in the loss of about 4 acres within the 200-foot ROW and likely extending outward within the 19-acre high-value wetland and juvenile rearing habitat.

5.4.4.2 No-Action Alternative

Under the No-Action Alternative, ARRC would not construct and operate the proposed Port MacKenzie Rail Extension, and there would be no impacts to fisheries from the project.