

3.10 Subsistence

“Subsistence” refers to the harvest of fish, wildlife, or other wild resources to provide for families, communities, and cultures. Subsistence is defined in the Alaska National Interest Lands Conservation Act (ANILCA), Section 803, as “the customary and traditional uses¹ by rural² Alaska residents of wild, renewable resources” for non-commercial purposes.

State and Federal regulations differ. State law regulates subsistence on State lands and waters and on private lands, while Federal law regulates subsistence activities on Federal lands and waters.

Under State law, all Alaska residents are eligible to participate in subsistence on State-owned lands, but only in State-defined subsistence use areas. The State Joint Boards of Fish and Game classifies all but the southern tip of the Kenai Peninsula³ as a “non-subsistence use area” (see Map 3.10-1). Therefore, there are no fisheries or hunts in the project area on State lands or waters that are considered “subsistence.” All Alaska residents are eligible to participate in “personal use” activities in State-defined “non-subsistence areas.” Noncommercial net fisheries (dip net fishing in the lower Kenai River and set net fishing in portions of Cook Inlet) are classified as “personal use fisheries” (ADF&G 2011a).

Federal subsistence law is based on the identification of rural and non-rural⁴ areas. Under Federal regulations, communities must be designated as rural to participate in subsistence activities on Federal lands. The Federal Subsistence Board (FSB) must determine that the community has customarily and traditionally harvested the particular resource. FSB subsistence fishing regulations mirror State sport fishing regulations, except the Federal regulations require a subsistence permit and do not require a sport fishing license.

The Sterling Highway passes through portions of the Chugach National Forest (CNF) and portions of the Kenai National Wildlife Refuge (KNWR) between Mileposts (MP) 45 to 60. These Federal lands provide subsistence opportunities to qualified rural Alaska residents under the provisions of ANILCA. A Section 810 subsistence evaluation was prepared to comply with Title VIII, Section 810, of ANILCA, which requires an evaluation of direct and cumulative effects of the project alternatives on subsistence uses of Federal lands. This section summarizes the *ANILCA Section 810 Subsistence Evaluation*, which is provided as Appendix C to this Supplemental Environmental Impact Statement (SEIS).

¹ As defined in ANILCA, “customary and traditional uses” means the noncommercial, long-term, and consistent taking of, use of, or reliance upon fish and wildlife in a specific area and the patterns and practices of taking or use of that fish and wildlife that have been established over a reasonable period of time, taking into consideration the availability of the fish and wildlife.”

² As defined in ANILCA, “rural” residents live in a community or area that is “substantially dependent on fish and wildlife for nutritional and other subsistence uses.” State subsistence regulations do not include this restriction to rural residents.

³ The areas around Seldovia, Nanwalek, and Port Graham have been classified by the State Joint Boards of Fish and Game as subsistence areas.

⁴ Rural (subsistence) areas are those in which dependence on subsistence is a principal characteristic of the economy, culture, and way of life. Non-rural (non-subsistence) areas are located around Fairbanks, Anchorage, the Matanuska-Susitna Borough, the Kenai Peninsula, Juneau, Ketchikan, and Valdez.

3.10.1 Affected Environment

The following summary of subsistence uses includes the three primary rural communities associated with harvests in the project area: Cooper Landing, Hope, and Ninilchik. These rural communities have Federal recognition of customary and traditional or subsistence uses for key subsistence species, such as fish and moose, in Game Management Units (GMUs) 7, 15A, and 15B. GMU 7 encompasses the eastern Kenai Peninsula; GMUs 15A and 15B lie within the eastern portion of the KNWR and abut GMU 7 (see Map 3.10-1).

In accordance with ANILCA 810, subsistence activities such as hunting, fishing, trapping, picking, and gathering are allowed on Federal public lands within the KNWR and CNF. In the Kenai River area, subsistence resources harvested may include bear, moose, fish, small mammals, birds, berries, edible plants, and wood.

The FSB has recognized customary and traditional use of all fish in the rural communities of Cooper Landing, Hope, and Ninilchik for the waters north of and including the Kenai River drainage within the KNWR and CNF. In addition, residents of Ninilchik also have recognized customary and traditional use for all fish in waters of the Kasilof River drainage within the KNWR. Federal subsistence fishing permits are required for those communities for salmon, trout, and Dolly Varden/char in the Kenai and Kasilof river drainages. Seasons, harvest and possession limits, and methods and means of harvest in the Kenai and Kasilof rivers are the same as those in Alaska sport fishing regulations. Regulations provide for three dip net fisheries in the Kenai basin, one on the Russian River, and two downstream of Skilak Lake, and a dip net fishery in the Kasilof River basin.

The FSB has adopted regulations that recognize the customary and traditional use of moose by residents of Cooper Landing. This allows residents of Cooper Landing to harvest moose on Federal lands in GMUs 7, 15A, and 15B under Federal subsistence regulations (see Map 3.10-1). Hope residents have been granted a harvest of moose on Federal lands (CNF and KNWR) in GMU 7, and residents of Ninilchik have been granted a harvest of moose on Federal lands (KNWR) in GMUs 15A and 15B (see Map 3.10-1). Cooper Landing, Hope, and Ninilchik have additional recognized customary and traditional use determinations that include black and brown bears⁵, caribou⁶, small mammals, and upland birds in these GMUs (see Appendix C for additional information regarding allowable harvests in these GMUs).

Because this is a State non-subsistence area, few harvest studies have been conducted. A study of subsistence harvests for all resources in select upper Kenai Peninsula communities, including Cooper Landing and Hope, was conducted by ADF&G in 1990 (see Table 3.10-1 and Table 3.10-2 and Seitz, Tomrdle and Fall (1992)). A 1998 survey conducted on wild resource uses of selected communities within the Kenai Peninsula Borough included data on wildlife harvests for the community of Ninilchik (see Table 3.10-1 and Table 3.10-2 and Fall, Vanek, et al. (2000)). In 2002, the FSB provided funding to the ADF&G Division of Subsistence to conduct a household survey of Kenai Peninsula communities, documenting subsistence uses of fish. This survey included the communities of Cooper Landing, Hope, and Ninilchik, and identified subsistence fishing patterns consistent with the 1990 study (see Table 3.10-3 and (Fall, Stanek, et al. 2004)). Recently published annual reports for subsistence salmon fisheries include harvest

⁵ The brown bear harvest is limited to Ninilchik in GMUs 15A and 15B.

⁶ The caribou harvest is limited to Hope in GMU 7.

information for Cooper Landing, Hope, and Ninilchik for 2009, 2010, and 2011 (Fall, Braem, et al. 2012, Fall, Balivet, et al. 2013a, Fall, Brenner, et al. 2013b). These studies quantified resource harvests taken under both Federal subsistence regulations and State regulations. The patterns of harvest in these communities generally followed seasonal availability and harvest regulations.

Table 3.10-1. Estimated harvest of fish and wildlife resources

Resource	Harvested Pounds per Person		
	Cooper Landing, 1990	Hope, 1990	Ninilchik, 1998
All resources	91.5	110.7	163.8
Fish	53.9	65.8	80.8
Salmon	39.5	50.1	42.5
Non-salmon fish	14.5	15.8	38.3
Land mammals	28.8	32.8	66.2
Large land mammals	28.6	31.1	65.7
Small land mammals	0.2	1.7	0.6
Marine mammals	0	0	0
Birds and eggs	2.5	2.4	1.4
Migratory birds	0.5	0.4	0.5
Other birds	2.0	2.0	1.0
Marine invertebrates	2.3	4.0	11
Vegetation	4.1	5.7	4.4

Source: ADF&G (2014b)

Table 3.10-2. Estimated harvest of select fish and wildlife resources

Resource	Percent of Households Harvesting		
	Cooper Landing, 1990	Hope, 1990	Ninilchik, 1998
All Resources	94	94	96
Berries	64	75	59
Sockeye Salmon	56	33	45
Coho Salmon	44	33	38
Dolly Varden	44	53	14
Plants/Greens/Mushrooms	35	39	20
Grouse	25	17	29
Halibut	25	25	60
Lake Trout	18	10	2
Chinook Salmon	15	19	47
Moose	10	9	21

Source: ADF&G (2014b)

The 1990 harvest study of all fish and wildlife resources showed that the harvest per person in the Cooper Landing area totaled 91.5 pounds, with an average household harvest total of 238 pounds, and 94 percent of households harvesting resources (ADF&G 2014b). For the community of Hope, the 1990 survey reported 110.7 pounds of resources were harvested per person, the average household harvest totaled 262 pounds, and 94 percent of households harvested wild resources (ADF&G 2014b). The 1998 survey for Ninilchik reported the per person harvest of wild resources totaled 163.8 pounds, and the average household harvest totaled 439.5 pounds, with 96 percent of households harvesting wild resources (Fall, Vanek, et al. 2000). Quantities of specific resources harvested and the percentages of households harvesting a particular resource are detailed in Table 3.10-1 and Table 3.10-2.

The 1990 household survey provides harvest quantities for moose. Historically, moose have been an important resource for Cooper Landing and Hope residents. Between 1975 and 1990, Cooper Landing residents reported an average harvest of 3.3 moose per year for the entire community, and Hope residents reported an average harvest of 5.4 moose per year for the entire community. In 1990, the estimated total community harvest of moose was higher than average, with 10 animals for Cooper Landing and 6 animals for Hope (Seitz, Tomrdle and Fall 1992). In 1998, moose represented the highest percentage of Ninilchik residents' total harvest (95 animals or 0.1 moose per person; see Fall, Vanek et al. (2000)).

The majority of Cooper Landing, Hope and Ninilchik households (59–75 percent) harvested berries. Other commonly harvested resources include other plants, such as greens and mushrooms, and grouse.

Salmon represent one of the most heavily used subsistence resources for the rural communities of Cooper Landing, Hope, and Ninilchik. According to the 1990 study, salmon were the most important wild resource harvested (based on quantities) for Cooper Landing and Hope (see Table 3.10-1 and Table 3.10-2). Because the FSB had not yet granted subsistence rights to these communities, they were taken largely under State sport fishing regulations and not under Federal subsistence regulations (Seitz, Tomrdle and Fall 1992). The 2002 household survey noted that less than 12 percent of all salmon harvested by both Cooper Landing and Hope residents were taken under subsistence regulations (Fall, Stanek, et al. 2004). Similarly, residents of Ninilchik harvested 30 percent of salmon under Federal subsistence regulations, but most fished outside the project area (Fall, Vanek, et al. 2000).

The 2002 ADF&G study surveyed the harvest and use of fish in 103 Cooper Landing households, 60 Hope households, and 100 Ninilchik households. A summary of select fish harvests for these communities is detailed in Table 3.10-3. In Cooper Landing, 90 percent of households used fish, 73 percent harvested fish, and 62 pounds of fish were harvested per person (Fall et al. 2004). In Hope, 83 percent of households used fish, almost 67 percent of households harvested fish, and 62 pounds of fish were harvested per person (Fall, Stanek, et al. 2004). Ninilchik reported 96 percent of households using fish, 73 percent of households harvesting fish, and almost 82 pounds of fish being harvested per person (Fall, Stanek, et al. 2004). The most common fish harvested by these households were sockeye and coho salmon and halibut. These results are comparable to the results of the 1990 and 1998 household surveys, which also showed the relative dependence of these communities on subsistence resources, especially fish.

Table 3.10-3. Estimated harvest of select fish resources, 2002/2003

Resource	Cooper Landing		Hope		Ninilchik	
	Pounds per Person	Percent of Households Harvesting	Pounds per Person	Percent of Households Harvesting	Pounds per Person	Percent of Households Harvesting
All Fish	61.7	73%	62.4	67%	81.8	73%
Sockeye Salmon	28.0	62%	14.8	30%	20.7	54%
Coho Salmon	12.2	45%	17.8	45%	11.1	41%
Halibut	10.5	29%	10.5	18%	28.8	53%
Chinook Salmon	4.2	18%	4.2	12%	8.4	38%
Lake Trout	2.2	16%	0.1	3%	0.8	6%
Dolly Varden	1.4	26%	1.6	28%	0.6	12%
Rainbow Trout	1.2	20%	0.9	10%	1.8	6%
Black Rockfish	0.7	3%	0.6	7%	0.8	7%
Eulachon	0.6	2%	1.4	8%	1.3	5%

Source: Fall, Stanek, et al. (2004)

The most recently published annual subsistence salmon fishery harvest information⁷ for Cooper Landing, Hope, and Ninilchik reports that in 2011, a total of 131 permits were issued to residents of those communities (69 to Cooper Landing residents, 19 to Hope residents, and 43 to Ninilchik residents). The total harvest in the Kenai and Kasilof rivers Federal fishery was 1,090 salmon (846 to Cooper Landing residents, 159 to Hope residents, and 85 to Ninilchik residents), all of which were sockeye salmon. ADF&G reported that sockeye salmon comprised the majority of the subsistence salmon harvest during the 2007–2010 study years, with 2008 being the highest at 1,716 sockeye salmon harvested by residents of these communities (Fall, Brenner, et al. 2013b).

The majority of the project area is located within GMU 7, and a smaller portion is located in both GMUs 15A and 15B. The locations used to harvest fish were documented in the 1990, 1998, and 2002 ADF&G studies in Cooper Landing, Hope, and Ninilchik (Fall et al. 2004; see Appendix C for further information). Residents of Cooper Landing primarily used the upper Kenai and Russian rivers for sockeye salmon; Kenai Lake and its tributary streams for Dolly Varden and lake trout; and the lower Kenai River for Chinook, sockeye, and coho salmon. Hope residents used Kenai mountain streams in the CNF and the KNWR to harvest salmon and non-salmon fish resources; the lower Kenai River, Kasilof River and Crooked Creek, and Resurrection Bay for salmon; and the northern portion of the Cook Inlet for hooligan. Ninilchik residents used the Russian River to harvest sockeye salmon; the Kenai Lake, Kenai Lake tributary streams, and Kenai mountain streams to harvest trout; and the lower Kenai River, Deep Creek, Ninilchik River and the Cook Inlet for salmon.

⁷ These annual reports are limited to salmon fisheries and summarize Federal subsistence and personal use salmon fisheries based on permit data and harvest assessment surveys. The data have limitations (e.g., harvest data are a conservative estimate, and may be an underestimation in some cases, of the number of salmon being taken for subsistence; there is inconsistency in how data are collected, analyzed, and reported). Data reported in the annual reports are limited to numbers of permits and estimated harvests and are not comparable to previously reported data, such as that shown in Table 3.10-3.

General resource use areas for Cooper Landing and Hope were also documented and mapped as a part of the 1990 survey. While the maps are at a large scale and lacking detail, they show that the Sterling Highway MP 45–60 project area and surrounding Federal lands (CNF and the KNWR) are used by residents of Cooper Landing and Hope for harvesting salmon and non-salmon fish, black bear, moose, and furbearers. Cooper Landing residents also reported harvesting vegetation, birds, goats, sheep, and firewood in the approximate project area. The survey does not, however, provide detail on whether the harvests occurred on State or Federal lands or the access locations used by area residents such as trailheads and docks (Seitz, Tomrdle and Fall 1992).

For the community of Ninilchik, the 1998 ADF&G survey provides general locations of wild resource harvests also at the GMU level (Fall, Vanek, et al. 2000). As reported in the study, the project area shows a low level of usage by Ninilchik residents for harvesting wild resources, with GMU 15B showing the highest usage (see Appendix C for additional information).

3.10.2 Environmental Consequences

The analysis of subsistence impacts is focused on subsistence users from the rural communities of Cooper Landing, Hope, and Ninilchik, as they are the primary harvesters of subsistence resources in the project area. As indicated in the ADF&G data presented in Section 3.10.1 above, key subsistence resources, such as fish and moose, are harvested by these communities in the project area. The following evaluation focuses on potential impacts to harvests of those key resources.

Potential impacts on subsistence within the project area were analyzed using the following three evaluation criteria:

- Potential to reduce subsistence uses caused by changes in resources, resource habitat, or competition for resources;
- Potential to reduce subsistence uses due to changes to resource availability due to alteration in resource migration patterns or distribution; and
- Potential to reduce subsistence uses due to physical or legal barriers to accessing resources.

Based on available subsistence data for the communities of Cooper Landing, Hope, and Ninilchik, the potential impacts to fish and wildlife subsistence resources, resource availability, and resource habitat would be minimal for the reasonable (Build and No Build) alternatives for the Sterling Highway MP 45–60 Project. It is unlikely that a significant reduction of harvestable resources in subsistence use areas would occur due to competition from other subsistence users or recreational hunting and fishing. In addition, it is unlikely that fish and wildlife resource populations and distribution would be substantially affected by increased access to subsistence use areas as a result of any of the alternatives.

The *ANILCA Section 810 Subsistence Evaluation* (see Appendix C) concluded that there was no reasonably foreseeable possibility of a significant restriction of subsistence uses from any of the reasonable alternatives.

The discussion of impacts presented below is modeled on the *ANILCA Section 810 Subsistence Evaluation* (Appendix C).

3.10.2.1 No Build Alternative

Direct and Indirect Impacts

Changes in Resources, Resource Habitat, or Competition for Resources. Under the No Build Alternative, there would be no new construction, so no new direct adverse effects on traditional harvest areas for fish, wildlife, or wild foods would occur. However, ongoing operations, and maintenance activities, including projected replacement of existing bridges over the Kenai River, could have a minor impact on subsistence resources and habitat. As traffic levels, human population, and recreation increase, resources may increasingly avoid or reduce use of habitats along the highway, habitat quality may decrease, and injury or mortality of resources may occur from increased collisions or hazardous materials spills.

The projected growth in human population and recreation in the project area could increase competition as larger numbers of both subsistence and recreational users compete for the same resources. However, for resources such as fish and moose, subsistence harvests are restricted on Federal lands and waters to residents of local rural communities. Concentrated fishing pressure and associated stream bank erosion could also increase as human population and recreational use of the area increase.

The No Build Alternative retains the existing highway as a narrow road that is at or near its maximum capacity for traffic. Currently, 77 percent of the existing Sterling Highway alignment in the project area is within 500 feet of the Kenai River and its tributaries, presenting a risk that vehicle crashes could spill pollutants with little buffer or opportunity for cleanup before they would reach the river (see Section 3.17 for discussion of hazardous material spill risks). Increased traffic on the existing highway could result in greater runoff of roadway debris and pollutants, which could adversely affect fish habitat immediately adjacent to the highway (see Sections 3.13 and 3.21 for additional discussion of impacts to water quality and fish, respectively).

Changes in Resource Availability due to Alteration in Resource Migration Patterns or Distribution. Under the No Build Alternative, there would be no new construction. Ongoing operations, and maintenance activities, including projected replacement of the existing bridges over the Kenai River could have minor impacts on fish and wildlife migration patterns and distribution (see Sections 3.21 and 3.22 for additional discussion of fish and wildlife distribution and movement). However, these activities would likely have negligible new direct effects on subsistence resource availability from changes in resource migration patterns or distribution.

Physical or Legal Barriers to Accessing Resources. The No Build Alternative would not cause new direct effects to access of subsistence resources due to physical or legal barriers. However, as traffic levels, human population, and recreation increases, increased impacts to resources and habitats, as well as increased competition for resources between subsistence users and sport or personal use harvesters, may result in changes to harvest regulations or closures.

Customary and traditional subsistence uses on Federal lands would continue as authorized by Federal law under the No Build Alternative. However, agencies would continue to monitor resource habitat and populations and to alter hunting and fishing regulations to maintain resources at sustainable levels.

3.10.2.2 Issues Applicable to the Build Alternatives

This section describes subsistence issues common to all of the build alternatives. Although the actual impacts may differ among the build alternatives, this section presents a summary of impacts and presents common background. Impacts specific to individual alternatives are discussed in Sections 3.10.2.3 through 3.10.2.5.

As presented in the *ANILCA 810 Subsistence Evaluation* (Appendix C), there would be no detrimental impacts on communities or people relying on subsistence harvests of fish and wildlife resources as a result of any of the build alternatives.

Direct and Indirect Impacts

Changes in Resources, Resource Habitat, or Competition for Resources. Similar to the No Build Alternative, the projected growth in traffic levels and recreation in the project area under all build alternatives could create additional pressures on subsistence resources located along the existing highway and increase competition for those resources. If poorly managed, additional and concentrated fishing pressure could reduce habitat and habitat quality, primarily through trampling of river banks and riparian vegetation. A possible increase in competition for subsistence resources could occur because of larger numbers of both subsistence and recreational users vying for the same resources.

All of the build alternatives share general impacts to subsistence resources, habitat, or competition. Impacts to fish and wildlife resources may occur as a result of construction and operation of the build alternatives.

Changes to the landscape can influence wildlife populations through habitat loss, changes in habitat quality, changes in habitat use, or reduced survival (see Section 3.22, Wildlife, for further discussion of these impacts). Impacts to subsistence uses in the project area may include resources avoiding or reducing use of habitat along the highway, actual loss of habitat within the new alignment, decreased habitat quality, fragmentation of habitat, and injury or mortality of resources from collisions or hazardous materials spills.

Some habitat for wildlife would be altered or destroyed by construction of new highway segments. In addition, direct mortality from vehicle collisions could increase where new alignments cross high-quality habitat and from increased traffic volume coupled with higher traffic speeds. However, new and reconstructed highway segments would be wider, with substantially better sight distance throughout their lengths, allowing for increased visibility and maneuvering room for both drivers and wildlife.

The new areas of habitat impact would contribute to fish and wildlife displacement and habitat fragmentation; however, as can be seen in the case of moose, the loss of habitat includes a negligible portion of their total habitat. Table 3.10-4 provides details on potential direct impacts to select fish and wildlife resource habitats for each alternative.

Table 3.10-4. Potential impacts to select fish and wildlife resource habitat by alternative

	Build Alternative			
	Cooper Creek	G South	Juneau Creek	Juneau Creek Variant
Miles of new roadway ^a	3.5	5.6	10	9
Miles of roadway on Federal lands	1.4	1.9	4	3.4
USFS	1.4	1.9	3.1	3.4
USFWS	-	-	0.9	-
Number of new culvert crossings or stream re-routing of anadromous fish streams	5	4	1 ^b	1
Number of new or replacement bridges	3 ^b	3 ^c	1 ^c	1 ^c
Acres of wetlands impacted	11	26.6	38.7	37.5
Total moose habitat acres impacted (% of habitat type in project area) ^d	204 (1%)	216 (1%)	277 (2%)	266 (2%)
Total upland game bird habitat acres impacted ^e	83	107	106	109
Total seasonally flooded or permanently flooded wetlands contiguous with essential fish habitat impacted (acres)	2.6	2.6	1.9	1.9
Total essential fish habitat impact (acres) ^f	1.2	1.0	0.8	0.8

^a“New roadway” is defined as the length of constructed highway that diverges from the existing highway alignment.

^b The Cooper Creek Bridge crossing is a clear-span design and would not result in any in-stream construction.

^c The Juneau Creek Bridge crossing is a clear-span design and would not result in any in-stream construction.

^d See Section 3.22.4 and Table 3.22-11 in the Wildlife section for further information on possible impacts to moose. The impacts to other mammals such as black bear, wolf, and lynx would be similar to those for moose.

^e See Section 3.22.6 and Table 3.22-13 in the Wildlife section for further information on possible impacts to birds.

^f See Section 3.21 and Tables 3.21-4, 3.21-5, and 3.21-6 in the Fish and Essential Fish Habitat section for further information.

In addition to improving upon the capacity and safety standards for the Sterling Highway, all build alternatives would decrease the risk of a containment spill into the Kenai River by moving the alignment away from the river (see Section 3.17). Design upgrades, such as widening and straightening the roadway, would also serve to decrease the possibility of collisions of vehicles carrying hazardous substances. According to the ADF&G Division of Subsistence, by routing the Sterling Highway away from the Kenai River, which would reduce the risk of a hazardous substance spill into the river, any of the build alternatives may serve to safeguard aquatic resources and habitat within the project area (Fall, personal communication 2005). Fuel spills may directly affect resource populations and habitat as well as users’ perceptions regarding contamination of the resource, possibly reducing their use of the resource.

Salmon represents one of the most heavily used subsistence resources for the rural communities of Cooper Landing, Hope, and Ninilchik (see Section 3.10.1). Several anadromous fish streams within the project area could potentially be affected during the replacement or construction of bridges and culverts. New culvert and bridge crossings could have temporary and permanent impacts on stream habitat by modifying the hydrologic flow and natural sediment transport in streams at the location of the crossing as well as possibly upstream and downstream of the

crossing. The primary impacts of culverts on aquatic resources would be changes in stream flow that could affect fish passage under the highway, elimination of habitat, and reduction of habitat quality where culverts would replace natural habitat. Where old culverts under the existing highway would be replaced with new culverts built to modern standards, and often at larger diameter, it is possible that fish passage would be established where it had previously been cut off. If designed, constructed, and maintained properly, permanent direct impacts to fish and fish habitat from culvert installation and bridge construction and/or replacement from the build alternatives would be minor. Required culvert design features for all build alternatives, which would preserve fish passage, would result in minimal permanent loss of fish populations or habitat (see Section 3.21.2.2 for more information on impacts to fish and essential fish habitat). Section 3.21.2 includes a detailed analysis of direct and construction impacts to resident and anadromous fish populations and habitat.

Moose inhabit the entire project area, and all of the build alternatives would impact their habitat through alteration and destruction resulting from new highway construction and vegetation clearing. However, the total habitat impacts under the build alternatives would be only 1 to 2 percent of total moose habitat in the project area (see Table 3.10-4). The construction of new roadway has the potential to impact the availability of moose as a subsistence resource due to wildlife displacement and habitat fragmentation. See Section 3.22.4 for further discussion of impacts to moose and moose habitat.

The build alternatives could also impact other wildlife species and their habitat, including Dall sheep, mountain goat, lynx, wolves, and brown and black bears, due to wildlife displacement and habitat degradation and fragmentation as well as mortalities caused by vehicle collisions and human-wildlife conflicts (i.e., defense of life or property for bears). However, these species did not constitute a significant proportion of wildlife resources harvested by Cooper Landing, Hope, and Ninilchik residents. See Section 3.22 for a detailed discussion of project impacts to other wildlife species and their habitats.

Changes to trails and trailheads might shift subsistence uses to new areas. The potential increase in access to new areas could be viewed as beneficial to some, while the increased competition could be viewed as an adverse impact. All build alternatives intersect project area trails and would affect access to CNF lands used for subsistence activities and connectivity of trails in the project area. Depending on the build alternative selected, some trails would be rerouted and additional trailhead areas would be provided (see Section 3.8, Park and Recreation Resources, and 4(f)). Improved access because of the construction of new roads and trailheads, and access to new areas could indirectly affect the intensity of subsistence activities in those areas. Improved access could also impact availability of resources because of increased competition from recreational hunting and fishing. Increased access to previously inaccessible or difficult-to-access areas could also introduce an increase in competition for unregulated subsistence resources such as berries, eggs, or wood.

In general, the build alternatives are unlikely to have a measureable effect on subsistence resources, habitat, or competition. Any impacts would not be significant relative to the overall availability of habitat and subsistence use areas in the project area.

Changes in Resource Availability due to Resource Migration Pattern or Distribution. All of the build alternatives share common impacts to subsistence resources availability due to potential changes in migration patterns or distribution of fish and wildlife resources. While caribou occur

in the Kenai Mountains, no regular migration of caribou herds occurs in the project area. The discussion here is concerned more with general distribution of fish and wildlife and ability to move within an individual's or species' normal range.

Changes to the landscape caused by project construction can influence wildlife population migration patterns and distribution through habitat loss, changes in habitat suitability, changes in habitat use, or reduced survival. In addition, the highway itself can become a barrier to resource migration patterns through design, such as steep embankments or retaining walls, or through resource injuries or mortality due to collisions. The ADF&G Division of Subsistence does not believe any of the project's build alternatives would negatively impact subsistence resource availability (Fall, personal communication 2005).

Wildlife resource availability could be adversely affected due to potential changes to migration patterns resulting from each of the proposed reasonable alternatives. The Cooper Landing area has been identified as a brown bear movement area, with areas just west of Cooper Landing near Juneau Creek identified as primary brown bear habitat. However, the brown bear is not a key subsistence species. Other movement areas have been identified in the project area for moose, as well as other mammals, although impacts to movement of these resources are likely to be minor.

The new highway segments may fragment habitat by impeding access to sections of habitat, which would change migration movements. Physical features of the highway, such as steep embankments and retaining walls, may create barriers to wildlife movement and result in less use of the existing range. Increased noise levels in areas adjacent to new highway alignment segments could also impact normal wildlife distribution through the avoidance or reduced use of existing habitat within the project area. Changes in the use of existing habitat may alter the population distribution and may result in less habitat availability and reduced population size. Impacts to wildlife movement patterns and distribution are discussed in more detail in Section 3.22 (Wildlife). Impacts on wildlife resource distribution or movement from the build alternatives would not likely result in substantial impacts on subsistence uses.

The Alaska Department of Transportation and Public Facilities (DOT&PF) is sponsoring a wildlife movement study that is expected to aid in the design of underpasses and other measures to accommodate movement of brown bears and moose, as well as for other mammals. In addition, DOT&PF has committed to building underpasses on U.S. Forest Service (USFS) roads. While these crossings are not intended specifically for wildlife, DOT&PF is committed to building these structures to wildlife crossing standards so that moose and bears would be able to move under the new highway at these locations.

The build alternatives would not adversely affect the distribution or migration patterns of fish resources, so there would be no impact to subsistence uses. No structures would be placed that would block or impede fish passage.

Physical or Legal Barriers to Accessing Resources. No boat launches would be permanently affected, and access to the Kenai River would remain unchanged from existing conditions, under the build alternatives.

It should be noted that customary and traditional subsistence uses on Federal lands and waters would continue as authorized by Federal law under all build alternatives. However, agencies would continue to monitor resource habitat and populations and alter hunting and fishing regulations to maintain resources at sustainable levels.

Increased access to previously inaccessible or difficult-to-access areas could introduce an increase in competition for unregulated subsistence resources. Unregulated wild resources such as berries, eggs, or wood, for example, could potentially be over-harvested in areas receiving higher levels of usage. Increased harvesting in newly accessible areas could result in land managers needing to introduce regulations to better manage those resources near trailheads or areas used for collecting subsistence resources.

Some access areas (trailheads) to Federal lands would be affected as a result of the build alternatives. Adding new trailheads or improving existing trailheads could improve access to subsistence resource areas, but these new or improved trailheads are not expected to be barriers to resources. In addition, for each of the build alternatives, DOT&PF has committed to building underpasses on USFS roads that would preserve access rights for subsistence users.

The availability of land for subsistence use also could be impacted because target species likely would not spend time near the new highway alignments except to cross them. Also, State law prohibits discharging firearms on, from, or across a road. It is advised that hunters discharge firearms well away from roads as a matter of safety and courtesy (ADF&G 2013d). This law could deter hunting on Federal land with firearms in an approximate one-half-mile-wide swath along each alternative, with the Juneau Creek alternatives creating the most new restriction, followed by the G South Alternative and the Cooper Creek Alternative. While access to CNF lands may be affected due to implementation of a build alternative and these areas of hunting restriction along the new roadway alignments, these changes are not anticipated to have a measurable effect on subsistence use within the project area.

Construction Impacts

Construction activities for each of the build alternatives may temporarily impact subsistence activities by affecting access and reducing habitat availability to subsistence resources, such as fish and wildlife. Construction activities could also result in temporary loss or alteration of habitats; displacement from habitats near staging areas, disposal and borrow sites, and access roads; reduced habitat quantity and quality; and changes in subsistence resource behavior or movement due to noise. Increased noise and activity levels during construction may disturb some subsistence resources, potentially resulting in a temporary displacement of resources from construction nodes in the project area, such as staging areas.

Depending on construction techniques and timing, subsistence populations of salmon could be temporarily impacted. Build alternatives would require construction of a new bridge and/or replacement of existing bridges spanning the Kenai River, Juneau Creek, Bean Creek, or Cooper Creek, all of which are anadromous fish streams. In-water work would be required for the replacement and construction of some bridges. Pile driving, augering, or both would be necessary for placement of bridge pier foundations. Placement of culverts in fish-bearing streams could temporarily affect anadromous fish populations and habitats; however, any new culverts installed in fish bearing waterbodies would be fish passage culverts. Direct disturbance of habitat from in-water work and siltation downstream could temporarily displace fish. Section 3.21 provides a discussion of impacts to resident and anadromous fish populations and habitat.

Access to surrounding Federal lands used for subsistence activities may be temporarily and intermittently disrupted during construction of any of the build alternatives. Construction would likely last three to four construction seasons and would overlap heavily with the primary hunting and gathering seasons (snow-free seasons).

Mitigation

No mitigation measures specific to subsistence are proposed for the build alternatives.

Mitigation identified for trail impacts includes rerouting trail segments and creating new trailheads. If access improves because of the reroutes and new trailheads, more people may use the trails and compete for subsistence resources with current users. This could increase competition for wildlife resources on surrounding Federal lands.

Permit stipulations and recommendations will detail construction techniques and timing of construction activities to minimize impacts to subsistence resources. Current permitting requirements would require build alternatives to be conducted using best management practices that would minimize the amount of time in-water work is conducted, minimize siltation of water bodies during construction, and provide for fish passage during construction and operation (see Section 3.21.2.2 for further discussion of essential fish habitat mitigation for the build alternatives). Mitigation that would address potential impacts to wildlife resources is discussed in Section 3.22.

3.10.2.3 Cooper Creek Alternative

Direct and Indirect Impacts

Changes in Resources, Resource Habitat, or Competition for Resources. The Cooper Creek Alternative would rebuild approximately 10 miles of the existing highway and construct approximately 4 miles of new alignment skirting Cooper Landing to the south. Where construction is outside the existing highway right-of-way, resource habitat loss will occur.

The Cooper Creek Alternative would result in the loss of approximately 204 acres of moose habitat, or 1 percent of the total moose habitat in the project area (Table 3.10-4). A small portion (2 acres) of this loss is considered high-quality moose habitat. An additional 92 acres of moose habitat could be directly impacted during construction from staging areas and disposal sites; however, these impacts would be temporary and could result in improved moose forage in these areas. Given the negligible impact to moose habitat, the impact to subsistence uses in regard to moose habitat would also be negligible. A detailed discussion of impacts to moose populations and habitat from the Cooper Creek Alternative is included in Section 3.22.4.3 of Wildlife.

The Cooper Creek Alternative would require replacement of two bridges, Cooper Landing Bridge and Schooner Bend Bridge, and construction of a new bridge over Cooper Creek. However, the Cooper Creek Bridge would be a clear-span design and would not involve in-stream construction. For replacement bridges, no permanent impacts would be expected because construction would be in almost the same locations and similar sizes as the existing bridges and highway. Potential impacts to fish habitat would be negligible and temporary and would have a negligible impact on subsistence uses. A detailed discussion of impacts to fish populations and habitat from the Cooper Creek Alternative is included in Section 3.21.2.3 (Fish and Essential Fish Habitat). As impacts to fish habitat and populations from the Cooper Creek Alternative are anticipated to be negligible, the impact on subsistence uses in regard to fish habitat and population would also likely be negligible.

Changes in Resource Availability due to Resource Migration Pattern or Distribution. The impacts to resource availability due to resource migration pattern or distribution under the Cooper Creek Alternative are the same as those discussed above in Section 3.10.2.2.

Physical or Legal Barriers to Accessing Resources. Impacts to subsistence resources and uses due to physical or legal barriers under the Cooper Creek Alternative are the same as those discussed above in Section 3.10.2.2.

Construction Impacts

Construction impacts for all build alternatives, as related to subsistence resources, are addressed in Section 3.10.2.2. These impacts include temporary changes to access, reduced habitat availability, and displacement to resources due to increased noise and activity.

Mitigation

No mitigation measures specific to the Cooper Creek Alternative are proposed. Mitigation measures that would address potential subsistence impacts as they relate to all build alternatives are discussed in Section 3.10.2.2. Permit stipulations and recommendations for fish and wildlife resources will detail construction techniques and timing of construction activities to minimize the impacts (see Sections 3.21 and 3.22, respectively).

3.10.2.4 G South Alternative

Direct and Indirect Impacts

Changes in Resources, Resource Habitat, or Competition for Resources. The G South Alternative would straighten and widen approximately 8 miles of the existing highway corridor along both ends of the project area, and construct approximately 6 miles for a new alignment skirting north of Cooper Landing and the Kenai River between existing MP 46.3 and MP 51.6. As stated above, where construction is outside the existing highway right-of-way, resource habitat loss would occur.

The alternative crosses currently unaffected wildlife habitat areas, including the lower Juneau Creek delta area. The G South Alternative would result in the loss of approximately 216 acres of moose habitat, or 1 percent of the total moose habitat in the project area (Table 3.10-4). A portion of this loss is considered high-quality moose habitat, including a large logged area east of Juneau Creek and an area near Bean Creek where USFS conducted a hazardous fuels reduction project. Both new and existing highway segments cross areas of predicted use for wildlife such as moose. An additional 114 acres of moose habitat could be directly impacted during construction from staging areas and disposal sites; however, these impacts would be temporary and could result in improved moose forage in these areas. A detailed discussion of impacts to moose populations and habitat from the G South Alternative is included in Section 3.22.4.4 of Wildlife. Given the negligible impact to wildlife habitat, the impact to subsistence uses in regard to wildlife populations and habitat would also be negligible.

The G South Alternative would require replacement of one bridge over the Kenai River and construction of two new bridges, one over lower Juneau Creek and one over the Kenai River. The Juneau Creek Bridge would be a clear-span design and would not involve in-stream construction, so no impacts to fish populations or habitat are anticipated. Construction of a new bridge across the Kenai River would permanently change fish habitat as a result of in-stream construction, altering flows around bridge piers and shadowing from bridge structures. However, this impact is expected to be minimal to resident fish species. The existing Schooner Bend Bridge would be replaced, but no permanent impact to fish populations and habitat would be expected, because the new bridge would be in nearly the same location and would be of similar

size and configuration. Potential impacts to fish habitat during reconstruction of the bridges under the G South Alternative would be negligible and temporary, and would have negligible impact on subsistence uses. A detailed discussion of impacts to fish populations and habitat from the G South Alternative is included in Section 3.21.2.4 of Fish and Essential Fish Habitat. As impacts to fish habitat and populations from the G South Alternative are anticipated to be negligible, the impacts on subsistence uses in regards to fish habitat and population would also be negligible.

A new trailhead would be built where the alignment intersects the Bean Creek Trail. The construction of new trailhead with parking would provide a new access point for the Bean Creek Trail, which potentially could increase the number of trail users and, therefore, increase competition for subsistence resources on adjacent Federal public lands (USFS).

Changes in Resource Availability due to Resource Migration Pattern or Distribution. The impacts to resource availability due to resource migration pattern or distribution under the G South Alternative are the same as those discussed above in Section 3.10.2.2.

Physical or Legal Barriers to Accessing Resources. Impacts to subsistence resources and uses due to physical or legal barriers under the G South Alternative are the same as those discussed above in Section 3.10.2.2.

Construction Impacts

Construction impacts for all build alternatives, as related to subsistence resources, are addressed in Section 3.10.2.2. These impacts include temporary changes to access, reduced habitat availability, and displacement to resources due to increased noise and activity.

Mitigation

No mitigation measures specific to the G South Alternative are proposed. Mitigation measures that would address potential subsistence impacts as they relate to all build alternatives are discussed in Section 3.10.2.2. Permit stipulations and recommendations for fish and wildlife resources will detail construction techniques and timing of construction activities to minimize the impacts (see Sections 3.21.2.2 and 3.22, respectively).

3.10.2.5 Juneau Creek and Juneau Creek Variant Alternatives

Direct and Indirect Impacts

Changes in Resources, Resource Habitat, or Competition for Resources. The Juneau Creek Alternative would straighten and widen approximately 4 miles of the existing highway at both ends of the project area, with approximately 10 miles of new alignment north of the existing roadway between existing MP 46.3 and 55 skirting north of Cooper Landing. The Juneau Creek Variant Alternative would straighten and widen approximately 5 miles of the existing highway at both ends of the project area, with approximately 9 miles of new alignment skirting north of Cooper Landing. An overpass or underpass would be provided to accommodate logging trucks on two USFS roads located west of Juneau Creek; however, no connections between the highway and these roads would be provided.

The Juneau Creek alternatives would not replace any existing bridges, but would construct a new bridge over Juneau Creek. The Juneau Creek Bridge crossing is a clear-span design and would not result in any in-stream construction, so no impacts to fish populations or habitat are

anticipated. As impacts to fish habitat and populations from the Juneau Creek alternatives are anticipated to be negligible, the impacts on subsistence uses in regard to fish habitat and population would also be negligible.

The Juneau Creek and Juneau Creek Variant alternatives would affect approximately 277 and 266 acres of moose habitat, respectively, representing approximately 2 percent of the total moose habitat in the project area (Table 3.10-4). A portion of this loss is considered high-quality moose habitat, including several logged areas east and west of Juneau Creek as well as an area near Bean Creek where USFS conducted a hazardous fuels reduction project. A 106-acre wildlife habitat improvement area is north of the proposed Juneau Creek and Juneau Creek Variant alternatives' alignments and would not be affected by these alternatives. Both new and existing highway segments cross areas of predicted use for wildlife such as moose. Construction activities for the Juneau Creek and Juneau Creek Variant alternatives would result in temporary impacts to approximately 119 and 118 acres, respectively, of moose habitat. A detailed discussion of impacts to moose populations and habitat from the Juneau Creek alternatives is included in Section 3.22.4.5. Given the negligible impact to wildlife habitat under these alternatives, the impact to subsistence uses would also be negligible.

Under the Juneau Creek alternatives, a new separated trailhead would be built where the alignment intersects the Resurrection Pass Trail and a pullout parking area would be built near the Bean Creek Trail. The construction of new trailheads would provide new access points for both the Resurrection Pass Trail and the Bean Creek Trail, which potentially could increase the number of trail users and, therefore, increase competition for subsistence resources on adjacent Federal public lands (USFS).

Changes in Resource Availability due to Resource Migration Pattern or Distribution. The impacts to resource availability due to resource migration pattern or distribution under the Juneau Creek alternatives are the same as those discussed above in Section 3.10.2.2.

Physical or Legal Barriers to Accessing Resources. Impacts to subsistence resources and uses due to physical or legal barriers under the Juneau Creek alternatives are the same as those discussed above in Section 3.10.2.2.

Construction Impacts

Impacts to subsistence from construction activities for the Juneau Creek alternatives are similar to those for the build alternatives as discussed in Section 3.10.2.2. Those impacts would primarily be temporary and would include changes to access, reduced habitat availability, and displacement to resources due to increased noise and activity.

Mitigation

No mitigation measures specific to the Juneau Creek or Juneau Creek Variant alternatives are proposed. Mitigation measures that would address potential subsistence impacts as they relate to all build alternatives are discussed in Section 3.10.2.2. Permit stipulations and recommendations for fish and wildlife resources will detail construction techniques and timing of construction activities to minimize the impacts (see Sections 3.21.2.2 and 3.22, respectively).



Map 3.10-1. Subsistence overview map

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