APPENDIX C

Essential Fish Habitat Assessment

New Seward Highway: Rabbit Creek Road to 36th Avenue Project

Essential Fish Habitat Assessment

DRAFT

Prepared for:

CH2M Hill
and
Alaska Department of Transportation
and Public Facilities

Prepared by:

HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, Alaska 99503

November 2005

Table of Contents

1.0 Introduction

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) defines the term Essential Fish Habitat (EFH) as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

The MSFCMA directs federal action agencies to consult with the National Marine Fisheries Service (NMFS) when any of their activities may have an adverse effect on EFH. According to Section 600.810 of Subpart J of the MSFCMA, adverse effect is "any impact which reduces quality and/or quantity of EFH." This section also notes that "adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, or reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences."

In accordance with the EFH requirements of the MSFCMA, the federal action agency's EFH Assessment presents information about the project, the affected EFH, an analysis of the impacts to the EFH, documentation of the action agency-NMFS consultation process, and the action agency's determination on the effect of the project on the EFH. In addition to the EFH Assessment, an Environmental Impact Statement (EIS) is being prepared for the NSH project in accordance with the National Environmental Policy Act. The consultation over EFH will occur as part of NMFS review of the Draft EIS.

The entire Seward Highway, including the study area, is designated as an interstate highway by the Federal Highway Administration (FHWA). The FHWA is the federal action agency funding this project and is the agency responsible for performing the EFH Assessment, in consultation with NMFS. As the state highway agency that manages Alaska's interstate highways, the Alaska Department of Transportation and Public Facilities is preparing the EIS and EFH Assessment on FHWA's behalf.

2.0 Project Description

2.1 Project Area

The project area extends 7.1 miles along the New Seward Highway from Rabbit Creek Road to 36th Avenue. The project will widen a portion of the NSH (from O'Malley Road to Tudor Road), and will cross Furrow Creek, a tributary of Furrow Creek, the South Fork of Little Campbell Creek [Alaska Department of Fish and Game (ADF&G) stream number 247-60-10340-2018], the North Fork of Little Campbell Creek (ADF&G stream number 247-60-10340-2018-3005), Campbell Creek (ADF&G stream number 247-60-10340), and Fish Creek (ADF&G stream number 247-60-10340). The ADF&G *Catalog of Waters Important to the Spawning, Rearing, and Migration of Anadromous Fishes* (ADF&G 1998) designates the South Fork of Little Campbell Creek, the North Fork of Little Campbell Creek, and Campbell Creek as anadromous fish streams and therefore essential fish habitat. No other EFH has been identified in the project area. Fish Creek supports anadromous fish only in its lowermost reaches.

2.2 Project Description

The Alaska Department of Transportation and Public Facilities (ADOT&PF) is proposing to construct improvements to the New Seward Highway (NSH) corridor between Rabbit Creek Road and 36th Avenue that will provide additional capacity, connectivity, and safety enhancements.

The NSH is a freeway and its efficient operation has a significant effect on transportation capacity and traffic flow. The NSH is a primary north-south traffic carrier for the Anchorage Bowl and its central location provides important transportation functions for southcentral Alaska residents, commercial goods movement, and visitors. Currently, the NSH is a four-lane divided highway, with diamond interchanges at

a spacing of 1 to 1.5 miles and an average daily traffic count ranging from 20,000 to 60,000. During the morning commute period, traffic volumes increase, travel speed reduces, and traffic often diverts to frontage roads as travelers make their way to midtown and downtown employment centers. During evening peak hours, the traffic exiting at ramps often backs up onto the freeway, creating potentially unsafe conditions. The constant stop-and-start congested traffic flow common during peak periods is a situation that jeopardizes the safety of travelers.

ADOT&PF is seeking to provide additional corridor capacity, improve system connectivity, enhance intermodal transportation, and upgrade design features to current standards. The ADOT&PF is considering three alternative actions in the EIS: the No-Build Alternative and two build alternatives (Build Alternatives 1 and 2).

2.3 Proposed Action

The proposed action has not yet been identified. It will be either one of the build alternatives, or no action. The build alternatives are identical between Dimond Boulevard and Dowling Road—the segment that crosses both the North and South Forks of Little Campbell Creek. The NSH crosses Campbell Creek between Dowling Road and Tudor Road, immediately north of International Airport Road. The build alternatives differ in this area. Actions described below for other project segments have limited relevance to EFH, but are presented to show the context of the EFH-related activities.

2.3.1 No-Build Alternative

The No-Build Alternative would maintain the existing four-lane divided highway from Rabbit Creek Road to 36th Avenue. No improvements to the mainline, interchanges, or frontage roads would be performed.

2.3.2 Build Alternative 1

This build alternative would involve the expansion of NSH with grade separations and Tudor Road interchange improvements.

- **Rabbit Creek Road to O'Malley Road** – The improvements would consist of pedestrian and bicycle enhancements.

- **O'Malley Road to Dimond Boulevard** – The NSH would be widened from the current four lanes to six lanes. The west frontage road would be extended south from Dimond Boulevard to O'Malley Road. Both the east and west frontage roads would include adjacent pathways. The O'Malley Road interchange improvements would include widening the southbound off ramp. A new half-diamond interchange would be constructed at 92nd Avenue. The NSH would bridge a new segment of 92nd Avenue, which would also be extended west to Old Seward Highway.

- **Dimond Boulevard to Dowling Road** – The widened NSH mainline would continue along with the adjacent pathways along the frontage roads. The Dimond Boulevard interchange would undergo ramp and channelization upgrades and replacement of the bridge. The west side ramp intersection would be realigned to the east to provide continuity to Homer Drive (the west frontage road). On the east side, Sandlewood Place would be extended north to Lore Road, to provide a connection to Brayton Drive (the east frontage road). New grade separations would be constructed at 76th and 68th Avenues and those roads would be extended under the NSH. A new half-diamond interchange would connect 76th Avenue with the NSH.

- **Dowling Road to Tudor Road** – The widened NSH mainline would continue and pathways would be constructed along the length of the segment. Ramps would be reconstructed at the Dowling Road interchange to accommodate the wider mainline. A grade separation would allow International Airport Road (IAR) to be extended from Homer Drive to Brayton Drive, without an interchange with the NSH. Bridges longer and higher than the existing bridges over Campbell Creek would be constructed for the mainline and frontage roads.

- **Tudor Road to 36th Avenue** – A new separated pathway would be constructed on the east side of the NSH. The two options being considered for the Tudor Road interchange design include: (1) upgrading the existing diamond interchange to provide dual left-turn lanes on Tudor Road serving the westbound-to-southbound traffic; and (2) constructing a loop ramp in the northwest quadrant of the interchange to serve westbound-to-southbound traffic.

2.3.3 Build Alternative 2

This build alternative involves the freeway expansion with grade separations and an interchange at IAR. Improvements between Rabbit Creek Road and Dowling Road would be the same as for Build Alternative 1.

- **Dowling Road to Tudor Road** – The NSH mainline would be widened from the existing four lanes to six lanes. The Dowling Road interchange modifications would include removal of the northern entrance and exit ramps. A new diamond interchange would be constructed at IAR. The NSH would be raised over IAR on bridges, and IAR would be extended east to meet Brayton Drive. The IAR bridge over Campbell Creek would be reconstructed to provide more road width. The existing NSH Campbell Creek bridges would be replaced with longer and higher bridges.

- **Tudor Road to 36th Avenue** – The NSH mainline and pathway improvements would be the same as for Build Alternative 1. Two options are being studied for use at the Tudor Road interchange: (1) removal of the southern ramps joining Tudor Road to the NSH to accommodate the IAR interchange; and (2) construction of hook ramps in the northeast quadrant of the interchange to serve NSH traffic northbound to Tudor Road and Tudor Road traffic turning to travel north on the NSH.

3.0 EFH Species

According to the ADF&G, three streams within the project area support anadromous fish: Campbell Creek, South Fork of Little Campbell Creek, and North Fork of Little Campbell Creek. Fish Creek has a small segment in its lower reach that supports anadromous fish, and Dolly Varden use the creek upstream of the long culverted segment crossed by the NSH; it does not support anadromous fish within the project area. Consultation with NMFS and ADF&G established that there is EFH for the following salmon species in the project area: Chinook salmon *(Oncorhynchus tshawytscha)*, coho salmon *(Oncorhynchus kisutch)*, pink salmon *(Oncorhynchus gorbuscha)*, sockeye salmon *(Oncorhynchus nerka)*, Dolly Varden char *(Salvalinus malma)*, and rainbow trout *(Oncorhynchus mykiss)*. The populations are predominately natural and are augmented by planted stock.

Chinook Salmon. Chinook salmon generally enter freshwater streams in southcentral Alaska from May through July. Chinook tend to spawn from July to September. They may spawn immediately above the tidal limit although some go upstream as much as 600 miles. Eggs hatch in late winter or early spring and juveniles typically remain in fresh water for at least one year before migrating to the ocean in the

springtime. Chinook salmon spend one to six years at sea before they return to freshwater streams to spawn (NPFMC 1998).

Coho Salmon. Coho salmon enter spawning streams from July to November, usually during periods of high runoff. Adults hold in pools until they ripen, then move onto spawning grounds. The eggs develop during the winter, hatch in early spring, and the embryos remain in the gravel utilizing the egg yolk until they emerge in May or June. The emergent fry occupy shallow stream margins and, as they grow, establish territories which they defend from other salmonids. They live in ponds, lakes, and pools in streams and rivers, usually among submerged woody debris.

Pink Salmon. Pink salmon, also known as "humpback" or "humpy", is the smallest of the Pacific salmon. Adult pink salmon enter Alaska spawning streams between late June and mid-October. The eggs generally hatch during early to mid-winter. The young fry feed on the attached yolk, continuing to grow and develop until late winter or spring, when they migrate downstream into salt water. Pink salmon mature in two years, making even- and odd-year populations essentially unrelated.

Sockeye Salmon. Sockeye salmon, often referred to as "red" salmon, return to their respective spawning streams from late spring to mid-summer. Spawning usually occurs in streams and associated lake systems. Eggs hatch during winter, and the fry feed off the yolk sacs until early spring. At this time they emerge from the gravel and move into rearing areas. Sockeye salmon may spend up to four years in freshwater before migrating to sea. After spending one to four years in the ocean, sockeye salmon return to their natal streams to spawn.

Dolly Varden. Dolly Varden char have multiple life history forms including resident, freshwater migratory, and anadromous forms. Resident and anadromous forms may move to spawning streams as early as late spring or early summer, and usually spawn in October. Juveniles of anadromous stocks may rear in freshwater for two to four years. In autumn, juveniles move into small tributaries where they remain throughout the winter (Aquatic Habitat Management Handbook 2001).

Rainbow Trout. Rainbow trout are generally spring spawners. These resident fish spawn in smaller tributaries of their rivers from March to August, but mainly mid-April to late June. Eggs usually hatch in approximately four to seven weeks and alevins take an additional three to seven days to absorb the yolk before becoming free swimming. Fry emerge from the gravel from mid-June to mid-August and move into rearing areas. The habitat of stream-dwelling rainbows is usually shallow rivers with moderate flow and gravel bottoms of the pool-riffle type. Rainbow trout generally feed on various invertebrates, including plankton, larger crustaceans, insects, snails, and leeches; other fishes; and fish eggs.

4.0 EFH Habitat Description

4.1 EFH in South Fork of Little Campbell Creek

The South Fork of Little Campbell Creek is a highly modified water body within the project area, passing under the existing highway and frontage roads in a series of three culverts. The creek passes through highly urbanized areas and is affected by the storm drainage systems. The South Fork provides spawning and rearing habitat for coho, Dolly Varden, and rainbow trout and rearing habitat for chinook (Seaberg 2003).

Directly upstream of the NSH, the creek passes between two stormwater retention ponds and parallels Brayton Drive for a short distance. The culverts appear to be in good shape and allow the water to pass

unimpeded at low flows. Throughout the project corridor, the stream is channelized. Upstream, it has a small cobble substrate. The section of stream that parallels the frontage road upstream has a medium gravel and sandy silt substrate.

4.2 EFH in North Fork of Little Campbell Creek

The North Fork provides habitat to coho, chinook, Dolly Varden, and rainbow trout in the NSH project area. Both Dolly Varden and rainbow trout spawn upstream from the NSH. Chinook and coho utilize the habitat for rearing. This branch runs mainly in open channels from its origin in Far North Bicentennial Park. Long culverts, channelization, and constriction into a narrow corridor are existing detriments to the natural functions of the creek. Recent projects affecting the creek have employed stringent measures to protect creek habitat. The creek closely parallels Brayton Drive east of the highway, then passes under the frontage roads, the mainline, and a driveway in a series of culverts before becoming open channel downstream.

4.3 EFH in Campbell Creek

Campbell Creek is the largest creek in the project area, and one of the largest and most intact creeks in Anchorage. At the NSH, the channel averages 39 ft in width and has a silt, sand, and medium gravel substrate. On the east side of the NSH along the banks of Campbell Creek, small trails run down perpendicular to the creek to the water's edge. Parallel to the creek, pedestrian and bike traffic have caused erosion and loss of cover along the bank and in the riparian area, including under the bridges. For much of its length, Campbell Creek lies within a greenbelt that provides a relatively unfragmented riparian corridor. Considerable community effort has been directed toward protecting and restoring Campbell Creek in the past decade, with the primary focus on enhancing fish habitat.

Campbell Creek provides excellent spawning and rearing habitat for the anadromous species mentioned above and for the resident Dolly Varden and rainbow trout, particularly in the slow-moving waters of the side channels present at the NSH crossing. The fish also overwinter in the gravel, banks, and instream cover of the creek. Adult coho, chinook, and sockeye salmon migrate past where the NSH crosses Campbell Creek and spawn in the upper reaches. Escapement estimates for Campbell Creek during 2003 were 745 chinook salmon (Bosch 2004). Adult chinook salmon were observed in Campbell Creek during the fish habitat surveys conducted in July 2004. The adults were observed in a scour pool upstream of the existing Campbell Creek bridges.

5.0 Consultation

On November 3, 1999, the ADOT&PF and NMFS issued an agreement on EFH consultations. It states that, if the ADOT&PF finds that a project may impact EFH, it will initiate discussions with NMFS and develop preliminary conservation measures to mitigate potential impacts to EFH and present them in an EFH Assessment. The NMFS may provide additional EFH conservation recommendations, if necessary, in response to the assessment. ADOT&PF must respond in writing within 30 days to NMFS' additional conservation recommendations, either accepting these recommendations or, if the recommendations are not accepted, reasons for not following the recommendations must be explained. If the ADOT&PF decisions regarding EFH impacts or conservation recommendations are found to be inconsistent with NMFS' policies, additional dispute resolution may occur.

ADOT&PF initiated consultation with NMFS about the NSH project by letter in January 2003. The letter described the project, acknowledged that EFH exists in three of the project-area creeks, solicited comments from NMFS on the project, and invited a NMFS representative to an agency scoping meeting

on January 23, 2003. Brian Lance represented NMFS at the scoping meeting. He supported the comments made by another participant regarding daylighting creeks, the need for long bridges over Campbell Creek, protection of creek corridors, and water quality. NMFS comments were further articulated in its January 27, 2003, letter to ADOT&PF (Kurland 2003). Briefly, the letter referenced the anadromous fish streams crossed by the NSH project, the potential for an adverse effect to EFH, and the opportunity to incorporate measures to mitigate those effects. It requested that NMFS be kept involved in the early design phase of all stream crossings. It stated a goal of that early involvement was "design of all stream crossings...to improve hydrologic capacity, allowing streams to reconnect with the flood plain (i.e., adequate bridge spans), with a resultant improvement in anadromous fish habitat."

NMFS will review the DEIS and this Draft EFH Assessment and will make any additional conservation recommendations it considers necessary. The outcome of this consultation will be documented in the final EFH Assessment.

6.0 Proposed Conservation Measures

The following proposed conservation measures would to be used to avoid and minimize adverse impacts to EFH under any of the build alternatives or options:

- ADOT&PF would obtain all necessary permits and agency approvals, and abide by the terms and conditions of each. The applicable permits and approvals anticipated at this time are as follows: U.S. Army Corps of Engineers Section 404 Permit, Alaska Department of Natural Resources (ADNR) Office of Habitat Management and Permitting Fish Habitat Permits pursuant to Title 41, Alaska Department of Environmental Conservation Clean Water Act Section 401 Certification, ADNR Office of Project Management and Permitting Alaska Coastal Management Program Consistency Determination, and Municipality of Anchorage Flood Hazard Permits.
- ADOT&PF would ensure all environmental commitments made during the NEPA and permitting processes were incorporated into construction contracts. ADOT&PF would monitor construction activities to ensure compliance with these commitments.
- During design, each of the culverts that conveys the South and North Forks of Little Campbell Creek through the corridor would be analyzed with respect to its hydraulic characteristics, fish passage, and the changes that would be needed to accommodate the project footprint. Any changes ADOT&PF proposed to the existing culverts would comply with: (1) the Memorandum of Agreement between ADOT&PF and ADF&G on culverts and fish passage (ADOT&PF and ADF&G 2001); (2) ADOT&PF drainage design standards; and (3) the Anchorage floodplain program, which requires that the project proponent demonstrate that its changes to culverts or streams would not cause any rise in the 100-year flood elevation. Any culvert crossing would match the elevation of the natural creek. Gravel and streambed material would be used in the bottoms of fish-passage culverts.
- The Campbell Creek bridges over the NSH would be approximately 140 feet long. Existing embankment under those bridges would be removed to provide floodplain benefits. Instream work might be necessary to restore the creek banks to a condition more natural and stable than the existing condition.
- Construction would be timed to minimize adverse effects to salmon during critical life stages. Timing for all instream work would comply with work windows specified in the Fish Habitat Permits. In the Anchorage area, in-water construction generally occurs between mid-May and mid-July; this timing window might be adjusted during permit acquisition.
- At no time would the construction activities be allowed to cause a migration barrier for adult and juvenile salmonids except during installation or removal of temporary creek diversions.

- Instream work would be minimized, and would be subject to stringent measures to protect fish and water quality. Work areas would be isolated from flowing water, and turbid waters would be treated before return to the creek. Fish would be removed from work areas before construction.
- The ADOT&PF would aim toward no net loss of EFH habitat values. To accomplish this, ADOT&PF would explore use of measures to minimize stream channel and bank impacts and stream restoration options during design and permitting. ADOT&PF would discuss information developed during design with regulatory agencies to determine the feasibility and desirability of specific minimization or restoration measures.
- ADOT&PF would design highway drainage systems to treat, infiltrate, and detain runoff from the highway surfaces to both minimize the conveyance of pollutants to fish-bearing streams and to minimize the rapid conveyance of water to streams that is typically associated with storm drain systems.
- ADOT&PF would require construction contractors to use contaminant-free embankment and surface materials in construction.
- All construction staging, fueling, and servicing operations would be kept a minimum of 100 feet from the EFH creeks.
- ADOT&PF would require the construction contractor to stabilize all temporary disturbance areas against erosion immediately following construction, with particular attention to slopes with the potential to impact the EFH creeks. Erodible areas would be revegetated with plant species indigenous to southcentral Alaska.
- The construction contract would require the contractors to comply with the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges from Construction Activities. This would require the construction contractor to prepare a Stormwater Pollution Prevention Plan (SWPPP) and comply with that plan. ADOT&PF's contract with the construction contractor would require ADOT&PF review and approval of the SWPPP before construction begins, and approval as the SWPPP was altered to reflect changing conditions. ADOT&PF would monitor construction activities for compliance with the SWPPP. The SWPPP would specify best management practices (BMPs) that would be used during construction to prevent erosion and delivery of pollutants to the creeks. BMPs would include installing temporary erosion control measures such as wood excelsior mats, straw bales, and silt fencing until soils were permanently stabilized. Other measures might include installing diversion dikes to channel rain water away from the disturbed soils, and using structures like check dams and sedimentation ponds to capture sediments. The SWPPP would specify a project construction sequence that would minimize the extent of exposed soil at any given time. It would also address appropriate storage and handling of petroleum products, hazardous materials, and other potential pollutants.

7.0 Analysis of Effects to EFH

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

7.1 Effects to EFH in the South Fork of Little Campbell Creek

Expansion of the NSH mainline, ramp and bridge enlargements at Dimond Boulevard, and additional project features would produce additional stormwater runoff volume due to an increase in impervious surface area. There would be an increase in flow to the five stormwater outfalls currently flowing into the South Fork. Most of the additional water generated would likely be taken up by the vegetated ditches along the NSH. With the addition of grassy swales and other natural filtration measures, impacts would not be substantial. Effects to EFH would include minor changes in water quality and substrate by the

addition of suspended solids, phosphorus, nitrogen, road salts, metals, and an increase in biological oxygen demand.

Instream work has the greatest potential for adverse water quality effects to creeks during construction, and such work might be necessary for culvert removal, installation, or modification, or for channel reconstruction. The conservation measures for fish protection and for erosion and sediment containment would provide an adequate level of protection during construction, so any adverse effects to EFH during construction would be minimal.

Modifications to the South Fork channel and banks would not be defined until project design. ADOT&PF would strive to improve the overall quality of habitat in the creek through restoration associated with project construction. It is possible that a segment of the South Fork would need to be realigned to allow for a perpendicular culvert crossing, widening of the mainline, and addition of pathways. Realigning the segment that now parallels Brayton Drive would decrease the stream's exposure to snow and gravel accumulation due to road plowing and might decrease the stream's exposure to untreated runoff.

The existing culverts conveying the South Fork across the frontage roads and mainline would likely need to be modified to accommodate the highway improvements. If modified culverts could not meet the fish passage or other design criteria, they would be replaced, with the likely result of an improvement to fish passage.

Depending on design and the success of any creek reconstruction, the net effects of the project on the South Fork of Little Campbell Creek EFH could be minimally adverse to moderately beneficial.

7.2 Effects to EFH in the North Fork of Little Campbell Creek

Expansion of the NSH mainline and extension of 68th Avenue would produce additional stormwater runoff volume due to an increase in impervious surface area within the North Fork watershed. The added stormwater would increase flow to the six outfalls now flowing into the creek and the flows would be concentrated during storm events. Grassy swales and vegetated ditches would provide filtration of pollutants in the stormwater. Minor changes in water quality and substrate would include the addition of suspended solids, phosphorus, nitrogen, road salts, metals, and an increase in biological oxygen demand. The project's effects on the North Fork water quality and flow would not likely be substantial.

Construction-period effects on fish and water quality would be the same as described above.

The project effects on the North Fork channel and fish passage characteristics of the culverts would be the same as described for the South Fork.

Depending on design and the success of any creek reconstruction, the net effects of the project on the North Fork of Little Campbell Creek EFH could be minimally adverse to moderately beneficial.

7.3 Effects to EFH in Campbell Creek

Expansion of the NSH mainline, the new IAR interchange, and additional pavement and embankment at the Tudor Road interchange would produce additional stormwater runoff volume due to an increase in impervious surface area. Portions of Campbell Creek have adjacent upland and wetland areas which would provide some attenuation and infiltration of stormwater and associated pollutants. Stormwater generated from the NSH and IAR improvements would generally flow into vegetated ditches along the NSH. Additional methods to protect water quality could include depressed vegetated medians, detention and retention basins, and constructed wetlands. Pollutants would be removed through sedimentation,

filtration, infiltration, adsorption, biological uptake, biological conversion, and degradation. Although these measures would be taken, minor adverse impacts to the EFH would result. The project would change Campbell Creek's water quality and substrate by the addition of suspended solids, phosphorus, nitrogen, road salts, metals, and an increase in biological oxygen demand. An increase in suspended solids could potentially reduce water quality, and if water quality protection measures were not successful, high turbidity could displace or harm fish and reduce the light available to instream plants.

Construction-period effects on fish and water quality would be the same as described above. There is higher potential for accidental degradation of water quality during construction near and in the creek. Instream work for bridge installation, removal, or reconstruction would be minimal unless bridge piers were located in the creek. Instream work would more likely be needed for channel habitat improvements where the existing bridges were removed.

Flood mapping indicates that the existing NSH bridges constrain the flow of Campbell Creek during large floods. Use of longer and higher bridges and removal of existing embankment to create a floodplain might reduce that constriction. Longer bridges would also allow for bridge abutments to be set further back thereby reducing erosion and undermining and increasing bank stability. Improved pedestrian paths under the bridges would reduce foot traffic along stream banks. These measures would improve fish habitat.

Overall, the project is likely to have a short-term and minor adverse effect on creek water quality, and a moderately positive effect on EFH and managed species in Campbell Creek.

8.0 Conclusion

The New Seward Highway Project mainline expansion and related improvements would satisfy future travel demands and mobility needs. ADF&G documents EFH for six species of salmon and trout within three creeks in the project area. Biologists have analyzed how that EFH would potentially be affected by the project, and proposed conservation measures. All NSH improvements and expansion involving creeks supporting EFH would be designed to allow for continued or improved fish passage, and implementation of proposed conservation measures would ensure that the adverse effects to EFH from the project would be no more than minimal. The project is likely to result in overall EFH improvements.

9.0 References

Alaska Department of Fish and Game (ADF&G), Habitat Protection Division. 1998. Atlas and Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes.

Alaska Department of Transportation and Public Facilities and Alaska Department of Fish and Game. (ADOT&PF and ADF&G). 2001. Memorandum of Agreement between Alaska Department of Fish and Game and Alaska Department of Transportation and Public Facilities for the Design, Permitting, and Construction of Culverts for Fish Passage.

Bosch, Dan. 2004. Alaska Department of Fish and Game. Sport Fish Division.

Groot, C. and Margolis, L. 1991. *Pacific Salmon Life Histories.* University of British Columbia, Vancouver.

Kurland, J.M. January 27, 2003. Letter from Kurland, Assistant Regional Administrator for Habitat Conservation, NMFS, to Jim Childers, Project Manager, ADOT&PF.

Municipality of Anchorage (MOA) Planning Department. Stream Protection Setbacks, Channel alteration including culverts AMC 21.45.210

North Pacific Fishery Management Council (NPFMC). 1998. Essential Fish Habitat Assessment Report for the Salmon Fisheries in the EEZ off the Coast of Alaska. Prepared by the Alaska Department of Fish and Game, National Marine Fisheries Service, and North Pacific Fishery Management Council, Anchorage, AK.

Scott W.B, and E.J. Crossman. 1973. *Freshwater Fishes of Canada.* Fisheries Research Board of Canada, Ottawa.

Seaberg, Stewart. 2003. Telephone conversation between Amy Hansen, HDR Alaska Biologist, and Stewart Seaberg, Biologist, Alaska Department of Fish and Game, Habitat and Restoration Division.

United States Forest Service (USFS). 2001. Aquatic Habitat Management Handbook, Forest Service Handbook (FSH) 2090.21, Chapter 30.