APPENDIX P

ANADROMOUS AND RESIDENT FISH STREAMS TECHNICAL REPORT

JUNEAU ACCESS IMPROVEMENTS
SUPPLEMENTAL DRAFT
ENVIRONMENTAL IMPACT STATEMENT

STATE PROJECT NUMBER: 71100
FEDERAL PROJECT NUMBER: STP-000S (131)

Prepared for

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Errata Sheet
Anadromous and Resident Fish Streams Technical Report
October 2004

1 Page 4-1, Section 4.2, 1st paragraph, 2nd sentence correction: "Three of the anadromous rivers, the Antler, Berners/Lace, and Katzehin rivers, would require multi-span bridges with in stream piers."

2. Page 4-3, Section. 4.3, 1st paragraph, 2nd sentence correction: "As with Alternative 2, the Katzehin River would require a multi-span bridge with in-stream piers, and the remaining four anadromous streams would be crossed with single-span bridges with no in-stream piers."

3. Page 4-4, Sec. 4.6, 1st paragraph, 2nd sentence correction: "Alternative 3 would cross 10 streams on the west side and one stream on the east side."

4. Page 4-7, Table 4-2, West Lynn Canal Stream Crossings by Structure.
Correction to 1st column, 4th row: "4W, 4AW, 14W, 15W, 19W (Ludaseska Creek)."

4. Figure 3-1, title correction: "Streams in the Project Area".

5. Figure 3-1, stream 51E name correction: "Dayebas Creek".

Note: DOT&PF has committed to crossing anadromous streams less than 50 feet in width with a single span above the creek, resulting in no in-stream piers. For multi-span bridges, the approximate pier spacing would be 130 feet.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLES

FIGURES

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
Act	Magnuson-Stevens Fishery Conservation and Management Act
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AHMU	Aquatic Habitat Management Units
AMHS	Alaska Marine Highway System
Catalog	Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fish
CFR	Code of Federal Regulations
DEIS	Draft Environmental Impact Statement
DOT&PF	Alaska Department of Transportation and Public Facilities
EFH	Essential Fish Habitat
FVF	Fast Vehicle Ferry
GIS	Geographic Information System
GPS	Global Positioning System
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
OHMP	Office of Habitat Management and Permitting
SDEIS	Supplemental Draft Environmental Impact Statement
U.S.	United States
URS	URS Corporation
USDA	United States Department of Agriculture

EXECUTIVE SUMMARY

This technical report presents the results of the 1994 stream surveys conducted by FPE Roen Engineers, Inc. along the proposed Juneau Access Improvements alternative highway routes within the Lynn Canal corridor, previously presented in the 1994 Anadromous Fish Stream and Habitat Report. Updates to the 1994 stream survey data, affected environment description, environmental consequences analysis, and discussion on resident fish populations have been provided by URS Corporation (URS). The 1994 study described the existing morphology of the stream systems and the existing and potential habitat for anadromous species, determined which anadromous species live in and use the stream systems within the proposed project area, and discussed the effects of the project alternatives to anadromous fish habitat. The 2003 update includes new information on anadromous streams and an expanded discussion of the environmental consequences of the alternatives to be brought forward for analysis in the 2004 Supplemental Draft Environmental Impact Statement (SDEIS). This information was obtained through internet and literature searches; new surveys were not conducted.

Results of the 1994 stream surveys and 2003 updates indicate that approximately 90 streams within the Lynn Canal corridor could be affected by the proposed project alternatives. Twenty-five of these surveyed streams in the project area were determined to support populations of anadromous fish (13 on the east side of Lynn Canal and 12 on the west side). These 25 streams also likely support resident fish populations. Anadromous fish are species that begin their lives in freshwater habitats, migrate to marine habitats where they mature, and then return to freshwater to spawn. Resident fish remain in the streams to spawn and breed, spending their entire life cycle in fresh water. This technical report focuses on the effects of the project alternatives on these anadromous and resident fish streams in the project area. A separate Essential Fish Habitat (EFH) Assessment (appended to the SDEIS), considers the impacts of proposed construction and operations on both marine and anadromous fish habitat, as required by the Magnuson-Stevens Fishery Conservation and Management Act (Act).

Potential secondary (indirect) and cumulative effects of the proposed project alternatives on fish species and habitat are defined and analyzed in the Indirect and Cumulative Effects Analysis Report (appended to the SDEIS).

All of the proposed alternatives could have varying effects on anadromous and resident fish streams. Alternatives 1, 4A, and 4C would likely have similar effects, with impacts limited to possible disturbance due to continued use of existing facilities (Alternative 1) and expanded use of existing facilities (Alternatives 4A and 4C). No effects on anadromous or resident fish streams are identified from proposed terminal modifications at Auke Bay Ferry Terminal under Alternatives 4A and 4C.

Alternatives 2, 2A, 2B, 2C, 3, 4B, and 4D would have varying effects on anadromous and resident fish streams from noise and vibration and increased turbidity during construction of stream crossing structures. These effects should be temporary and reversible, occurring only during the construction process. Multi-span bridge piers and culverts, and single-span bridge abutments, would not impede fish passage once in place near or within the streams and rivers. Ferry terminal construction or modification of existing terminals is associated with all alternatives except Alternative 2C. Ferry terminal construction, however, is not expected to impact anadromous fish streams. Details concerning impacts of ferry terminal construction and operations on fish habitat are discussed in the EFH Assessment.

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1.0 PROJECT DESCRIPTIONS AND ALTERNATIVES

1.1 Project Purpose and Need

The purpose of and need for the Juneau Access Improvements Project is to provide improved surface transportation to and from Juneau within the Lynn Canal corridor that will:

- Provide the capacity to meet the transportation demand in the corridor
- Provide flexibility and improve opportunity for travel
- Reduce travel time between Lynn Canal communities
- Reduce state costs for transportation in the corridor
- Reduce user costs for transportation in the corridor

1.2 Project Description

Lynn Canal, located approximately 25 miles north of Juneau, is the waterway that connects Juneau with the cities of Haines and Skagway via the Alaska Marine Highway System (AMHS). At present there is no roadway connecting these three cities. The Glacier Highway originates in Juneau and ends at Echo Cove, approximately 40.5 miles to the northwest.

As required by the National Environmental Policy Act (NEPA), the Supplemental Draft Environmental Impact Statement (SDEIS) for the Juneau Access Improvements Project considers the following reasonable alternatives:

Alternative 1 – No Action Alternative – The No Action Alternative includes a continuation of mainline AMHS service in Lynn Canal as well as the operation of the fast vehicle ferry (FVF) *M/V Fairweather* between Auke Bay and Haines and Auke Bay and Skagway. The *M/V Aurora* would provide shuttle service between Haines and Skagway, beginning as early as 2005.

Alternative 2 (Preferred) – East Lynn Canal Highway with Katzehin Ferry Terminal – This alternative would construct a 68.5-mile-long highway from the end of Glacier Highway at the Echo Cove boat launch area around Berners Bay to Skagway. A ferry terminal would be constructed north of the Katzehin River delta, and operation of the *M/V Aurora* would change to shuttle service between Katzehin and the Lutak Ferry Terminal in Haines. Mainline ferry service would end at Auke Bay, and the existing Haines/Skagway shuttle service would be discontinued. The *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 2A – East Lynn Canal Highway with Berners Bay Shuttles – This alternative would construct a 5.2-mile highway from the end of Glacier Highway at Echo Cove to Sawmill Cove in Berners Bay. Ferry terminals would be constructed at both Sawmill Cove and Slate Cove, and shuttle ferries would operate between the two terminals. A 52.9-mile highway would be constructed between Slate Cove and Skagway. A ferry terminal would be constructed north of the Katzehin River delta, and the *M/V Aurora* would operate between the Katzehin and the Lutak Ferry Terminals. Mainline ferry service would end at Auke Bay, and the existing Haines/Skagway shuttle service would be discontinued. The *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 2B – East Lynn Canal Highway to Katzehin with Shuttles to Haines and Skagway – This alternative would construct a 50.5-mile highway from the end of Glacier Highway at Echo Cove around Berners Bay to Katzehin, construct a ferry terminal at the end of the new highway, and run shuttle ferries to both Skagway and Haines from the Katzehin Ferry Terminal. The Haines to Skagway shuttle service would continue to operate, two new shuttle

ferries would be constructed, and the *M/V Aurora* would be part of the three-vessel system. Mainline AMHS service would end at Auke Bay. The *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 2C – East Lynn Canal Highway with Haines/Skagway Shuttle – This alternative would construct a 68.5-mile highway from the end of Glacier Highway at Echo Cove around Berners Bay to Skagway with the same design features as Alternative 2. The *M/V Aurora* would continue to provide service to Haines. No ferry terminal would be constructed at Katzehin. Mainline ferry service would end at Auke Bay, and the *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 3 – West Lynn Canal Highway – This alternative would extend the Glacier Highway 5.2 miles from Echo Cove to Sawmill Cove in Berners Bay. Ferry terminals would be constructed at Sawmill Cove and William Henry Bay on the west shore of Lynn Canal, and shuttle ferries would operate between the two terminals. A 38.9-mile highway would be constructed between William Henry Bay and Haines with a bridge across the Chilkat River/Inlet connecting to Mud Bay Road. The *M/V Aurora* would continue to operate as a shuttle between Haines and Skagway. Mainline ferry service would end at Auke Bay, and the *M/V Fairweather* would be redeployed on other AMHS routes.

Alternatives 4A through 4D – Marine Options – The four marine alternatives would construct new shuttle ferries to operate in addition to continued mainline service in Lynn Canal. All of the alternatives would include a minimum of two mainline vessel round trips per week, year-round, and continuation of the Haines/Skagway shuttle service provided by the *M/V Aurora*. The *M/V Fairweather* would no longer operate in Lynn Canal. All of these alternatives would require construction of a new double stern berth at Auke Bay.

Alternative 4A – FVF Shuttle Service from Auke Bay – This alternative would construct two FVFs to provide daily summer service from Auke Bay to Haines/Skagway.

Alternative 4B – FVF Shuttle Service from Berners Bay – This alternative would extend the Glacier Highway 5.2 miles from Echo Cove to Sawmill Cove in Berners Bay, where a new ferry terminal would be constructed. Two FVFs would be constructed to provide daily service from Sawmill Cove to Haines/Skagway in the summer and from Auke Bay to Haines/Skagway in the winter.

Alternative 4C – Conventional Monohull Shuttle Service from Auke Bay – This alternative would construct two conventional monohull vessels to provide daily summer service from Auke Bay to Haines/Skagway. In winter, shuttle service to Haines and Skagway would be provided on alternate days.

Alternative 4D – Conventional Monohull Shuttle Service from Berners Bay – This alternative would extend the Glacier Highway 5.2 miles from Echo Cove to Sawmill Cove in Berners Bay, where a ferry terminal would be constructed. Two conventional monohull vessels would be constructed to provide daily service from Sawmill Cove to Haines/Skagway in the summer and alternating day service from Auke Bay to Haines/Skagway in the winter.

1.3 Technical Report Overview

Anadromous fish are species that begin their lives in freshwater habitats, migrate to marine habitats where they mature, and then return to freshwater to spawn. Resident fish remain in streams to spawn and breed, spending their entire life cycle in fresh water. Anadromous waters are protected by the State of Alaska, Department of Natural Resources (ADNR). The ADNR Office of Habitat Management and Permitting (OHMP) requires that permits be obtained for

activities (use or construction) potentially affecting anadromous waters. The OHMP is also concerned with protecting fish passage in both anadromous and resident fish streams. The ADNR OHMP is responsible for reviewing project plans and specifications submitted by permit applicants for proposed uses or activities in anadromous waters. However, ADF&G continues to receive and process anadromous water body nominations and maintains the fish distribution database. ADNR OHMP then initiates the regulation process for adopting the maps depicting anadromous streams and catalogs describing stream locations into state regulations. The Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes (Catalog) and its associated atlas are the media used to accomplish this specification and are adopted as regulation under 11 Alaska Administrative Code (AAC) 195.010. Stream numbers, locations, extent of cataloged habitat, and species utilization of a given stream may change from year to year.

This technical report focuses on direct effects of the project alternatives on anadromous and resident fish streams in the project area. A separate Essential Fish Habitat (EFH) Assessment (appended to the SDEIS), considers the impacts of proposed construction and operations on both marine and anadromous fish habitat as required by the Magnuson-Stevens Fishery Conservation and Management Act (Act). Potential secondary (indirect) and cumulative effects of the proposed project alternatives on fish species and habitat are defined and analyzed in the Indirect and Cumulative Effects Analysis Report (appended to the SDEIS).

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2.0 METHODS

2.1 Studies and Coordination

This technical report presents the results of the 1994 stream surveys conducted by FPE Roen Engineers, Inc., along the proposed Juneau Access Improvements alternative highway routes within the Lynn Canal corridor, as previously presented in the 1994 Anadromous Fish and Stream Habitat Report. Updates to the 1994 report are provided by URS Corporation (URS), and updated methodology is discussed in Section 2.2. The 1994 study described the existing morphology of the stream systems and the existing and potential habitat for anadromous species, determined which anadromous species live in and use the stream systems within the proposed project area, and discussed the effects of the project alternatives in regards to anadromous fishery habitat.

Recommendations and permits regarding the 1994 surveys were provided by ADF&G. Recommendations were also provided by the United States (U.S.) Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS).

The survey area for the 1994 report considered all streams draining into Lynn Canal that could be impacted by each of several proposed alternative highway alignments. These streams are found in the area ranging from Echo Cove north to Skagway on the east side of the canal, and from William Henry Bay to Haines on the west side of the canal.

Each stream was assigned a number based on its location on the map. These numbers were used consistently throughout the study to catalog the streams; the nomenclature is continued in this update and further described in Section 3.0. Locations of the highway crossings were obtained prior to the 1994 field studies from the FPE Roen Engineers, Inc. Reconnaissance Engineering Report, May 1994, and were updated in the summer of 2003 to reflect any changes in alignment.

Stream surveys conducted between June 22 and July 27, 1994, were completed on foot, with use of a marine vessel for base support and transportation. Each stream system was surveyed by walking from the mouth of the stream and heading upstream to the proposed highway-crossing site. Global positioning system (GPS) readings were taken at each crossing site to determine the location of each potential bridge crossing at the stream. Observations in the 1994 report are based on stream morphology, bank vegetation, upland morphology, stream origin, fish habitat, and fish presence. Fish traps were baited with salmon eggs and set at four streams on the east side of Lynn Canal and two on the west side. The traps were located where fish were not observed, but where stream conditions permitted and where habitat appeared to be able to support anadromous or resident fish spawning and/or rearing. All captured fish were identified and returned to the capture site unharmed.

In addition to ground surveys, aerial flights were conducted along the proposed highway alignments during August 1994. These flights resulted in observations of many adult fish spawning within the various streams.

Anadromous streams and species previously cataloged by ADF&G are listed by catalog number and are included in Attachment A, along with a detailed description of each stream and its potential as anadromous fish habitat. Attachment B provides photographs of the individual streams taken during the 1994 survey. New streams and species that were observed within the surveyed streams during 1994, which at that time were not cataloged by ADF&G, were submitted to ADF&G. Eleven streams fell into this category. Tables 3-2, 3-3, and A-1 identify the status of these submissions.

Also, in 2003, ADF&G, ADNR, and NMFS were consulted regarding the applicability of 1994 data and potential for additional stream surveys. At that time it was decided that stream surveys would not be required for the SDEIS.

2.2 Updates to Anadromous Stream Catalog Data

To update the information presented in the 1994 Anadromous Fish and Stream Habitat Report, URS conducted a literature review of publications addressing anadromous stream habitat and species within the project area. Geographic Information Systems (GIS) data from the ADF&G website (ADF&G, 2003a) regarding updates to the Catalog numbers and listing of anadromous species were downloaded into URS' existing Juneau Access Improvements GIS mapping system, and incorporated into this report. The United States Department of Agriculture (USDA) Forest Service 1995 Anadromous Fish Habitat Assessment Report to Congress was reviewed to determine whether the proposed project alternatives comply with the Tongass National Forest management plans. The State of Alaska website yielded life history information on various resident fish populations, and the USDA Forest Service website provided additional information on topography of the project area. When discussing numbers of streams crossed and crossing impacts, URS considered the current (2003) alignment, which differs from the 1997 alignment.

3.0 AFFECTED ENVIRONMENT

The affected environment section of this report describes the anadromous and resident fish streams and the species they support within Lynn Canal. The following report provides information regarding anadromous fish, anadromous fish habitat, and resident fish found within the proposed alignments. Additional life history information for Pacific salmon and eulachon, are provided in the EFH Assessment. Figure 3-1 depicts the project area and the locations of all streams surveyed during the 1994 field effort. Approximately 90 streams lie within the proposed alignments, all of which could be potentially affected by the proposed project alternatives

3.1 Species Description

Anadromous fish species known to occur in the streams that enter Lynn Canal include the following:

- All five species of Pacific salmon – Chinook (*Onocorhynchus tshawytscha*), coho (*O. kisutch*), sockeye (*O. nerka*), chum (*O. keta*), and pink (*O. gorbuschas*);
- Two species of trout – steelhead/rainbow (*O. mykiss*) and cutthroat (*O. clarki*);
- One species of char – Dolly Varden (*Salvelinus malma*);
- Pacific Lamprey (*Entosphenus tridentatus*);
- River Lamprey (*Lampetra ayresi*);
- Round whitefish (*Prosopium cylindraceum*); and
- Eulachon (*Thaleichthys pacificus*).

Depending upon the species, anadromous fish spend from one to several years rearing in freshwater (Chinook, coho, and sockeye salmon; rainbow/steelhead and cutthroat trout; and Dolly Varden) or leave immediately upon emerging from the spawning gravels (chum and pink salmon). Still others move into freshwater with the tides, spawn, and return to saltwater (eulachon). Steelhead trout, a rainbow trout that has spent a portion of its life at sea, commonly spawn more than once, unlike salmon.

Chinook salmon tend to favor large river systems such as the Chilkat River for spawning and rearing, while sockeye salmon seek out river systems that include lakes, such as the Berners, Chilkoot, and Chilkat rivers. Coho salmon will rear in lakes but are usually found in small streams that empty directly into saltwater. In the Lynn Canal area, round whitefish are found only in the Chilkat River system. They are less tolerant of the marine environment than other anadromous species, and during spring and summer they move from freshwater out to nearshore brackish waters to feed, and then move upstream in the fall to spawn, and/or overwinter.

According to Morrow (1980), the following resident fish species can be found within the project area:

- Sculpins (Family: Cottidae)
- Nine-spine Stickleback (*Pungitius pungitius*)
- Three-spine Stickleback (*Gasterosteus aculeatus*)
- Rainbow Trout (*Salmo gairdneri*)

3.2 Characteristics of Anadromous and Resident Fish Streams

Most species of anadromous fish depend on freshwater environments for both the spawning and rearing phases of their lives. Adequate spawning habitat is always required, and depending upon the species, adequate rearing habitat is necessary for successful reproduction. Resident fish remain in the streams and channels year-round and also require adequate spawning and rearing habitat.

3.2.1 Spawning Habitat

For anadromous fish and resident fish such as rainbow trout, adequate spawning habitat consists of a location in a stream where the female fish is able to dig a nest, or "redd," in the substrate and lay her eggs, after which the male fertilizes them. Components of useable spawning habitat include clean, appropriately sized substrate (gravel), well-oxygenated water, and adequate inter-gravel flow to provide the incubating eggs with oxygen and a means to remove metabolic wastes. If sediment or other material clogs the inter-substrate spaces and the water fails to circulate freely, the incubating eggs can die from hypoxia or be poisoned by toxic concentrations of their own metabolic wastes. Available spawning habitat is usually the key indicator of production potential, especially for those anadromous species that do not rear in freshwater, like pink and chum salmon.

Sculpins and sticklebacks spawn in the lower reaches of streams and in upstream areas. Generally, the male selects the nest site. Sculpin nests are found under rocks or logs and usually have sandy bottoms. Stickleback males construct nests using algae or bits of debris. Sometimes nests are located in aquatic vegetation or under rocks. Spawning for sculpins and sticklebacks occurs within the nest, and males remain to guard the nest and fan the eggs until hatching occurs.

3.2.2 Rearing Habitat

Adequate rearing habitat for both anadromous and resident fish consists of a location in the stream where the young fish can safely feed and grow before migrating to saltwater in the case of anadromous fish, or moving within the stream itself for resident fish.

There are several important characteristics of rearing habitat: a source of food, escape cover from predators, a velocity shelter during high flow events, and a living space for fry as they emerge from the gravel that is protected from larger fingerlings. Good rearing habitat can be found in areas with undercut banks, ponds, pools, lakes, and small side tributary streams. The finite amount of food and living space available in any stream, paired with the fact that rearing species usually establish territories and aggressively defend them, means that rearing habitat is often the key indicator of production potential for resident species, and for those anadromous species that do not immediately migrate to saltwater.

3.3 Stream Habitat in Lynn Canal

Stream Categorization – Nearly all of the approximately 90 streams in the Lynn Canal project area were surveyed in 1994. The survey team categorized each of the streams into one of four project-specific classes (Class I, IIA, IIB, or III), depending on observed fish use and potential anadromous habitat. The project stream classifications were based on channel type classifications described in the Channel Type User Guide, Tongass National Forest, Southeast Alaska (USDA Forest Service, 1992) and Aquatic Habitat Management Units (AHMUs) described in the Aquatic Habitat Management Guide (ADF&G, 1986). Channel habitat typing is a method of categorizing stream reaches according to gradient, size, and valley form. Streams that display similar physical characteristics and respond in predictable patterns to natural and

human-caused modifications are grouped together. AHMUs are based on stream class and riparian vegetation, and, when available, land type, soils, and additional stream classification. These two standardized classifications were combined with a general class description, developed by the survey team specifically for the project area, to produce the four project-specific stream classifications:

CLASS I

- Class I streams are used by anadromous fish, and include any streams confirmed as anadromous by ADF&G. Resident fish populations may also be present.

CLASS II

- **CLASS IIA** – Class IIA streams have potential habitat for resident fish. These streams are generally steep, often 6 to 15 percent gradient. This class also includes streams with a gradient of 0 to 5 percent that have a potential for anadromous fish habitat, but where no anadromous fish occur (no fish were observed during the survey). The streams have migration barriers or other habitat features that preclude anadromous fish use. The streams are often tributaries to anadromous streams. Resident populations often occur upstream of migration barriers.
- **CLASS IIB** – Class IIB streams have poor quality fish habitat. These streams may have resident fish, but the population would be limited by the poor quality of the habitat. These streams are generally steep, often having a 6 to 15 percent gradient. The streams are often tributaries to anadromous streams.

CLASS III

- Class III streams are streams with no observed fish populations or habitat but have potential to influence water quality of the downstream aquatic habitat. Class III includes waterfalls and steep mountain runoffs.

A summary of the classifications for surveyed streams is provided in Table 3-1. All streams are listed by number and fully described in Attachment A.

Topography – The study area is dominated by rugged glaciated mountains with deep V-shaped and U-shaped valleys. Many of the bays in Lynn Canal have narrow margins of hilly moraines, with small flat-bottomed valleys at their head. Most slopes throughout the project area are steep. Elevation ranges from sea level to over 14,750 feet. Such a mixture of steep and gentle terrain produces a variety of stream types and habitat for anadromous and resident species.

Fish habitat contained along the steeper terrain exists within the river-carved V-shaped valleys. Generally these stream valleys are located between two steep mountains, and lack the outwash region or floodplain characteristic of the more gently sloped U-shaped valleys where many side channels and sloughs are usually located. Although spawning habitat for anadromous fish in these streams is limited to the intertidal zone, intertidal habitat is relatively common and not limiting for those species that require such conditions. Rearing habitat for both anadromous and resident fish in these streams is usually limited to the main channel, and therefore may restrict the variety of species able to use the area.

The large, glacial, braided river systems contained within U-shaped valleys provide a greater potential for anadromous habitat located outside of the main channel. Side channels branch out into adjacent muskegs and floodplain areas associated with the river, providing varied and

extensive rearing and spawning habitat within the river system, which promotes species diversity for both anadromous and resident streams.

3.3.1 East Lynn Canal

Thirteen of the 62 streams surveyed along East Lynn Canal in the project area were either listed in the Catalog or were observed to support anadromous species (Table 3-2 and Figure 3-1). Detailed descriptions are provided in Attachment A. These streams also likely support resident fish populations.

Anadromous fish habitat has been identified along East Lynn Canal within Berners Bay (the Berners, Lace, and Antler rivers; Sawmill, Slate, and Johnson creeks; and unnamed creek #10AE), at Sherman and Sweeny creeks, as well as at the Katzehin River. The Katzehin, Berners, Lace, and Antler rivers are large glacial river systems in U-shaped valleys. This area, along with the Katzehin River, provides excellent habitat for fish and is shown in Figure 3-1. Ten Class II streams have been identified on the east side of Lynn Canal. The remaining streams along East Lynn Canal provide poor fish habitat and/or are steep waterfalls.

3.3.2 West Lynn Canal

Twelve out of the 28 streams surveyed along West Lynn Canal were either listed in the Catalog or were observed to support anadromous species (Table 3-3 and Figure 3-1). Anadromous fish habitat exists within rivers contained in floodplains and U-shaped valleys along West Lynn Canal. Anadromous fish habitat is also found in William Henry Bay (Figure 3-1). These Class I streams, along with the 11 Class II streams identified on the west side, probably also support resident fish populations.

3.3.3 Summary

Approximately 90 streams within Lynn Canal could be affected by the proposed project alternatives. Twenty-five of these surveyed streams were either listed in the Catalog or were observed to support anadromous species (13 on the east side of Lynn Canal and 12 on the west side). Streams classified as Class I and II probably also support resident fish populations. Field studies conducted in 1994 determined that of the 64 streams along East Lynn Canal, 39 have waterfalls and are located either directly north or south of the Katzehin River. Most of the 13 anadromous streams on the east side are concentrated south of Independence Lake and in the Berners Bay area. Accordingly, most of the rivers on the east side of Lynn Canal are contained within V-shaped valleys, with the exception of those at the head of Berners Bay.

The 12 anadromous streams on West Lynn Canal occur from William Henry Bay to the Chilkat River. Most are contained within U-shaped valleys amid floodplains. Due to the variable topography, the streams along the west tend to provide a greater opportunity for anadromous and resident fish habitat.

Many side sloughs exist within the floodplains and adjacent drainages of the river valleys beyond the main channels of the streams. These sloughs were not investigated in 1994 because only the areas that would be directly affected by the proposed highway crossings were included in the survey.

Table 3-1
Types of Streams Within Lynn Canal

	East Lynn Canal	West Lynn Canal
Class I Confirmed Or Apparent Anadromous Fish Streams (Fish Observed)	5E, 10AE, 11E, 12E, 13E, 13AE, 14E, 15E, 16E, 17E, 18E, 46E, 47E	1W, 2W, 3W, 4BW, 5W, 7W, 8W, 9W, 9AW, 10W, 17BW, 22W
Class IIA Streams With Potential Fish Habitat (No Fish Observed)	6E, 8E, 9E	6W, 16W, 17W, 20W
Class IIB Streams With Poor Quality Fish Habitat (No Fish Observed)	1E, 2E, 3E, 7E, 43E, 44E, 45E	4W, 4AW, 14W, 15W, 19W
Class III Very Steep Stream Or Waterfall (No Fish Observed)	10E, 19E-25E, 28E-34E, 37E, 39E, 40E, 48E, 49E, 50AE, 51E, 53E, 55E, 57E, 58E	8AW, 11W, 12W, 13W, 14AW, 18W

Notes: Refer to area map for the location of the streams by stream numbers.
The following streams shown on Figure 3-1 were either not found or were dry channels during the 1994 Field Study: 4E, 26E, 27E, 35E, 36E, 38E, 41E, 42E, 50E, 52E, 54E, 55AE, 56E, 17AW, and 21W.

Table 3-2
Anadromous Fish Streams East Lynn Canal Project Area

ANADROMOUS STREAM		FISH SPECIES INVENTORY	
STREAM NUMBER and NAME		CATALOG[1]	1994 Field Observations
5E	Sawmill Creek	Chum and pink salmon, Dolly Varden	Pink salmon
10AE	Unnamed	(Stream not listed as of 2002)	Coho[2] and Pink[2] salmon
11E	Antler River	Coho and chum salmon, eulachon	Coho smolt
12E	Lace River	Coho salmon, eulachon	Coho salmon
13E	Berners River	Coho salmon, eulachon	Coho salmon
13AE	Johnson Creek	Coho, chum, and pink salmon	Coho, chum, and pink salmon
14E	Slate Creek	Chum salmon (coho and pink salmon not listed as of 1998)	Coho[2] and pink[2] salmon
15E	Unnamed	(Stream not listed as of 2002)	Coho[2] and pink[2] salmon
16E	Sweeny Creek	Pink salmon	Pink salmon
17E	Sherman Creek	Pink salmon	Pink salmon
18E	Unnamed	Sockeye salmon (pink salmon not listed as of 2002)	Pink[2] salmon
46E	Katzehin River	Coho and chum salmon, Dolly Varden (pink salmon not listed as of 1998)	Coho and pink[2] salmon
47E	Side channel of Katzehin River	(Stream not listed as of 2002)	None observed

Notes: [1] Includes updates to catalog (1998/2002)
[2] Submitted to ADF&G to be cataloged for species found in streams during the Juneau Access 1994 Stream Survey.

Table 3-3
Anadromous Streams West Lynn Canal Project Area

ANADROMOUS STREAM		FISH SPECIES INVENTORY	
STREAM NUMBER and NAME		CATALOG[1]	1994 Field Observations
1W	Beardslee River	Coho, pink, and chum salmon; Dolly Varden	Coho, pink, and chum salmon; Dolly Varden
2W	William Henry Creek (cataloged as unnamed)	Pink and chum salmon	Pink[2] salmon
3W	Unnamed	(Stream not listed as of 2002)	Pink[2] salmon
4BW	Endicott River	Coho and chum salmon; Dolly Varden; eulachon	Coho and pink[2] salmon
5W	Unnamed	(Stream not listed as of 2002)	(ADF&G observed Dolly Varden in previous surveys)
7W	Unnamed	(Stream not listed as of 2002)	Pink[2] salmon
8W	Unnamed	Pink and chum salmon	No fish observed
9W	Sullivan River	Chum salmon and Dolly Varden (coho and pink salmon not listed as of 1998)	Coho and pink[2] salmon
9AW	Side channel of Sullivan River	(Stream not listed as of 2002)	Unidentified smolt, potentially coho salmon observed
10W	Sullivan Creek (listed as unnamed in 1994 survey)	Chum & pink salmon (coho salmon not listed as of 2002)	Coho[2] and pink[2] salmon
17BW	Glacier River	Coho salmon and Dolly Varden	None
22W	Chilkat River	Chinook, coho, pink, chum, and sockeye salmon; steelhead and cutthroat trout; Dolly Varden; whitefish; and eulachon	Not surveyed

Notes: [1] Includes updates to ADF&G catalog (1998/2002)
[2] Submitted to ADF&G to be cataloged for species found in streams during the Juneau Access 1994 Stream Survey.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

This technical report considers the direct effects of the Juneau Access Improvements alternatives on anadromous and resident fish streams in the project area. As defined by 40 Code of Federal Regulations (CFR) 1808.8(a), in accordance with NEPA, direct effects are those effects that result from the action and occur at the same time and place.

Direct effects considered in this assessment include direct mortality of anadromous and resident fish and direct disruption or disturbance of spawning and rearing behavior (such as blockage of fish passage). Direct effects regarding stream crossings also include those crossings that could potentially result in mortality of fish or disruption and disturbance to fish downstream of the crossing. Habitat-related impacts (i.e., destruction of spawning and/or rearing habitat for fish both at the crossings and downstream) due to construction and operation of the highway are discussed separately in the EFH Assessment.

Several minimization measures would be instituted to protect anadromous and resident fish streams during construction, should a construction alternative be chosen. In-water construction windows would be established if determined necessary to protect anadromous and resident fish streams.

To prevent destruction of spawning habitat, the OHMP typically does not permit culverts to be placed in spawning habitat. The OHMP has identified Class II streams that are potentially fish-bearing streams, and expressed concern about maintaining fish passage (proper placement of culverts or use of bridges instead of culverts). Out of 17 Class II streams of concern to OHMP on both west and east sides of Lynn Canal, as many as six could be crossed by culverts depending on the alternative chosen. During design, additional surveys will be conducted as needed to determine whether fish are present, and the most appropriate type of crossing for fish passage, if required. All culvert structures would follow the Memorandum of Agreement (MOA) between ADF&G and the Alaska Department of Transportation and Public Facilities (DOT&PF) dated August 3, 2001.

4.1 Alternative 1 – No Action Alternative

Under this alternative, a highway would not be built, and no new ferry terminals would be constructed. Therefore, there would be no construction impacts on anadromous fish. While no cataloged anadromous streams flow in the immediate vicinity of the existing ferry terminal at Haines, a small, unnamed stream (Catalog #115-34-10310) appears to drain into the harbor near the terminal at Skagway, and several anadromous streams drain into Auke Bay (Auk Nu Creek #111-50-10350, Waydelich Creek #111-50-10370, Bay Creek #111-50-10390, and Auke Creek #111-50-10420). These streams were not surveyed in 1994; however, they are listed in the Catalog (ADF&G, 2003a). Because existing ferry service would continue in these areas, the possibility of effects from ferry traffic on these surrounding anadromous streams is acknowledged and discussed further in the EFH Assessment.

4.2 Alternative 2 – East Lynn Canal Highway with Katzehin Ferry Terminal

Alternative 2 would cross nine of the 13 anadromous streams or rivers that are listed in the Catalog (ADF&G, 2003b) or by the 1994 field study conducted for the 1997 Juneau Access Improvements Draft Environmental Impact Statement (DEIS) to support populations of anadromous fish (see Section 3.3 and Figure 3-1). Three of the anadromous rivers, the Antler, Berners/Lace, and Katzehin rivers, would require multi-span bridges exceeding 50 feet in length. Typical construction techniques for multi-span structures include the erection of

falsework to provide a platform for equipment, thereby eliminating the need for active equipment in the river bottom. However, impacts within the river could occur due to noise and vibration generated during pile driving and increased turbidity (at the crossing and downstream) as the falsework is erected. The areas where the Antler and Berners/Lace rivers would be crossed are upstream, away from the mouth of the river, which is used by eulachon for spawning. Single-span bridges would cross the remaining six Class I fish streams. Four Class I streams (13E, 13AE, 15E, and 47E) identified during the 1994 survey will not be crossed by the current (December 2003) alignment.

Due to topographical constraints, four additional single-span bridges would be placed across streams 9E (Class IIA), 43E, 44E, and 45E (Class IIB). Single-span bridges do not encroach upon the stream banks and require minimal modification of the stream profile. Construction activities would be staged from the bridge abutments, and construction equipment would not be used within these streams. However, noise and vibration and increased turbidity at the crossing or downstream could be evident in the stream during construction.

All other Class II and Class III streams would be crossed with culvert structures. The culverts in Class II streams with resident fish, or identified by OHMP as having a potential to have future resident fish populations, would allow fish passage and would be designed and constructed per the standards provided in the MOA between ADF&G and DOT&PF for the "Design, Permitting, and Construction of Culverts for Fish Passage," dated August 3, 2001. During culvert placement, construction equipment would be used in the stream. Noise and vibration and increased turbidity at the crossing and downstream would be evident in the streams during placement of the culverts. Refer to Table 4-1 for a summary of East Lynn Canal streams and proposed crossing structures.

Although construction of all river crossings would occur outside of spawning season, fish may suffer mortality and/or disturbance during construction activities. There would be some direct mortality and disturbance of anadromous and resident fish at and downstream of the Katzehin, Berners/Lace, and Antler river crossings during multi-span bridge construction; however, these rivers are braided with many channels, and not all channels would be impacted at the same time (i.e., bridge construction would either occur from one side of the river to the other or from both sides to the middle). Once in place, the piers would not impede fish movement within the rivers. There would be short-term increases in turbidity during construction of all three multi-span bridges; however, it is not expected that the increases would be noticeable relative to the ambient turbidity in the Antler, Berners/Lace, and Katzehin rivers. Airborne dust is not likely to occur during in-water construction.

Runoff during construction and from the completed highway could potentially contain sediments, heavy metals, salts, organic molecules, ozone, and nutrients. However, none of these components are expected to be sufficiently concentrated to cause direct mortality or disturbance of anadromous and resident fish. Impacts of runoff on fish habitat are discussed in the EFH Assessment.

No direct effects on anadromous fish streams would be expected at the Katzehin Ferry Terminal site due to its distance from the Katzehin River and other anadromous streams. In addition, in-water construction windows would be established for terminal construction if necessary to protect migrating anadromous and/or resident species. Details concerning impacts of ferry terminal construction and operations on fish habitat are discussed in the EFH Assessment.

4.3 Alternative 2A – East Lynn Canal Highway with Berners Bay Shuttle

Under this alternative, no highway would be constructed around Berners Bay; therefore, no bridges would cross the following Class I streams: Antler or Berners/Lace rivers, Slate Creek, or stream 10AE. As with Alternative 2, the Katzehin River would require a multi-span bridge exceeding 50 feet in length and the remaining six anadromous streams to be crossed along the highway route would be crossed with single-span bridges that are less than 50 feet long. Three additional single-span bridges would also be placed at streams 43E, 44E and 45E (Class IIB). Culverts would cross the remaining streams. Stream crossings are detailed in Table 4-1. Therefore, impacts due to bridge construction and culvert placement are the same as described for Alternative 2, with the exception that there would be no impacts at the Berners/Lace and Antler rivers, Slate Creek, or stream 10AE.

This alternative includes construction of three ferry terminals: at Slate Cove, at Sawmill Cove, and North of the Katzehin River. The Katzehin shuttle ferry terminal would also be built for a total of three new terminals under this alternative. Anadromous fish populations have been identified in Sawmill and Slate creeks (see Section 3.3). However, the proposed Sawmill Cove Ferry Terminal is sited over a mile north of the mouth of Sawmill Creek. Likewise, the proposed Slate Cove Ferry Terminal is approximately 3,000 feet south of Slate Creek. In-water construction windows would be established to protect anadromous fish returning to spawn in Slate and Sawmill creeks. Therefore, no direct effects are expected on anadromous fish from construction of a ferry terminal in Slate Cove or Sawmill Cove. Impacts to resident fish in these creeks are also not expected.

Eulachon, which are seasonally abundant in Berners Bay and could be found in Sawmill and Slate coves, and could suffer impacts from construction of the ferry terminals. Again, in-water construction windows would help to mitigate impacts. Details concerning impacts of ferry terminal construction and operations on fish habitat are discussed in the EFH Assessment.

4.4 Alternative 2B – East Lynn Canal Highway to Katzehin with Shuttles to Haines and Skagway

Under this alternative, the number of anadromous fish streams that would be crossed is the same as under Alternative 2 (nine total, three of which – the Katzehin, Antler, and Berners/Lace rivers – exceed 50 feet wide). Twelve streams north of the Katzehin Ferry Terminal (one Class IIB, the rest Class III) would not need to be crossed because the highway would not extend to Skagway.

As described for Alternative 2, single-span bridges would be used for crossing anadromous streams that are less than 50 feet wide. These spans do not commonly encroach upon the stream banks. Four additional single-span bridges would also be placed at streams 9E (Class IIA) and 43E, 44E, and 45E (Class IIB). Culverts would cross the remaining streams. Stream crossings are detailed in Table 4-1.

Multi-span bridges would be required for the Katzehin, Berners/Lace, and Antler rivers. As described for Alternative 2, construction of these structures requires in-stream activities such as the placement of pilings and other structures. Impacts of bridge construction would be the same as described for Alternative 2. Similarly, there would be no effects on anadromous or resident fish in the Katzehin River from construction and operations at the Katzehin Ferry Terminal site. Details concerning impacts of ferry terminal construction and operations on fish habitat are discussed in the EFH Assessment.

4.5 Alternative 2C – East Lynn Canal Highway with Haines/Skagway Shuttle

This alternative is the same as Alternative 2 in that a highway would be constructed along East Lynn Canal. Alternative 2C would cross nine streams that have been confirmed to support populations of anadromous fish and also likely support resident fish. Streams less than 50 feet wide would be crossed with a single-span bridge, and those over 50 feet would be crossed with multi-span bridges. Four additional single-span bridges would also be placed at streams 9E (Class IIA) and 43E, 44E, and 45E (all Class IIB). Culverts would cross the remaining streams. Stream crossings are detailed in Table 4-1. Multi-span bridges would be required for the Katzehin, Berners/Lace, and Antler rivers. As described for Alternative 2, construction of these bridges would require in-stream activities such as the placement of pilings and other structures. The direct effects of Alternative 2C on anadromous and resident fish streams would be the same as effects from Alternative 2.

4.6 Alternative 3 – West Lynn Canal Highway

Alternative 3 consists of constructing a highway from Echo Cove to Sawmill Cove on the east side of Lynn Canal, and building ferry terminals at Sawmill Cove and William Henry Bay. A shuttle ferry would cross Lynn Canal between Sawmill Cove and William Henry Bay, and a highway would be constructed from William Henry Bay to Haines.

As described for Alternative 2, construction and maintenance of the highway bridges would have an effect on anadromous and resident fish streams within the alignment. Alternative 3 would cross 11 streams on the west side and one stream on the east side that have been confirmed to support populations of anadromous fish and also likely support resident fish populations. These streams are characterized in Section 3.3, in Table 3.1, and in Attachment A, and are shown on Figure 3-1. Another anadromous stream, the Beardslee River, lies at the head of William Henry Bay. The William Henry Bay Ferry Terminal access road would not cross this stream.

Multi-span bridges would be required for crossing the Endicott, Sullivan, and Chilkat rivers. However, most of the anadromous fish streams on the west side are less than 50 feet wide and would be crossed by single-span bridges. Approximately 10 additional bridges would be needed to cross Class II streams on the west side of Lynn Canal due to engineering considerations. These bridges would span small streams, some of which have the potential to provide spawning and rearing habitat for resident species (Class IIA streams). All other Class II and Class III streams would be crossed with culvert structures. The culverts in Class II streams with resident fish, or identified by OHMP as having a potential to have future resident fish populations, would allow fish passage and would be designed and constructed per the standards provided in the MOA between ADF&G and DOT&PF for the "Design, Permitting, and Constructions of Culverts for Fish Passage," dated August 3, 2001. Refer to Table 4-2 for proposed crossing structures under this alternative.

The typical bridge and culvert construction techniques presented in the Alternative 2 discussion also apply here. There would be some mortality and disturbance of anadromous and resident fish in the Endicott and Sullivan rivers and in the Chilkat River during bridge construction at the crossings and downstream; however, effects would be short-term and localized. In-water construction windows would be established to protect these fish. Once in place, the piers would not impede fish movement within the rivers. As described for Alternative 2, there would be short-term increases in turbidity during construction of all crossings; however, it is not expected that the increases would be observable above ambient conditions during the summer construction season. Impacts of runoff would also be as described for Alternative 2.

Under this alternative, ferry terminals would be constructed at William Henry Bay and Sawmill Cove. Two anadromous streams/rivers flow into William Henry Bay: the Beardslee River and William Henry Creek. The Beardslee River is approximately 3,000 feet southeast of the proposed ferry terminal at William Henry Bay. William Henry Creek is approximately 3,000 feet north of the proposed terminal. A pile-supported access trestle would be required to reach adequate water depths for vessel berthing. In-water construction windows would be established if necessary to protect anadromous and marine species. No direct effects are expected to anadromous or resident fish in the Beardslee River or William Henry Creek from construction of a ferry terminal or trestle in William Henry Bay. Once in place, the presence of the structure would not impede fish migration patterns. Impacts are also not expected on anadromous species from the ferry terminal at Sawmill Cove (see Alternative 2A). Details concerning impacts of ferry terminal construction and operations on fish habitat are discussed in the EFH Assessment.

4.7 Alternatives 4A through 4D – Marine Options

In the following sections, the impacts of Alternatives 4A and 4C are discussed together. Both of these alternatives include changes to the ferry service and modification of the ferry terminal at Auke Bay, but do not require any new highway construction. Similarly, Alternatives 4B and 4D are discussed together. These alternatives include modifications at Auke Bay, highway construction to Echo Cove, and construction of a ferry terminal at Sawmill Cove.

4.7.1 Alternatives 4A and 4C – Marine Alternative – Auke Bay

The direct effects of Alternatives 4A and 4C would be similar to direct effects under Alternative 1, but would also include direct effects due to that addition of a double stern berth at the Auke Bay Ferry Terminal. Construction of the new double stern berth would occur in Auke Bay, which is already altered by development. Several anadromous streams flow into the bay (see the discussion for the No Action Alternative); however, direct impacts on anadromous and resident fish would not occur due to the distance of the streams from the dock location and the fact that in-water work periods would be established to minimize impacts. Details concerning impacts of Auke Bay modifications on fish habitat are discussed in the EFH Assessment.

4.7.2 Alternatives 4B and 4D – Marine Alternative – Berners Bay

Alternatives 4B and 4D differ only in the type, and possibly frequency, of ferry service provided. Both alternatives propose to construct a highway from Echo Cove to Sawmill Cove and a ferry terminal at Sawmill Cove. The alternatives also include modification of the ferry terminal at Auke Bay as described above for Alternatives 4A and 4C.

A single-span bridge would cross Sawmill Creek, an anadromous stream. Impacts of bridge construction are the same as those discussed for Alternative 2. There would be no direct effects of ferry terminal construction at Sawmill Cove on anadromous fish. Details concerning impacts of ferry terminal construction and operations on fish habitat are discussed in the EFH Assessment. Effects of construction of the new double stern berth at the Auke Bay Ferry Terminal are discussed above for Alternatives 4A and 4C.

4.8 Summary of Effects of Alternatives

All of the proposed alternatives could have varying effects on anadromous and resident fish streams. Alternatives 1, 4A, and 4C would likely have similar effects, with impacts limited to possible disturbance from continued use of existing facilities (Alternative 1) and from expanded use of existing facilities (Alternatives 4A and 4C). No effects on anadromous fish streams,

which also likely have resident fish populations, are identified for ferry terminal modifications at Auke Bay under Alternatives 4A and 4C.

Alternatives 2, 2A, 2B, 2C, 3, 4B, and 4D would have varying effects on anadromous and resident fish streams from noise and vibration and increased turbidity during construction of stream crossing structures. These effects should be temporary and reversible, occurring only during the construction process. Multi-span bridge piers and culverts and single-span bridge abutments would not impede fish passage once in place near or within the streams and rivers. Ferry terminal construction or modification of existing terminals is associated with all alternatives except Alternative 2C. However, ferry terminal construction is not expected to impact nearby anadromous fish streams or resident fish within nearby streams.

Effects of operations and maintenance of the highway under Alternatives 2, 2A, 2C, 3, 4B, and 4D include runoff that could potentially contain sediments, heavy metals, salts, organic molecules, ozone, and nutrients. However, none of these components are expected to be sufficiently concentrated to cause direct mortality or disturbance of anadromous and resident fish.

Table 4-1
East Lynn Canal
Stream Crossings By Structure

Stream Number[1]	Class	Maximum Stream Width (Feet)[2]	Proposed Crossing Structure
5E Sawmill Creek	I	20	Single-span bridge
9E	IIA	15	Single-span bridge
10AE	I	25	Single-span bridge
11E Antler River	I	500	Multi-span bridge
12E/13E Berners/Lace River	I	400	Multi-span bridge
13AE Johnson Creek	I	10	Not crossed under current (2003) alignment
14E Slate Creek	I	20	Single-span bridge
15E	I	20	Not crossed under current (2003) alignment
16E Sweeny Creek	I	10	Single-span bridge
17E Sherman Creek	I	15	Single-span bridge
18E	I	10	Single-span bridge
43E, 44E, 45E	IIB	Varies	Single-span bridge
46E Katzehin River	I	± 2800 (including tidal channels)	Multi-span bridge
6E, 8E	IIA	Varies	Culvert
1E, 2E, 3E, 7E	IIB	Varies	Culvert
10E, 19E, 20E, 21E, 22E, 23E, 24E, 25E, 26E, 27E, 28E, 29E, 30E, 31E, 32E, 33E, 34E, 35E, 36E, 37E (Yeldagalga Creek), 38E, 39E, 40E, 41E, 42E, 48E, 49E, 50E, 51E (Dayebas Creek), 52E, 53E, 54E, 55E, 56E, 57E (Kasidaya Creek), 58E	III (or dry at time of survey	Varies	Culvert

Notes: [1] Source: 1994 Anadromous Fish Stream and Habitat Report
[2] Width taken from the Anadromous Fish Stream and Habitat Report, Attachment A, 1994 Fishery Habitat Field Surveys.

Table 4-2
West Lynn Canal
Stream Crossings By Structure

Stream Number [1]	Class	Maximum Stream Width (feet)[2]	Proposed Crossing Structure
1W Beardslee River	I	20	None, ferry terminal access road does not cross this river
2W William Henry Creek	I	15	Single-span bridge
3W	I	20	Single-span bridge
4W, 4AW, 14W, 15W, 19W (Ludaska Creek)	IIB	Varies	Single-span bridge
4BW Endicott River	I	300	Multi-span bridge
5W	I	5	Single-span bridge
6W, 16W, 17W, 20W (Anchorage Point Stream)	IIA	Varies	Single-span bridge
7W	I	25	Single-span bridge
9W, 9AW Sullivan River	I	300	Multi-span bridge
10W Sullivan Creek	I	20	Single-span bridge
17BW Glacier River	I	25	Single-span bridge
22W Chilkat River	I	11,000	Multi-span bridge
8W	I	2	Single-span bridge
8AW, 11W, 12W, 13W, 14AW, 17AW, 18W, 21W	III (or dry at time of survey)	Varies	Culvert or bridge depending on topography

Notes: [1] Source: Anadromous Fish Stream and Habitat Report
[2] Width taken from the Anadromous Fish Stream and Habitat Report, Attachment A, 1994 Fishery Habitat Field Surveys at proposed highway crossing site.

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5.0 LIST OF PREPARERS

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FIGURES

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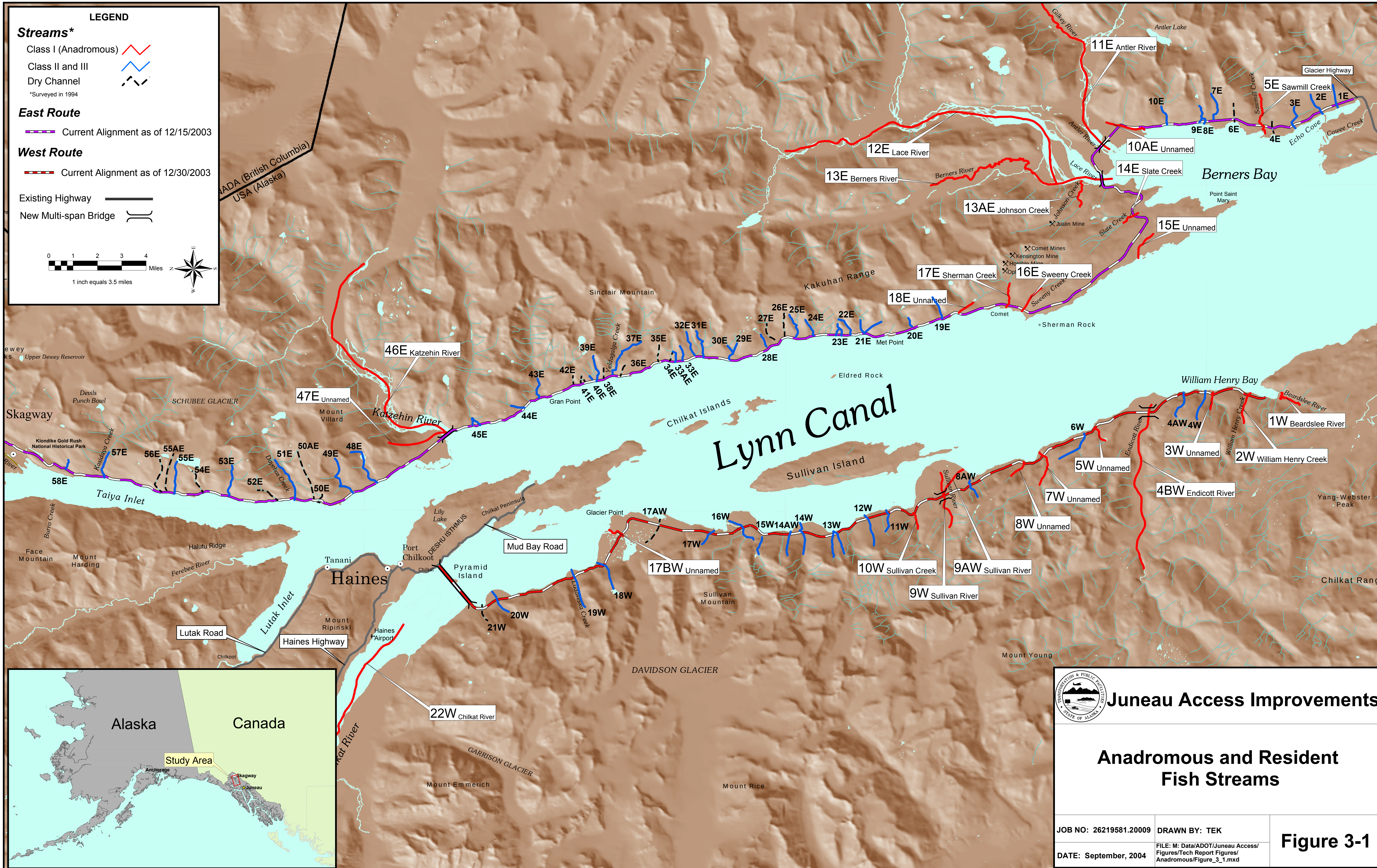

LEGEND
Streams*
Class I (Anadromous)
Class II and III
Dry Channel
*Surveyed in 1994
East Route
Current Alignment as of 12/15/2003
West Route
Current Alignment as of 12/30/2003
Existing Highway
New Multi-span Bridge
0 1 2 3 4 Miles
1 inch equals 3.5 miles
CANADA (British Columbia)
USA (Alaska)
Lynn Canal
Berners Bay
Taiya Inlet
Chilkat Islands
Sullivan Island
William Henry Bay
Skagway
Haines
Lutak Inlet
Kakuhan Range
Chilkat Range
Sinclair Mountain
Eldred Rock
Point Saint Mary
Sherman Rock
Gran Point
Met Point
Comet
Glacier Point
Port Chilkoot
Pyramid Island
Tanani
Mount Villard
Mount Ripinski
Mount Harding
Face Mountain
Sullivan Mountain
Mount Young
Mount Emmerich
Mount Rice
Yang-Webster Peak
DAVIDSON GLACIER
GARRISON GLACIER
SCHUBEE GLACIER
Klondike Gold Rush National Historical Park
Upper Dewey Reservoir
Devils Punch Bowl
Haines Airport
Antler Lake
Glacier Highway
Echo Cove
Cowee Creek
Jualin Mine
Comet Mines
Kensington Mine
Mud Bay Road
Lutak Road
Haines Highway
1E
2E
3E
4E
5E Sawmill Creek
6E
7E
8E
9E
10E
10AE Unnamed
11E Antler River
12E Lace River
13E Berners River
13AE Johnson Creek
14E Slate Creek
15E Unnamed
16E Sweeny Creek
17E Sherman Creek
18E Unnamed
19E
20E
21E
22E
23E
24E
25E
26E
27E
28E
29E
30E
31E
32E
33E
33AE
34E
35E
36E
37E
38E
39E
40E
41E
42E
43E
44E
45E
46E Katzehin River
47E Unnamed
48E
49E
50E
50AE
51E
52E
53E
54E
55E
55AE
56E
57E
58E
1W Beardslee River
2W William Henry Creek
3W Unnamed
4W
4AW
4BW Endicott River
5W Unnamed
6W
7W Unnamed
8W Unnamed
8AW
9W Sullivan River
9AW Sullivan River
10W Sullivan Creek
11W
12W
13W
14W
14AW
15W
16W
17W
17AW
17BW Unnamed
18W
19W
20W
21W
22W Chilkat River
Alaska
Canada
Study Area
Anchorage
Skagway
Juneau
Juneau Access Improvements
Anadromous and Resident Fish Streams
JOB NO: 26219581.20009
DRAWN BY: TEK
DATE: September, 2004
FILE: M: Data/ADOT/Juneau Access/Figures/Tech Report Figures/Anadromous/Figure_3_1.mxd
Figure 3-1

ATTACHMENT A

1994 FISHERY HABITAT FIELD SURVEYS
EAST SIDE: ECHO COVE TO SKAGWAY
WEST SIDE: WILLIAM HENRY BAY TO HAINES
AND TABLE A-1 JUNEAU ACCESS STREAM DATA

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Attachment A

This attachment includes narratives for each stream investigated in Lynn Canal that may be potentially affected by the Juneau Access Improvements Project alternative highway routes. Each narrative describes the stream based on the information gathered during the field surveys.

Each stream was numbered according to its position on the quadrangle (quad) maps, beginning at the southernmost point of the alignment and ending at the northernmost point. Numbering for Alternative 2, the East Lynn Canal Highway alignment, begins with stream 1E at Echo Cove and travels north along the alignment, culminating at stream 58E in Skagway. Numbering for Alternative 3, the West Lynn Canal Highway alignment, starts with stream 1W at William Henry Bay, heads north along the alignment, and ends with stream 22W at the Chilkat River. Photographs taken during the 1994 field stream survey are included as Attachment B. Table A-1 summarizes the results of the field survey and includes additional stream information identified from the 2003 literature search.

The stream narratives address the following subjects, where applicable:

- Location
- Description of Overall Stream
- Description of Stream at the Proposed Highway Crossing
- Fish Observed
- Evaluation of Anadromous Habitat Type: Spawning and Rearing
- Wildlife Observed

The locations of the streams were obtained with the global positioning system (GPS), and the latitudes and longitudes listed in the stream descriptions are at the proposed highway crossing sites. Most of the proposed highway crossings are located within 0.5 miles of the mouth of the stream. The overall stream description is based on the area of the stream, from the mouth to the proposed highway-crossing site. The description of the highway crossings covers approximately a 30- to 50-foot section of the stream. Observations were made occasionally past the proposed highway crossing when topographical conditions permitted. The anadromous habitat type description includes evaluations of observed spawning and rearing habitat. The species of fish and wildlife are listed when observed.

The following list defines the terms used in this section:

- Bedrock – substrate that is greater than 160 inches in diameter.
- Boulders – substrate ranging from 160 to 10 inches in diameter.
- Cobbles – substrate ranging from 10 to 2.5 inches in diameter.
- Large woody debris (LWD) – large logs or woody masses greater than 4 feet long and 8 inches wide.
- Gravel – substrate ranging from 2.5 to 0.2 inches in diameter.
- Sand – substrate less than 0.2 inches in diameter.
- Silt – substrate less than 1 inch in diameter.

- Spawning gravel – gravel adequate for fish spawning ranging from 1 to 6 inches in diameter.
- Stream channel types – the topographical region in which a stream may flow or be contained. Examples include estuarine, floodplain, palustrine, alluvial fan, high gradient V-shaped valleys (usually steep streams or waterfalls), moderate gradient V-shaped valleys, low gradient V-shaped and U-shaped valleys (usually associated with glaciers).

Table A-1
Juneau Access Stream Data

Stream	Class	Catalog #	Fish Species	Fish Observed or Traps Set in 1994	Planned Crossing Structure
Sawmill Creek 5E	I	115-20-10520	Chum and pink salmon, and Dolly Varden	Adult pink salmon were observed; no traps set.	Single-span bridge
Unnamed 10AE	I	Submitted	Coho and pink salmon	Spawning pink salmon observed; traps set; coho smolt caught.	Single-span bridge
Antler River 11E	I	115-20-10300	Coho and chum salmon	Unidentified smolt observed in side slough; traps set; no fish caught.	Multi-span bridge
Lace River 12E	I	115-20-10200	Coho salmon	Coho smolt observed in side slough; no traps set.	Multi-span bridge
Johnson Creek 13AE	I	115-20-10070	Coho, pink, and chum salmon	Rearing coho and spawning pink and chum salmon observed; no traps set.	Not crossed under current alignment
Slate Creek 14E	I	115-20-10030	Chum salmon (submitted for coho and pink salmon)	Spawning chum and pink salmon observed; traps set; coho smolt caught.	Single-span bridge
Unnamed 15E	I	Submitted	Submitted for coho and pink salmon	Spawning pink salmon observed; traps set; coho smolt caught.	Not crossed under current alignment
Sweeny Creek 16E	I	115-31-10350	Pink salmon	Spawning pink salmon observed at the mouth of the stream; no traps set.	Single-span bridge
Sherman Creek 17E	I	115-31-10330	Pink salmon	Spawning pink salmon observed; no traps set.	Single-span bridge
Unnamed 18E	I	115-31-10300	Sockeye salmon (submitted for pink salmon)	Spawning pink salmon observed; no traps set.	Single-span bridge
Katzehin River 46E / Side Channel 47E	I	115-34-10700	Coho and chum salmon, and Dolly Varden (submitted for pink salmon)	Spawning pink salmon and coho smolt observed; traps set; coho smolt caught.	47E is not crossed under current alignment ; runs through floodplain of 46E
Berners River 13E	I	115-20-10100	Coho salmon	Coho smolt observed in side channel; no traps set.	Not crossed under current alignment
9E	IIA	N/A	Potential fish habitat	No fish observed; no traps set.	Single-span bridge due to topographical constraints
6E, 8E	IIA	N/A	Potential fish habitat	No fish observed; traps set at 8E; no fish caught.	Culverts
4E	N/A	N/A	Not located during survey	N/A	N/A

Table A-1 (continued)
Juneau Access Stream Data

Stream	Class	Catalog #	Fish Species	Fish Observed or Traps Set in 1994	Planned Crossing Structure
43E, 44E, 45E	IIB	N/A	N/A (high velocity, boulder cobble substrate)	No fish observed; no traps set.	Single-span bridges due to topographical constraints
1E, 2E, 3E, 7E	IIB	N/A	N/A (no fish, poor habitat or waterfall)	No fish observed; no traps set.	Culverts
10E, 19E-42E, 48E-58E (Includes Yeldagalga, Dayebas, and Kasidaya creeks)	III	N/A	N/A (waterfall, dry channels, or otherwise poor habitat)	No fish observed; no traps set.	Culverts
Berners Bay	N/A	N/A	Eulachon spawning habitat; extends into Johnson Creek, Antler and Berners/Lace rivers	N/A	N/A
Unnamed	N/A	115-34-10310	Coho, chum, and pink salmon; Dolly Varden	**NEW**. Parallels coastline/north portion of highway to Skagway. Outside of highway alignment.	N/A
Unnamed	N/A	115-34-10310-2018	Coho salmon and Dolly Varden	**NEW**. Short stream, between 115-34-10310 and coast / highway. Upper Taiya Inlet. Outside of highway alignment.	N/A
Takhin River	N/A	115-32-10300	Coho salmon, cutthroat trout, and Dolly Varden	**NEW**. Skagway A2. Across from Haska Creek, appears to have branches that are bisected by proposed highway alignment.	N/A
Haska Creek	N/A	115-32-10290	Coho and pink salmon	**NEW**. North of bridge to Haines. Bridge construction may affect influx of fish.	N/A
South Kicking Horse River	N/A	115-32-10280	Coho and sockeye salmon	**NEW**. North of bridge to Haines. Bridge construction may affect influx of fish.	N/A
Unnamed	N/A	115-32-10230	Coho salmon and Dolly Varden	**NEW**. South of bridge to Haines. Bridge construction may affect influx of fish.	N/A
Unnamed	N/A	115-32-10240	Coho salmon and cutthroat trout	**NEW**. South of bridge to Haines. Bridge construction may affect influx of fish.	N/A

Table A-1 (continued)
Juneau Access Stream Data

Stream	Class	Catalog #	Fish Species	Fish Observed or Traps Set in 1994	Planned Crossing Structure
Unnamed	N/A	115-32-10260	Coho and king salmon, cutthroat trout, and Dolly Varden	**NEW**. Slightly north of bridge to Haines. Bridge construction may affect influx of fish.	N/A
Auke Nu Creek	N/A	111-50-10350	Pink salmon	In area of existing Auke Bay Ferry Terminal.	N/A
Waydelich Creek	N/A	111-50-10370	Pink and chum salmon	In area of existing Auke Bay Ferry Terminal.	N/A
Bay Creek	N/A	111-50-10390	Coho and pink salmon	In area of existing Auke Bay Ferry Terminal.	N/A
Auke Creek	N/A	111-50-10420	Silver, coho, pink, and chum salmon; steelhead and cutthroat trout; and Dolly Varden	In area of existing Auke Bay Ferry Terminal.	N/A
Beardslee River 1W	I	115-10-10650	Coho, pink, and chum salmon; Dolly Varden	Anadromous fish were observed during 1994 survey; no traps set.	None, ferry terminal access road does not cross this river
William Henry Creek 2W	I	115-10-10680	Pink and chum salmon (submitted for pink salmon in 1994)	Pink salmon were observed; no traps set.	Single-span bridge
Unnamed 3W	I	Submitted	Submitted for pink salmon	Pink salmon were observed; no traps set.	Single-span bridge
Endicott River 4BW	I	115-10-10800	Coho and chum salmon, and Dolly Varden (submitted for pink salmon)	Traps set; coho smolt caught. Sculpin and spawning pink salmon observed.	Multi-span bridge
Unnamed 5W	I	N/A	Dolly Varden found in previous ADF&G surveys	No fish observed; no traps set.	Single-span bridge
Unnamed 7W	I	Submitted	Submitted for pink salmon	Pink salmon and sculpins observed; no traps set.	Single-span bridge
Unnamed 8W	I	115-31-10380	Pink and chum salmon	No fish observed; no traps set.	Single-span bridge
Sullivan River 9W	I	115-31-10430	Chum salmon and Dolly Varden (submitted for pink salmon)	Spawning pink salmon observed; no traps set.	Multi-span bridge
9AW (small branch of Sullivan River)	I	N/A	Unidentified smolt observed – possibly coho salmon	Pink salmon and possibly coho observed; no traps set.	Multi-span bridge (part of Sullivan River bridge; see above)

Table A-1 (continued)
Juneau Access Stream Data

Stream	Class	Catalog #	Fish Species	Fish Observed or Traps Set in 1994	Planned Crossing Structure
10W	I	115-31-10450	Chum and pink salmon (Submitted for coho and pink salmon)	Pink salmon and coho smolt observed; fish traps set but no fish caught.	Single-span bridge
Unnamed 17BW	I	115-32-10010	Coho salmon and Dolly Varden	No fish observed; no fish traps set.	Single-span bridge
Chilkat River 22W	I	115-32-10250	King, coho, pink, chum, and sockeye salmon; steelhead and cutthroat trout; Dolly Varden; and whitefish	Not surveyed; no traps set.	Multi-span bridge
6W, 16W, 17W, 20W	IIA	N/A	Potential fish habitat	No fish observed; no traps set.	Single-span bridges due to topographical constraints
4W, 4AW, 14W, 15W, 19W	IIB	N/A	N/A (waterfall, high velocity or no flow)	No fish observed; no traps set.	Single-span bridges due to topographical constraints
8W, 17AW, 11W, 12W, 13W, 14AW, 18W, 21W	III	N/A	N/A (waterfalls or dry streams)	No fish observed; no traps set.	Culverts or bridges depending on topography

Notes: Classes (assigned from 1994 survey):
I – confirmed anadromous fish stream
IIA – streams with potential fish habitat
IIB – streams with poor quality fish habitat
III – very steep stream or waterfall
Dry streams – not classified

ATTACHMENT A: STREAM NARRATIVES

EAST SIDE: ECHO COVE TO SKAGWAY

The following pages contain detailed information of the investigated streams, based on information gathered during the streams surveys on the East Lynn Canal from Echo Cove north to Skagway.

Stream #1E – Class IIB

Location: LAT N 58° 40' 24.5" / LONG W 134° 54' 47.9" JUNEAU C3

Description of Overall Stream: This stream flows about one mile north of the Echo Cove boat launch. It is a small water runoff that originates at 1,500 feet in elevation and is contained within a single straight channel. The overall stream gradient is about 10 percent. The width of this stream is two feet and the depth is six inches. The water is clear, with a very low velocity. Water runoff barely reaches the inlet at high tide.

This stream has an 85 percent canopy cover. Predominant vegetation noted along the banks are Sitka spruce, alders, devils club, currants, cow parsnip, goatsbeard, wooded ferns, and deerberry. Sedges and grasses are growing at the mouth and onto the beach.

Description of Stream at the Proposed Highway Crossing: The description of the highway crossing is basically the same as the overall stream. The gradient at the highway crossing is two percent. The stream bottom is fairly flat. The substrate consists of 80 percent gravel, along with 10 percent boulders, which is adequate for spawning. There is no evidence of flooding, and no pools or riffles. LWD is scattered at the highway crossing and throughout the whole stream.

The banks are stable and are one foot in height. They are composed of boulders and soil. A thick moss layer is growing on top of the boulders.

Fish Observed: No fish were observed in this stream.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Although adequate gravel exists, the gradient is too steep and this stream is too shallow to support any anadromous species, likely due to a seasonal variation of water runoff.

Stream #2E – Class IIB

Location: LAT N 58° 40' 45.6" / LONG W 134° 55' 3.6" JUNEAU C3

Description of Overall Stream: This stream flows about 1.64 miles north of the Echo Cove boat launch. The water is clear and flows at a low velocity, originating at a 2,000-foot elevation. It is contained within a low gradient valley. This stream is 20 feet wide and six inches deep. The mouth of the stream widens to 30 feet and is four inches deep. The gradient is 10 percent. The substrate consists of a mixture of boulders and gravel. The bottom of the stream is fairly irregular.

This stream is a single channel, which divides into two streams and flows around a gravel bar that is located approximately 75 feet up from the mouth. The gravel bar is approximately 120 feet long and is covered with vegetation. The stream rejoins as a single channel and empties into the inlet. The banks of the stream are one foot in height, stable, and are lined with large granite boulders intermixed with soil. A thick moss cover is growing on the granite substrate.

The cliffs around this stream are covered with large trees, 20 percent of which are uprooting and have fallen into and around the stream as a result of mass wasting.

This stream has a 90 percent canopy cover. Predominant vegetation noted along the banks consists of Sitka spruce and alder, western hemlock, devils club, elderberry, deer berry, goatsbeard, and deer fern. Towards the inlet, grasses and seaweed are prevalent.

Description of Stream at the Proposed Highway Crossing: At the proposed highway crossing, this stream is 20 feet wide and six inches deep. The gradient is 15 percent and the water velocity is low. Large moss-covered trees lie across and in the stream. The large boulders and fallen trees at the crossing create a stair step effect and, as result, the water runs down from multiple channels emptying into the main straight channel. Some small gravel bars are noted. Pools are present which have been formed by large boulders and logs.

This section of the stream has a fairly flat bottom and the substrate consists of gravel, which appears to be adequate for spawning. The vegetation and percent of coverage are the same as the overall stream.

Fish Observed: No fish were observed in this stream. Fish traps were not set.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Because of the stream's steep gradient, low velocity, shallow water depth, and irregular substrate, this stream does not likely provide spawning or rearing habitat.

Stream #3E – Class IIB

Location: LAT N 58° 41' 44.3" / LONG W 134° 55' 55.5" JUNEAU C3

Description of Overall Stream: This stream flows three miles north of the Echo Cove boat launch, and 1.5 mile south of Sawmill Cove. The water is clear, the width is 15 feet, and the depth is approximately one foot. The gradient is six percent. The stream is contained in a single straight channel.

A 40-degree rock cliff with a waterfall (50 feet high) is located approximately 300 feet up from the mouth of the stream. The height of the banks/side slopes follows the contour of the slope up to the waterfall. The bank height begins at five feet and increases to 50 feet. Sloughing at the toe of the side slopes was observed. This stream originates at 1,500 in elevation and is contained in a low gradient valley.

The substrate of this streambed is irregular with a mixture of bedrock, boulders, and cobbles. LWD is found near downed trees.

This stream has 70 percent canopy coverage. Spruce trees are noted on the upper shelf of the cliff, while shrubs and forbs cover the side slopes. Predominant vegetation lining the banks consists of Sitka spruce and alder, western hemlock, devils club, ferns, deer cabbage, and

twisted stalk. The stream flows over the boulders and grasses and onto the beach before emptying into the inlet.

Description of Stream at the Proposed Highway Crossing: The proposed highway crossing lies about 150 feet upstream from the mouth and about 100 feet downstream from the large waterfall. The description of the highway crossing is essentially the same as the overall stream. In the area of the highway crossing, pools exist that have been formed by submerged and scattered fallen trees. The banks are stable and are lined with large, thickly moss-covered granite boulders.

Fish Observed: No fish were observed in this stream. Fish traps were not set. Pink salmon were noted swimming along the coastline in front of this stream.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Because of the steep gradient and irregular substrate, this stream does not provide adequate spawning or rearing habitat.

Wildlife Observed: One mature bald eagle, one harbor seal.

Stream #4E – Not Classified

Location: LAT N 58° 42' 30" / LONG W 134° 56' 11" JUNEAU C3

Description of Overall Stream: This stream channel was not found during the survey. The quad map and GPS location lists this stream in Sawmill Cove, 300 feet down from Sawmill Creek.

Stream #5E Sawmill Creek – Class I

Location: LAT N 58° 42' 56" / LONG W 134° 56' 95" JUNEAU C3

Catalog #: 115-20-10520

Species Identified by ADF&G: Chum salmon, pink salmon, Dolly Varden

Description of Overall Stream: Sawmill Creek is located in Berners Bay. It has a single meandering main channel with many small tributary streams running down the steep mountainsides that empty into the creek. It originates from a glacier at 3,000 feet elevation and flows down a moderate gradient V-shaped valley. Sawmill Creek flows out onto a wide floodplain that begins approximately 0.75 mile upstream and continues down to the mouth of the stream.

The gradient of this stream is less than three percent. The water is clear and has a low velocity. The width ranges from 15 to 20 feet and the depth ranges from one to two feet. The banks are one to three feet high with some erosion occurring towards the toe of the slopes. The substrate consists of cobbles, gravel, and sand. The stream bottom has a U shape.

Predominant vegetation noted along the stream banks consists of beach peas, grasses, and sedges. All three are found growing on the gravel bars and are the most dominant vegetation along the floodplain. Upstream, the floodplain narrows and the dominant vegetation changes to Sitka spruce, alders, willow, devils club, cow parsnip, ferns, and various flowers.

Description of Stream at the Proposed Highway Crossing: The proposed highway crossing of Sawmill Creek is about 0.5 miles from the mouth of the stream contained within the floodplain.

The stream width at the proposed highway crossing is 20 feet and the depth is 1.5 feet. The substrate consists of gravel, which is adequate for spawning. The water is clear and the velocity remains low.

The banks are stable and are one foot in height. Undercutting of the vegetated banks occurs. LWD and root wads are noted at this crossing site. Pools have been formed by LWD.

Fish Observed: Adult pink salmon were observed in this stream. Fish traps were not set.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Sawmill Creek has good spawning potential because of the adequate velocity and proper gravel size. Good rearing habitat exists as a result of undercut banks, LWD, root wads, and pools. Adequate canopy coverage is present for moderating year round stream temperatures. Therefore, spawning and rearing can exist at the proposed crossing site.

Wildlife Observed: Two mature bald eagles were noted in the trees on the beach. Brown bear were observed feeding on salmon in the creek.

Stream #6E – Class IIA

Location: LAT N 58° 44' 15.1" / LONG W 134° 55' 48.4" JUNEAU C3

Description of Overall Stream: Streams #6E and #7E are located approximately 1.5 miles north of Sawmill Creek. Neither stream was visible from an ocean beach view. A GPS was used to locate and survey these streams. Both of these streams receive excessive seasonal variation of water runoff. Stream #6E originates from 1,000 feet in elevation and #7E from 3,000 feet in elevation. Both streams are contained in a moderate gradient chute.

Stream #6E empties into the ocean only at high tide. The water is clear and flows at a low velocity. The width is three feet and the depth is six inches. The gradient is five percent. The substrate is composed primarily of non-compacted cobble. Pools have been formed by LWD lying in and over the stream. The banks are less than 1-foot high, stable, and are covered with vegetation.

This stream has a dense forested canopy of 80 percent. Predominant vegetation noted along its banks consists of Sitka spruce and alder, western hemlock, devils club, skunk cabbage, and various flowers.

Description of Stream at the Proposed Highway Crossing: At the highway crossing, this stream's morphology is the same as the overall stream morphology. This portion of the stream is contained in a single meandering channel. No spawning or rearing occurs at the crossing.

Fish Observed: No fish species were observed in this stream. Fish traps were not set.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: LWD and shallow depths are the limiting factors for fish passage. Poor substrate conditions and seasonal variation of water runoff make this stream questionable for anadromous habitat. Intertidal spawning may occur at high tide only.

Stream #7E – Class IIB

Location: LAT N 58° 44' 19.6" / LONG W 134° 55' 51.5" JUNEAU C3

Description of Overall Stream: This stream has a similar morphology to stream #6E.

Description of Stream at the Proposed Highway Crossing: At the highway crossing the width of this stream is one foot, the depth is six inches, and the water is clear, with a low velocity. The substrate is uniform and is predominantly cobble. This stream is contained in a single meandering channel.

The banks are less than one foot high, stable, and densely covered with vegetation. The canopy cover is 80 percent, and the predominant vegetation is Sitka spruce, alder, western hemlock, skunk cabbage, and various flowers.

Fish Observed: No fish were observed in this stream. Fish traps were not set.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Poor substrate conditions, lack of pools and undercut banks, and seasonal variation of water runoff make this stream unlikely for any anadromous habitat.

Stream #8E – Class IIA

Location: LAT N 58° 44' 51.6" / LONG W 134° 55' 54.8" JUNEAU C3

Description of Overall Stream: This stream is located two miles north of Sawmill Creek. It originates at 2,500 in elevation and flows down a moderate contained valley. This stream has a medium velocity and is contained in a single meandering channel that branches out into multiple (alluvial) channels as it reaches the beach. Boulders form a stair step pattern at the mouth, which increases the velocity of the water in this 50-foot section. Above the mouth, the stream levels out and the velocity slows again. The highway crossing is located 150 feet upstream from this section.

The overall gradient is six percent; the width is 15 feet at the mouth, and 10 feet at the highway crossing. The depth is one to two feet.

This stream's bottom stratum is composed of a uniform cobble/gravel substrate with scattered boulders, ranging to one foot in height. Pools and riffles exist throughout the stream.

Large trees are found lying in and over the stream. Slumping and sloping of the vegetation and LWD indicates erosion of the banks. Undercutting of these trees by the stream is evident due to the large root systems that have been overturned and exposed.

Vegetation and foliage is lush next to this stream. The canopy coverage is 50 percent. Predominant species are Sitka spruce and alder, mountain hemlock, devils club, blueberry, ferns, and goatsbeard.

Description of Stream at the Proposed Highway Crossing: The highway crossing is located 200 feet up from the mouth of the stream. The gradient is four percent, the width is 10 feet, and the depth is one to two feet. The banks are two feet in height, appear fairly stable, and are covered with vegetation. There are many large trees overturned at this site. Thick moss covers these trees and boulders. Shallow pools and riffles were observed.

Fish Observed: No fish were observed. Fish traps were set.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Riffles and shallow pools, LWD, and undercut banks are present at the highway crossing. Spawning is possible in this stream, including at the proposed highway crossing.

Wildlife Observed: A total of 20 eagles, mature and immature, were observed between streams #6E, #7E, and #8E

Stream #9E – Class IIA

Location: LAT N 58° 45' 12.6" / LONG W 134° 55' 44" JUNEAU D3

Description of Overall Stream: This stream flows 0.25 miles north of stream #8E and approximately one mile south of the Berners Bay Forest Service recreational cabin. The stream originates from a lake 2,500 feet in elevation and flows through a moderate contained valley.

The mouth is 25 feet wide and has a fairly shallow water runoff. The gradient is 10 percent. The stream narrows into a single straight channel and the width is between 10 and 15 feet. The overall depth is one foot, and the water is clear and has a high velocity. The substrate is composed of cobbles and gravel and is fairly uniform.

The height of the banks is two feet. The banks are stable and are composed of boulders covered with a two - inch layer of moss. Undercut banks are present, and large woody debris is observed, forming pools and riffles.

The overhead canopy coverage is about 80 percent. Predominant vegetation is Sitka spruce, alder, western hemlock, blueberry, devils club, ferns, and twisted stalk.

Description of Stream at the Proposed Highway Crossing: This site is located about 75 feet up from the mouth of the steam. The description of the highway crossing is the same as the overall stream. The gradient is 10 percent, the width is 15 feet, and the depth is one foot. The water velocity is high, and LWD forms two drops approximately three feet in height. The water is very shallow at the base of these drops and fish passage appears to be minimal.

Fish Observed: No fish were observed in this stream. Fish traps were not set.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Undercut banks and pools and LWD are present, which can promote adequate rearing. The two blockages found at the highway-crossing site combined with the very shallow runoff at the mouth make this system questionable regarding spawning and rearing habitat of anadromous species.

Wildlife Observed: Five immature bald eagles were spotted in the trees on the beach in front of this stream.

Stream #10E – Class III

Location: LAT N 58° 46' 33.0" / LONG W 134° 55' 60" JUNEAU D3

Description of Overall Stream: This stream is a vertical, high-velocity waterfall flowing directly into Berners Bay. It is located about 0.25 mile north of the Berners Bay Forest Service recreational cabin.

Stream #10AE – Class I

Location: LAT N 58° 47' 30.9" / LONG W 134° 56' 7.2" JUNEAU D3

This stream has been submitted to the ADF&G to be cataloged as an anadromous stream for the identification of pink and coho salmon.

Description of Overall Stream: This stream is located one mile north of the waterfall #10E and approximately 0.75 mile southeast of the Antler River. It is located along the northeastern most coastline in Berners Bay, and follows the contour of the slope to the east. This stream is fed by water runoff from the east slope. It is contained within a single meandering channel. This stream has a wide mouth, is largely tidally influenced and meanders through a floodplain for approximately 0.5 miles. Upstream, the stream meanders through the forest dominated by Sitka spruce, and eventually narrows to an end.

The stream is approximately 25 feet wide at the mouth and progressively narrows north through the forest. The width ranges from 15 to five feet and the depth from two to three feet. The gradient of this stream is less than one percent, and the water is clear and has a low velocity. The bottom of this stream is flat, consisting mostly of sand, intermixed with scattered gravel in areas. At the mouth, approximately 40 percent of the substrate is covered with algae.

The banks range from one to three feet in height and are composed of sand and silt. They are fairly stable and are covered with grasses and sedges. Some undercutting of the grassy banks is obvious. There is no canopy coverage within this stream. Predominant vegetation includes grasses and sedges that grow within the floodplain, until dominated by the spruce forest.

Description of Stream at the Proposed Highway Crossing: The highway crossing lies approximately 1.75 miles upstream from the mouth. Here the stream is 10 feet wide and the banks are three feet in height, covered with grasses on the top, while the sides of the banks show evidence of erosion. The depth is two feet. The bottom is mostly sand with small amounts of gravel. There are no pools, riffles, or LWD.

Fish Observed: Fish traps were set and eight coho smolt approximately five inches in length were caught. Adult pink salmon were also observed spawning throughout the stream.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream has good rearing habitat and is probably a rearing home to wandering coho that have found their way from other close river systems, like the Berners/Lace River and the Antler River. The stream bottom consists primarily of sand and has a small amount of gravel intermixed, which is adequate for spawning. Slow and clear water helps to provide fish with adequate spawning habitat. Both spawning and rearing habitats are available in the area of the proposed bridge-crossing site.

Stream #11E Antler River – Class I

Location: LAT N 58° 48' 60" / LONG W 134° 56' 45.2" JUNEAU D3

Catalog #: 115-20-10300

Species Identified by ADF&G: Coho salmon, chum salmon

Description of Overall Stream: The Antler River is a large braided river and is part of a classic glacial system that flows from the Antler Glacier. It is located at the north end of Berners Bay. This river is very silty and has a low to moderate velocity. Because of the silt deposition, sand bars are present throughout the steam. There are many trees that are overturned and lie across and in the river. The bottoms of the various channels are flat, and the substrate is composed of gravel, sand, and silt. The banks are highly vegetated and dominant vegetation includes alders, sedges, grasses, lupine, and Sitka spruce within the forested area. There is no canopy coverage.

Description of Stream at the Proposed Highway Crossing: The river at the proposed highway crossings has a morphology similar to that of the overall stream. The width of the river is 500 feet. The substrate is uniform and is composed of gravel, sand, and silt. There are side sloughs with low water velocities within the bridge crossing area, and rearing fish were noted. LWD, pools, and undercut banks all exist within this area.

Fish Observed: Unidentified smolt were observed rearing in a side slough within the proposed bridge crossing. These fish were not caught in the fish traps. There is a very likely chance that the fish were coho salmon.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The side sloughs noted at the bridge-crossing site have good rearing habitat potential. Spawning potential is noted. However, the main channel of the river is too fast; it is more likely that the fish spawn further upstream in some of the larger side sloughs.

Streams #12E & #13E Berners and Lace Rivers – Class I

Location: #12E: LAT N 58° 49' 52" / LONG W 134° 57' 28" JUNEAU D3

Location: #13E: LAT N 58° 49' 36" / LONG W 134° 59' 41" JUNEAU D3

Catalog #: 115-20-10020 – Lace River
115-20-10010 – Berners River

Species Identified by ADF&G: Coho salmon

Description of Overall Stream: The Berners/Lace River is a classic braided glacial river system. The mouth of the river is located at the north end of Berners Bay. It originates from an arm of the Meade Glacier, at approximately 800 feet in elevation, and flows south for 20 miles into Berners Bay. The river deposits much sand and silt, creating many sand bars scattered throughout the channel. The bottom strata are composed primarily of sand and silt. The water is silty and flows at a moderate rate. The gradient is less than 1 percent.

There is no canopy cover over this river, and predominant vegetation is Sitka alders, devils club, and grasses that grow along the west bank. Undercutting is prevalent along the bank as well. Also along the west bank are many side sloughs that flow through the grasses and into the Berners/Lace River. Small tributary streams (water runoff from uphill slopes) deposit fresh and clear water creating excellent areas for rearing habitat. Coho salmon smolt were caught and identified within these sloughs.

Description of Stream at the Proposed Highway Crossing: Two miles upstream from the start of the mouth and about 0.75 miles north of Johnson Creek the Berners/Lace River's main channel splits and flows around an island. The bridge crossing for the Berners/Lace River is located at two spots on this island, which would connect to the mainland. Locations for these crossings are on the east and west sides of the island.

The river runs straight at the proposed highway crossing location, and the channels on both sides of the island are 400 feet wide and the depth is approximately four feet deep. The bottom stratum is composed primarily of sand and silt, which feels and looks like the consistency of mud. Sand bars and riffles were observed.

Fish Observed: There were no fish observed at or near the highway crossing; however, there were coho salmon smolt identified rearing in the side sloughs on the west bank near the mouth of the Berners/Lace River.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This classic glacial system river supports anadromous species. The many side sloughs along the sides of the river provide excellent rearing habitat for rearing fish. No rearing or spawning was noted at the crossings sites. It is probable that spawning in the Berners/Lace River occurs further upstream.

Stream #13AE Johnson Creek – Class I

Location: LAT N 58° 49' 28.3" / LONG W 135° 00' 21" JUNEAU D3

Catalog #: 115-20-10070

Species Identified by ADF&G: Coho salmon, chum salmon, pink salmon

Description of Overall Stream: The mouth of Johnson Creek is located along the west bank of the Berners/Lace River. Johnson Creek flows into the Berners/Lace River approximately 1.75 miles north from the beginning of the Berners/Lace River's mouth. This stream originates from a 2,000-foot snowfield and flows through a moderate gradient V-shaped valley.

At the mouth of Johnson Creek there is a large forested island that sits directly in front of the creek, creating an oxbow at the mouth. North of this oxbow, the main channel of the creek is 10 feet wide and three feet deep. The water is clear and has a medium velocity. The gradient is three percent. Numerous LWD and boulders lie in and across the stream.

The stream meanders upstream through a forested area. A high velocity, 100-foot waterfall is located approximately one mile upstream. Two hundred feet above this waterfall is the bridge crossing and the highway that provides access to the Jualin mine. Upstream from the bridge the river flows straight, and the gradient is four percent, with a moderate flow rate.

Description of Stream at the Proposed Highway Crossing: The gradient is three percent, the width is 10 feet, and the depth is one to three feet. The bottom substrate is composed of cobbles, gravel, and sand. Pools exist around this area. LWD is found in and across the stream. Undercutting of the banks is present. The banks are one foot in height and are composed of soils covered with dense vegetation. Predominant vegetation along the banks is Sitka spruce and alder, western hemlock, willow, devils club, currants, cranberry, blueberry, salmonberry, ferns, cow parsnip, and skunk cabbage. The canopy coverage ranges from 40 to 80 percent.

Note: Stream is not crossed under the current 2003 alignment.

Fish Observed: Rearing coho, spawning adult chum and pink salmon.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Excellent spawning and rearing potential is located throughout the creek, until the waterfall. Both spawning and rearing exists in the area of the bridge crossing. Fish were observed within the oxbow and up the creek to the falls. This creek has a low velocity and adequate canopy coverage. LWD, pools, undercut banks, and adequate spawning gravel rate this creek excellent for fish habitat.

Wildlife Observed: An abundance of bear scat was observed along with some moose scat during the hike to Johnson Creek. Porcupines and bald eagles were also noted.

Stream #14E Slate Creek – Class I

Location: LAT N 58° 47' 26" / LONG W 135° 01' 54.4" JUNEAU D4

Catalog #: 115-20-10030

Species Identified by ADF&G: Chum salmon

This stream has been submitted to the ADF&G to be cataloged for the identification of coho and pink salmon.

Description of Overall Stream: Slate Creek is located at the northeast end of the cove in Berners Bay. The beginning of the access highway to the Jualin Mine is also located in this cove. Earlier studies have been done on Slate creek, with relation to the Kensington and Jualin mines.

The main channel of the stream originates 1,500 feet in elevation, and is contained within a palustrine floodplain. The creek has many channels. A dry streambed parallels the main channels, and has a high probability of flooding during spring runoff. The mouth of the stream is also made up of multiple channels. The non-compacted substrate is composed of gravel, which is adequate for spawning, and cobbles, which are composed of various flat shales. Forty percent of this substrate at the mouth is covered with intertidal algae. One-half mile up from the mouth exists a waterfall, approximately 30 feet in height.

Description of Stream at the Proposed Highway Crossing: The gradient is two percent, the width is 20 feet, the depth is one foot, the water is clear and has a low velocity. The bottom stratum is U-shaped and is composed of gravel and cobbles. The banks are stable and are lined with cobbles and vegetation. They range from one to two feet in height. Undercutting of the banks is observed. Predominant vegetation along the banks is Sitka alder and spruce, cow parsnip, and devils club. The canopy coverage ranges from 10 to 30 percent.

Fish Observed: Fish traps were set. Coho smolt were caught. Adult chum and pink salmon were observed spawning throughout the stream.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The gravel substrate and low water velocity provide adequate spawning habitat. Pools formed by LWD and boulders are present for rearing habitat. Numerous rearing coho were observed at the site of the proposed bridge crossing and along the entire stream. A large number of chum and pink salmon were also observed spawning in the creek and in the area of the bridge crossing.

Wildlife Observed: Five harbor seals were spotted approximately one mile from the stream, at the entrance to the cove. Mature bald eagles were observed in the trees of the beach, and brown bears were observed feeding on the salmon.

Stream #15E – Class I

Location: LAT N 58° 47' 25.3" / LONG W 134° 04' 42" JUNEAU D4

This stream has been submitted to the ADF&G to be cataloged as an anadromous stream for the identification of coho and pink salmon.

Description of Overall Stream: This stream is located about four miles north of Point St. Mary and Berners Bay. It is a single channel that is highly tidally influenced. An intertidal stream channel exists for approximately 200 feet, beginning at the mouth and ending at a small partial blockage. This blockage consists of boulders ranging from two to four feet tall, with LWD intermixed. The stream originates from muskegs located at a 300-foot elevation approximately 1.5 mile from the mouth of the stream.

Coho smolt were caught and identified above this blockage. Migration of coho adults above this blockage is highly probable during seasonal water variations. Above the blockage, two channels come together. The channel to the left facing upstream is a feeder stream that is approximately 10 feet wide and one foot deep and has a slow to medium velocity. The water is clear and runs over large boulders covered with moss. Pools and LWD exist within this channel. The channel to the right, facing upstream, is 15 feet wide and one to two feet deep. It flows at a much slower rate, almost becoming stagnant. A large pool pushes up against the rocks that create the blockage. The bottom stratum consists of gravel and small cobble, which is adequate for spawning.

Undercut banks, composed of boulders and cobbles, were covered with moss and vegetation. LWD exists in and across this portion of the stream. The canopy coverage is about 70 percent. Predominant vegetation includes Sitka spruce and alder, western hemlock, salmonberry, blueberry, devils club, grasses, and lupine.

Description of Stream at the Proposed Highway Crossing: The 1994 alignment crossed the stream over the intertidal channel. The 2003 highway alignment, however, avoids this stream.

Fish Observed: Coho smolt were caught and identified in the intertidal channel and above the small partial blockage. Pink salmon were observed spawning within the main channel but not above the blockage.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This is a classic stream for coho spawning and rearing. It is probable that seasonal variations of water runoff allow the coho

to migrate through the barrier and spawn up the stream. Gravel adequate for spawning exists. This stream has excellent rearing habitat including LWD, low water velocity, many pools, and small insects skimming the surface of the water.

Wildlife Observed: Bears and eagles were observed along the stream banks feeding on the spawning pink salmon.

Stream #16E Sweeny Creek – Class I

Location: LAT N 58° 51' 31" / LONG W 135° 08' 36.8" JUNEAU D4

Catalog #: 115-31-10350

Species Identified by ADF&G: Pink salmon

Description of Overall Stream: Sweeny Creek flows approximately 0.25 miles north of Point Sherman. It originates at 1,600 feet elevation and flows through a moderate gradient valley. The stream is contained within a single meandering channel. The water is clear and has a low velocity. The gradient is three percent, the average width is 10 feet, and the depth is one foot.

The bottom stratum is uneven and consists of boulder and spawning gravel. Boulders and LWD form pools needed for rearing. The banks range from three to five feet in height and are armored with boulders intermixed with cobbles. Sloughing of the vegetation is observed along the banks. Large trees are overturned and lie in and across the stream. The canopy coverage is 40 percent, and the predominant vegetation includes Sitka spruce and alder, devils club, ferns, and goatsbeard. A smaller side channel is present towards the mouth of the stream. The stream narrows to 5 feet in width, and large boulders ranging from one to two feet in diameter, create a stair step effect flowing onto the beach. The mouth of the stream becomes alluvial and braided. The percent of gravel increases at the mouth. Large boulders and alders growing on the beach divert the flow.

Description of Stream at the Proposed Highway Crossing: The proposed highway-crossing site is located approximately 800 feet from the mouth of the stream. The width is 10 feet, and the depth is one foot. Large boulders lie in the stream creating two - foot deep pools. The bottom stratum consists of boulders and gravel. The gradient is three percent and the water velocity is slow. The vegetation remains the same as the overall stream description.

Fish Observed: Pink salmon were observed spawning within the mouth of the stream.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Pools, LWD, and low water velocity provide good rearing habitat for juvenile fish. Rearing habitat is noted within the area of the highway crossing. Intertidal spawning was observed. In the area of the highway crossing, the irregular boulder substrate does not provide a good area for spawning. However, spawning may occur further upstream.

Stream #17E Sherman Creek – Class I

Location: LAT N 58° 52' 4.2" / LONG W 135° 08’ 21" JUNEAU D3

Catalog #: 115-31-10330

Species Identified by ADF&G: Pink salmon

Description of Overall Stream: Sherman Creek is located one mile north of Point Sherman. The Kensington Mine is located at this creek. The stream is contained in a single, meandering, classic V-shaped valley. It flows at a moderate to high velocity. The bottom stratum is composed of cobbles and boulders, which form an uneven bottom. The stream's water flow increases as it approaches the inlet. Boulders in the stream form a stair step pattern, which possibly allows fish migration.

Predominant vegetation is Sitka spruce and alder, thimbleberry, cow parsnip, goatsbeard, ferns, and various flowers, while sedges and grasses are predominant on the beach.

Description of Stream at the Proposed Highway Crossing: The stream gradient is five percent, the average width is 15 feet, and the depth is three feet. The substrate is composed of cobble and boulders. The north bank consists of a shale bedrock wall and ranges from 40 to 60 feet in height. At the top of the rock face, the shale is eroding, and large trees are slumping toward the stream. The south bank has a gravel floodplain 50 feet wide and is met by a shale rock wall approximately 100 feet in height. Erosion and vegetation slumping is also observed. There is no canopy coverage at the crossing site.

Fish Observed: Pink salmon were observed spawning in the creek

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Because of the high water velocity and irregular substrate, spawning habitat in the area of the highway crossing is minimal. Regarding rearing habitat, few pools exist and the stream at the highway crossing lacks vegetation along the banks. Intertidal spawning is probable, as well as minimal spawning upstream.

Stream #18E – Class I

Location: LAT N 58° 53' 21.1" / LONG W 135° 08' 16.6" JUNEAU D4

Catalog #: 115-31-10300

Species Identified by ADF&G: Sockeye salmon

This stream has been submitted to the ADF&G to be cataloged for the identification of pink salmon.

Description of Overall Stream: This stream originates from Independence Lake, which is glacially fed. From the lake, the main channel of the steam flows about 1.5 miles before reaching the inlet. The main channel has a four percent gradient, and an average width of 15 feet. The depth is one to two feet. The water is clear and has a medium velocity. The stream meanders and is contained in a single channel. Towards the mouth, the stream becomes braided, and its multiple channels flow over the beach at an eight percent gradient. The banks are approximately eight feet high and are sloughing.

Description of Stream at the Proposed Highway Crossing: The stream gradient is four percent, the width is 10 feet, and the depth is two feet. A small tributary stream deposits sediment into the main channel. The substrate is fairly irregular and is composed of gravel, cobbles, and scattered boulders. A large gravel bar is located in the middle of the stream. The south bank is a stable floodplain composed of gravel and cobbles. The predominant vegetation of the bank is grasses and beach peas.

The north bank ranges from one to three feet in height and is lined with boulders and cobbles. A 1,000 foot high bedrock cliff is located 100 feet back from the bank. The banks show undercutting, erosion, and sloughing from the toe of the slope. The canopy coverage is 40 percent. Predominant vegetation is Sitka spruce and alder, willow, cow parsnip, sedges, grasses, and flowers.

Fish Observed: Pink salmon were observed spawning in the creek.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Pools, LWD, and undercut banks are present for rearing habitat. Spawning habitat is present in this stream.

Streams #19E through #42E

Streams #19E through #42E are located on the east side of Lynn Canal and are all too steep to survey. All were observed 0.125 miles offshore from the boat with binoculars. The latitude was taken by GPS from the boat. The longitude was taken from profile maps. These are streams or waterfalls contained in chutes or gullies, originating from various glacial fields and spring melt-off. The majority of these waterfalls are contained within a V-shaped valley or chute. Predominant vegetation found along the streams is Sitka spruce and alder and western hemlock.

Stream #19E – Class III

Location: LAT N 58° 54' 31.5" / LONG W 135° 09' 15.8" JUNEAU D4

This waterfall originates from a snowfield at 3,000 feet elevation. The stream flows in a single straight channel. The substrate is composed of boulders and gravel. The water velocity is low and empties onto a gravel beach. Sitka spruce and alder, cow parsnip, and sedges are the predominant species.

Stream #20E – Class III

Location: LAT N 58° 55' 40.6" / LONG W 135° 09' 6.0" JUNEAU D4

This waterfall flows from an 80-degree slope and then flows down a 30-degree slope for approximately 100 feet. It originates from a snowfield at 2,000 feet elevation. The stream is contained within a single straight channel and flows down a partial V-shaped valley. The substrate is composed of boulders and gravel. The water velocity is high and empties onto a cobble and boulder beach. The cliffs are covered with Sitka spruce and alder and cow parsnip. Sedges are the predominant species.

Stream #21E – Class III

Location: LAT N 58° 56' 58.5" / LONG W 135° 10' 23.6" JUNEAU D4

This high-velocity waterfall originates from 3,000 feet elevation. The first 1,500 feet is at an 80-degree slope and consists of snow covering the bedrock. Water runs off the remaining 1,500 feet at a 70-degree slope, and mellows to 60 degrees as it flows onto the beach and into the canal. There is evidence of slides and avalanches. Sitka spruce and alder are found growing from 1,500 feet to sea level.

Stream #22E – Class III

Location: LAT N 58° 57' 41.5" / LONG W 135° 10' 20.25" JUNEAU D4

This low-velocity stream originates at 2,000 feet and is contained within a deep gorge. Water flows approximately 500 feet and then disappears behind a steep talus slope with cobble debris that erodes onto the beach. The rockslide is composed of large, angular cobbles and boulders.

Stream #23E – Class III

Location: LAT N 58° 59' 22.5" / LONG W 135° 10' 34.1" JUNEAU D4

This high velocity stream originates at 3,000 feet and slopes 60 degrees. The water follows the topography of the partial V-shaped valley, which flows around a large, vertical, exposed cliff face, flows north and then cuts south, emptying into a 70-degree waterfall. This waterfall flows directly onto a boulder beach and into the canal. No vegetation is growing on the exposed cliff. Sitka spruce, alder, and western hemlock cover the rest of the area.

Stream #24E – Class III

Location: LAT N 58° 59' 26.4" / LONG W 135° 10' 33.8" JUNEAU D4

This low velocity, 70-degree waterfall flows through a snowfield chute. At lower elevations the slope decreases to about 30 degrees and flows through vegetation. The waterfall dries up before reaching the canal. The beach is lined with bedrock.

Stream #25E – Class III

Location: LAT N 58° 59' 56.3" / LONG W 135° 10' 31.3" SKAGWAY A1

This 70-degree, low-velocity waterfall originates from a 3,000-foot elevation hanging glacier. It flows through a 300-foot long avalanche chute. The scar and the immature vegetation growing within it denote evidence of large avalanches.

Stream #26E – Dry – Not Classified

Location: LAT N 59° 00' 7.6" / LONG W 135° 10' 41.5" SKAGWAY A1

This stream is dry with no visible water. Between streams #25E and #27E, a large band of bedrock is exposed beginning at sea level and rising up about 2,000 feet.

Stream #27E – Dry – Not Classified

Location: LAT N 59° 00' 49" / LONG W 135° 11' 32.4" SKAGWAY A1

This chute, where a stream could have existed at one time, is dry. Steep exposed cliffs continue to loom out, and predominant vegetation growing on the mountainside is Sitka spruce.

Stream #28E – Class III

Location: LAT N 59° 02' 0.9" / LONG W 135° 12' 4.4" SKAGWAY A1

This stream originates from a large overhanging icefield at 3,000 feet elevation. A horizontal bedrock band is down slope from the glacier. Vegetation starts 500 feet below the rock band. Three 70-degree, low-velocity, small waterfalls join into one stream. The slope decreases to 30 degrees before emptying into another 100-foot long, steep, high-velocity waterfall. The waterfall then empties onto a cobble/boulder beach.

Stream #29E – Class III

Location: LAT N 59° 02' 49" / LONG W 135° 11' 58.2" SKAGWAY A1

This high-velocity, nearly vertical waterfall originates from a 3,000-foot elevation ice field. The waterfall flows over exposed rock and through an avalanche chute before emptying into the canal.

Stream #30E – Class III

Location: LAT N 59° 02' 55.5" / LONG W 135° 11' 56" SKAGWAY A1

This waterfall joins with #29E at 1,000 feet elevation. It has a low-velocity and an 80-degree gradient.

Stream #31E – Class III

Location: LAT N 59° 03' 4.2" / LONG W 135° 11' 53.3" SKAGWAY A1

This is a low-velocity waterfall that flows down an 80-degree slope. Evidence of avalanches and vegetation change is prominent.

Stream #32E – Class III

Location: LAT N 59° 03' 6.7" / LONG W 135° 11' 53.3" SKAGWAY A1

This is a low-velocity waterfall that flows down an 80-degree slope. Evidence of avalanches and vegetation change is prominent.

Stream #33E – Class III

Location: LAT N 59° 04' 5.2" / LONG W 135° 12' 10.4" SKAGWAY A1

This small, low-velocity waterfall empties directly into the canal. It originates at about 2,500 feet and has a gradient of 70 degrees. It flows over exposed bedrock, with some small shrubs growing on the sides. Evidence of an old avalanche chute is prominent.

Stream #33AE – Class III

Location: LAT N 59° 04' 6.3" / LONG W 135° 12' 10.5" SKAGWAY A1

This waterfall is similar to #33E.

Stream #34E – Class III

Location: LAT N 59° 04' 13.2" / LONG W 135° 12' 8.9" SKAGWAY A1

This stream originates from a snowfield and slows to a small trickle at about 300 feet elevation. It flows down an 80-degree sloping avalanche chute but dries up before it reaches the canal.

Stream #35E – Dry – Not Classified

Location: LAT N 59° 04' 31.2" / LONG W 135° 12' 15.6" SKAGWAY A1

A stream is not visible at this site.

Stream #36E – Dry – Not Classified

Location: LAT N 59° 04' 41.8" / LONG W 135° 12' 23.1" SKAGWAY A1

This stream is dry. North of this stream, granite bedrock lines the beach for approximately two miles. These granite cliffs along the shore range from 30 to 50 feet in height, and the vegetation growing on top of the cliffs is Sitka spruce and western hemlock.

Stream #37E Yeldagalga Creek – Class III

Location: LAT N 59° 06' 13.3" / LONG W 135° 13' 17.5" SKAGWAY A1

This waterfall is a large, high velocity, vertical waterfall originating from a snowfield 3,000 feet in elevation. It flows through a V-shaped valley with large mountains on both sides. The waterfall levels out at 2,000-feet elevation and flows along a bench before emptying into another vertical waterfall that is 50 feet in height. Thick vegetation consisting of spruce and alder surround the falls from 2,000 feet to sea level.

Stream #38E – Not Classified

Location: LAT N 59° 06' 16.2" / LONG W 135° 13' 20.1" SKAGWAY A1

There is no stream visible at this site.

Stream #39E – Class III

Location 1) LAT N 59° 06' 27.0" / LONG W 135° 13' 38.2" SKAGWAY A1

2) LAT N 59° 06' 41.0" / LONG W 135° 13' 38.2" SKAGWAY A1

3) LAT N 59° 06' 43.5" / LONG W 135° 13' 38.2" SKAGWAY A1

4) LAT N 59° 06' 54.0" / LONG W 135° 13' 38.2" SKAGWAY A1

All four of these small, low-velocity waterfalls exist where #39E is sited on the topographical maps and dry up before flowing into the canal. The waterfalls start at about 3,000 feet elevation and flow through an 80-degree avalanche chute carved into the bedrock. Prominent vegetation is spruce. The beach is lined with granite bedrock.

Stream #40E – Class III

Location: LAT N 59° 07' 4.5" / LONG W 135° 13' 43.8" SKAGWAY A1

Two streams join at 2,000 feet and then dry up. The slope is 80 degrees with Sitka spruce growing on the exposed bedrock. A distinctive rock band is present between streams #40E and #41E.

Stream #41E – Dry – Not Classified

Location: LAT N 59° 07' 16.4" / LONG W 135° 13' 50" SKAGWAY A1

Dry stream.

Stream #42E – Dry – Not Classified

Location: LAT N 59° 07' 31" / LONG W 135° 13' 57.6" SKAGWAY A1

Dry stream.

Stream #43E – Class IIB

Location: LAT N 59° 08' 46" / LONG W 135° 14' 51" SKAGWAY A1

Description of Overall Stream: This stream originates from a 3,000-foot elevation ice field, with tributary streams. The stream flows through a V-shaped, moderate gradient valley. The stream stair steps down over boulders, but no blockages were noted. The overall gradient to the ocean increased to about 25 percent. An island of boulders and shrubs are present in the middle of the stream. The stream fans out and flows over boulders before emptying into the ocean.

Description of Stream at the Proposed Highway Crossing: The stream gradient is 10 percent, the width is 10 to 30 feet, and the depth is three feet. The water is glacial and has a high velocity. The stream is contained in a single straight channel. The substrate is composed of boulders and large cobbles, with a fairly uniform bottom. The two-foot stable banks consist of moss-covered boulders and granite bedrock. The existing vegetation is Sitka spruce and alder, western hemlock, willow, blueberries, wild iris, grasses, and sedges.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The flow is too high and the substrate consists of cobble; therefore, spawning is not probable at this site. There are no pools, LWD, or undercut banks that are necessary for rearing.

Stream #44E – Class IIB

Location: LAT N 59° 09' 14" / LONG W 135° 15' 21" SKAGWAY A1

This low-velocity waterfall is 70 degrees and passes over granite walls to flow onto a boulder beach. The waterfall is two feet wide, with Sitka spruce and alders and western hemlock along its banks.

Stream #45E – Class IIB

Location: LAT N 58° 53' 45" / LONG W 135° 08' 50" SKAGWAY A1

Description of Overall Stream: This stream originates from a snowfield and flows down a high-gradient, large, contained V-shaped valley. Two 3,000-foot mountains are on either side of the stream. The gradient is 10 degrees, and the substrate consists of large cobbles and boulders. At low tide, the stream fans out to 50 feet wide, and runs about 100 feet down the beach to the inlet.

Description of Stream at the Proposed Highway Crossing: A 50-foot-high waterfall is present at the highway crossing. Downstream from the waterfall the gradient is 45 degrees, the width is 10 feet, the depth is one to three feet, and the water is clear and has a high velocity. The stream is contained in a single straight channel. The substrate is composed of boulders, with an irregular bottom. Dead trees and other LWD are found in and over the stream. The banks are 60-foot-high granite bedrock walls, sloping 30 degrees. The canopy coverage over the stream is 50 percent. The predominant vegetation growing on top of the banks is Sitka spruce and alder, western hemlock, and devils club.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream is not suitable for spawning or rearing fish because of its high velocity and lack of spawning gravel, undercut banks, and pools.

Wildlife Observed: Mature bald eagles were seen in the trees on the beach.

Stream #46E Katzehin River – Class I

Location: LAT N 59° 12' 0.30" / LONG W 135° 17' 17.5" SKAGWAY A1

Catalog #: 115-34-10700

Species Identified by ADF&G: Coho and chum salmon, and Dolly Varden

This stream has been submitted to the ADF&G to be cataloged for the identification of pink salmon.

Description of Overall Stream: The Katzehin River is located approximately six miles southeast of Haines. It is a large glacial stream that flows approximately 12 miles through a classic U-shaped valley, originating 500 feet in elevation from the Meade Glacier. The river is an active braided stream channel, and is home to a very productive run of chum salmon.

The river meanders around high mountains. The north bank expands into a large floodplain for 1 mile, after which the mountains meet it. Predominant vegetation growing on the floodplain is Sitka spruce, while grasses dominate towards the mouth. There is a 60-degree slope, 3,000 feet in elevation on the south bank. Much of the rock is exposed, and hemlock and alder are growing on the steep cliffs. Many small runoff streams originating from these steep slopes pour into the Katzehin. Large pools and many side tributaries allow for excellent habitat to rearing fish. Coho smolt were observed and caught in the side channels. The mouth of the river is approximately 2,800 feet wide and alluvial.

Description of Stream at the Proposed Highway Crossing: The gradient is two percent, the width is 30 feet, and the depth ranges from one to three feet. The water is silty and flows at a low velocity. The substrate is fairly uniform and is composed of silt and gravel adequate for spawning. Pools are observed, and LWD is scattered on the banks and in the river. There is evidence of flooding along the banks. Tidal influence is also observed in the area of the crossing. The banks are fairly stable and are composed of gravel and silt. The predominant vegetation is Sitka spruce, and alder, western hemlock, grasses, sedges, and potentilla. There is no vegetation coverage over the river.

Fish Observed: Many coho smolt were observed in the stream. Traps were set and the coho smolt were identified. Pink salmon were observed spawning close to the mouth in a side channel on the north bank of the river.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Spawning and rearing exist at the proposed highway-crossing site, as well as throughout the entire stream. The river contains adequate gravel, low velocity, pools, LWD, and some undercutting of the banks on the north side.

Wildlife Observed: Moose, black bear, and bird tracks were observed. Eagles were spotted on the beach.

Stream #47E – Class I

Location: LAT N 59° 12' 31.2" / LONG W 135° 18' 3.3" SKAGWAY A1

Description of Overall Stream: This stream is located off the main channel of the Katzehin River. It flows throughout the floodplain on the north side upland of the highway alignment and outflows into the Katzehin River. It is contained in a single meandering channel and is influenced directly by intertidal levels. The flow is slow to almost stagnant. The bottom has 40 percent algae coverage. The substrate is composed of sand, silt, and gravel, which is adequate for spawning. The banks are composed of the alluvium transported by the Katzehin from the Meade Glacier. The source of this stream is the Katzehin and muskegs that exist on the north side of the river.

Description of Stream: The stream gradient is one percent, the width is three feet, and the depth is one foot. The water is clear and has a low velocity. The substrate consists of sand, silt, and gravel. The banks are composed of sand and covered with grasses and sedges.

Note: This stream flows through the Katzehin River Delta, but outflows into the river upstream of the 2003 alignment.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Fish were not observed; however, potential intertidal spawning might exist. This channel provides an excellent habitat for rearing.

Stream #48E – Class III

Location: LAT N 59° 13' 33" / LONG W 135° 19' 22.1" SKAGWAY A1

This is a 70-degree, low-velocity waterfall that barely reaches the canal.

Stream #49E – Class III

Location: LAT N 59° 14' 61" / LONG W 135° 20' 58.9" SKAGWAY A1

This medium-velocity waterfall levels out for about 100 feet before it empties onto the beach in an alluvial fan.

Stream #50E – Not Classified

Location: LAT N 59° 15' 32.5" / LONG W 135° 21' 31.2" SKAGWAY B1

A stream is not visible at this site. A bedrock wall lies to the north and south of this dry streambed.

Stream #50AE – Class III

Location: LAT N 59° 17' 27.1" / LONG W 135° 21' 31.2" SKAGWAY B1

The stream originates approximately 2,000 feet in elevation and flows through a V-shaped forested canyon. The slope is 60 degrees and flows for about 70 feet before dropping onto the beach as a large-volume, high-velocity waterfall. Just to the north of the waterfall is a 600-foot vertical rock face.

Stream #51E Dayebas Creek – Class III

Location: LAT N 59° 17' 53" / LONG W 135° 21' 56.4" SKAGWAY B1

This stream has a low velocity and is barely visible.

Stream #52E – Dry – Not Classified

Location: LAT N 59° 18' 21.5" / LONG W 135° 21' 59.8" SKAGWAY B1

This stream is dry. An 85-degree talus slope is visible.

Stream #53E – Class III

Location: LAT N 59° 19' 50.8" / LONG W 135° 21' 38.8" SKAGWAY B1

This 60-degree, medium-velocity waterfall flows over bedrock up high. Below 1,000 feet, the stream is barely visible and flows through the trees before flowing into Taiya Inlet.

Stream #54E – Dry – Not Classified

Location: LAT N 59° 20' 54.9" / LONG W 135° 21' 29.8" SKAGWAY B1

This area has exposed, fractured bedrock. No waterfall is visible.

Stream #55E – Class III

Location: LAT N 59° 21' 46.6" / LONG W 135° 21' 24" SKAGWAY B1

This massive, high-velocity waterfall flows 80 degrees through a vegetated gorge, landing directly onto the beach.

Stream #55AE – Dry – Not Classified

Location: LAT N 59° 22' 24.7" / LONG W 135° 21' 24" SKAGWAY B1

This is an uncharted waterfall that is similar to #55E. Its large flow is potentially produced from the source that once fed stream #56E, which is currently dry.

Stream #56E – Dry – Not Classified

Location: LAT N 59° 22' 38.8" / LONG W 135° 21' 2.3" SKAGWAY B1

This waterfall is dry. It is possible that this stream could have changed course and become what is now referred to as #55AE. A talus slope contained in a gorge is visible. In previous years #56E had been observed as a large, high-velocity waterfall.

Stream #57E Kasidaya Creek – Class III

Location: LAT N 59° 24' 15.8" / LONG W 135° 20' 20.6" SKAGWAY B1

The waterfall originates from a 4,000-foot snowfield and flows through a 30-degree sloping gorge. It then cuts through a 20-foot high rock wall before flowing onto a boulder beach. Just north of this stream are a stable bedrock band and a large talus slope with a lot of debris lying on the beach.

Stream #58E – Class III

Location: LAT N 59° 25' 18.4" / LONG W 135° 20' 19.3" SKAGWAY B1

This steep, low-velocity stream originates from Lower Dewey Lake. It travels around a knoll and between rock walls before emptying into Taiya Inlet. A trail parallels this creek and provides access from Skagway starting at Lower Dewey Lake and travels down to the mouth of the creek. At the mouth of the creek is Sturgills landing, a historical sawmill site. Picnic tables, an outhouse, and fire pits are found here, which are maintained by the USDA Forest Service for public use.

WEST SIDE: WILLIAM HENRY BAY TO HAINES

The following pages contain detailed information of the investigate streams, based on information gathered during the streams surveys on West Lynn Canal from William Henry Bay to Haines.

Stream #1W Beardslee River – Class I

Location: LAT N 58° 42' 31" / LONG W 135° 15' 0.8" JUNEAU C4

Catalog #: 115-10-10650

Species Identified by ADF&G: Coho salmon, pink salmon, chum salmon, and Dolly Varden.

Description of Overall Stream: The Beardslee River is located at the south end of William Henry Bay. The main channel receives water from two tributary streams. One of these streams flows from a small lake located at 500 feet in elevation, and the other originates at 2,500 feet in elevation. The two streams meet one mile up from the mouth and form the main channel, which meanders through a palustrine floodplain and into the bay. It is contained within a U-shaped valley. Two dry channels parallel the main channel and have the potential to flood with seasonal water variations.

Unstable banks are noted. The west bank is 30 feet high and has a slope of 50 degrees. Sloughing and sediment input from the banks and into the stream is observed. The east bank is adjacent to a floodplain and is stable and covered with grasses and sedges. Gravel bars covered with grasses are also observed along the east bank. The canopy cover is about 10 percent, and predominant vegetation is Sitka spruce and alder, devils club, cow parsnip, and various flowers and grasses.

Description of Stream at the Proposed Highway Crossing: The 2003 highway alignment does not cross this river.

Fish Observed: Coho salmon, pink salmon, chum salmon, and Dolly Varden.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream has an adequate water velocity, proper gravel size, LWD, undercut banks, pools, and canopy cover for providing excellent fish habitat. Coho smolt were observed along with many adult pinks spawning near the mouth and up the stream.

Wildlife Observed: Brown bear were observed feeding upstream from the mouth on the run of chum salmon.

Stream #2W William Henry Creek – Class I

Location: LAT N 58° 42' 59.5" / LONG W 135° 14' 45.3" JUNEAU C4

Catalog #: 115-10-10680 (as of 2002)

Species Identified by ADF&G: Pink and chum salmon (as of 2002). This stream has been submitted to the ADF&G to be cataloged as an anadromous stream for the identification of pink salmon (1994).

Description of Overall Stream: William Henry Creek is located on the northwest side of William Henry Bay. The overall stream's morphology is similar to the description of the proposed highway crossing. The stream flows through a moderate gradient V-shaped valley and meanders through a forest, which provides a 40-percent vegetation canopy cover. The vegetation decreases and opens up towards the mouth. The predominant vegetation along the beach consists of grasses, beach pea, and sedges.

Description of Stream at the Proposed Highway Crossing: The stream gradient is two percent, the width is 15 feet, the depth is one to two feet, and the water is clear and has a medium velocity. The stream flows in a single straight channel. The bottom stratum is irregular and is composed of boulders and cobbles. Large woody debris lies across and in the stream, with pools formed behind the boulders. Small gravel bars with grasses and sedges growing on top are located on the sides of the stream.

The banks are 10 feet high and slope up to 50 degrees. They are moderately stable with some vegetation growth down the slopes of the banks. Erosion of cobbles and boulders from the sides of the banks and into the stream is noted. The boulders form small pools. The stream has a thick canopy cover of about 45 percent. Predominant vegetation is Sitka spruce and alder, western hemlock, devils club, salmonberry, goatsbeard, ferns, flowers, and sedges.

Fish Observed: Pink salmon.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Observations of spawning and rearing during the primary study show the water velocity is fairly high, the substrate is too large and irregular for spawning, and no undercut banks and calm pools exist for rearing habitat. However, during the aerial surveys, hundreds of pinks were observed spawning intertidally, in the mouth, and approximately 100 feet up into the stream.

Wildlife Observed: One harbor seal was observed south of the mouth of the stream.

Stream #3W – Class I

Location: LAT N 58° 44' 44.6" / LONG 135° 14' 27" JUNEAU C4

This stream has been submitted to the ADF&G to be cataloged as an anadromous stream for the identification of pink salmon.

Description of Overall Stream: This stream is located approximately 1.5 miles from the mouth of William Henry Bay. This stream originates at 2,500 feet elevation and flows down a large, steep gradient V-shaped valley. The stream follows a single straight channel. Along the beach, the stream flow is moderate to slow and the slope is approximately six degrees. The mouth is 15 feet wide. The river continues into the woods, and large boulders with small gravel scattered in between fill up the stream. Large boulders are eroding out of the sides of the stream banks. The depth of the river is approximately one foot. The banks are two to three feet in height. The water table seems to be high, as evidenced by large uprooted and slumping trees.

Approximately 100 feet upstream from the mouth is a two-foot high logjam forming a partial blockage through which fish passage is probable. The velocity slows above the logjam, forming pools for rearing. Spawning gravel is present. The vegetated banks have under cutting, and are fairly stable. Approximately 500 feet upstream from the mouth is a 70-degree, 100-foot cascading waterfall, which forms a total fish blockage. At the bottom of the falls lie huge trees and rocks that have fallen and now slow the water velocity before it enters the inlet.

Description of Stream at the Proposed Highway Crossing: The proposed highway-crossing site is located approximately 75 feet from the mouth of the stream. The gradient is three percent, the width is 20 feet, the depth is up to one foot, and the water is clear and has a medium velocity. The substrate is composed of boulders and cobbles that form an irregular bottom. Spawning gravel is observed in the stream along the sides of the banks. The banks consist of cobble and are eroding from the toe of the slope. LWD of downed spruce trees lie across and in the stream.

The canopy coverage is about 50 percent, with the predominant vegetation (Sitka spruce, mountain hemlock, salmonberry, blueberry, huckleberry, devils club, and goatsbeard) on the banks of the stream.

Fish Observed: Pink salmon were observed spawning in the intertidal zone and a short distance up the stream during the aerial flight surveys.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Spawning and rearing is probable in this stream because of the adequate stream velocity, spawning gravel, pools, and undercut banks.

Wildlife Observed: A school of porpoise was observed in front of the stream, and bald eagles were spotted in the area.

Stream #4W – Class IIB

Location: LAT N 58° 45' 2" / LONG W 135° 14' 21.7" JUNEAU D4

Description of Overall Stream: This stream flows approximately 1.75 miles north of William Henry Bay and two miles south of the Endicott River. It originates at 1,500 feet and flows through a floodplain at lower levels. The overall stream grade is approximately 30 degrees. Upstream about 30 feet from the highway crossing is a 70-degree, 25-foot waterfall that is impassable to fish. The banks are thick with spruce, and trees are slumping and falling off the huge cliffs that surround the stream. The cliffs are about 25 feet high. From the highway crossing to the mouth, the stream gradient increases to about 25 percent, and the water level on the beach is six inches. The banks are lined with huge boulders that are covered with moss. Some undercutting of the moss blanket is evident close to the falls.

Description of Stream at the Proposed Highway Crossing: The highway crossing is approximately 60 feet from the mouth of the stream. The gradient is 15 degrees, the width is five to 10 feet, the depth is one foot, the water is clear and has a high velocity. The stream follows a single straight channel. The substrate is irregular with boulders, cobbles, and spawning gravel. The water stair steps down over two-foot boulders and LWD, forming pools.

The banks are 25-feet high, with vegetation growing on top. The boulder and bedrock banks are stable and slope 60 degrees. Sitka spruce and alder, salmonberry, devils club, goatsbeard, ferns, and grasses are the predominant species. Twenty percent of the trees are slumping and eroding down the side banks into the stream. The canopy coverage is about 90 percent.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The waterfall is a fish blockage. Spawning habitat in the stream is limited because of the large substrate and lack of spawning gravel. LWD and pools are present; however, the high water velocity could be a limiting factor.

Stream #4AW – Class IIB

Location: LAT N 58° 46' 37.8" / LONG W 135° 15' 07.4" JUNEAU D4

Description of Overall Stream: This stream flows through a moderate contained valley. The gradient and substrate are similar with the highway crossing. From the inlet, approximately 50 feet up from the mouth, exists a waterfall that is approximately 20 feet in height, slopes 70 degrees, and flows at a low velocity.

Description of Stream at the Proposed Highway Crossing: The proposed bridge crossing lies in between the waterfall and the mouth of the stream. The gradient of this stretch is 10 percent, the width is five feet, and the depth is 6 inches. The water is clear and has a low velocity. The stream runs in a single straight channel. The substrate, composed of boulders and spawning gravel, has an irregular bottom. The water stair steps over the two-foot boulders, forming six-inch deep pools. Large woody debris in and over the stream also forms pools. Both the LWD and the boulders are covered with moss.

The banks are stable and slope 70 degrees. They are 20 feet high, and are composed of bedrock. The canopy coverage is 60 percent. The predominant vegetation includes Sitka spruce and alder, and willow trees on the upper banks. Sloughing of these trees is observed. The remaining vegetation includes devils club, salmonberry, goatsbeard, ferns, and flowers.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The low velocity, shallow depths, and short level reach do not promote good spawning or rearing habitat. The waterfall blocks fish passage.

Stream #4BW Endicott River – Class I

Location: LAT N 58° 47' 7.2" / LONG W 135° 16' 1.7" JUNEAU D4

Catalog #: 115-10-10800

Species Identified by ADF&G: Coho and chum salmon, and Dolly Varden

This stream has been submitted to the ADF&G to be cataloged as an anadromous stream for the identification of pink salmon.

Description of Overall Stream: The Endicott River is a large glacial river system that is contained in a classic U-shaped valley. It is an active meandering braided stream that originates near the Glacier Bay National Park boundary at Endicott Lake, near the 1,900-foot elevation. The river flows 21 miles east, through the valley and floodplain, and terminates in Lynn Canal. Karst topography lines the beach in front of the river.

To the south of the river lies a dense forest. To the north lies an open estuary, bordering the floodplain. Many tributary creeks are observed running off of the adjacent mountains and into the river from the south bank. These runoffs provide extra freshwater for rearing pools, and enable the channels to remain active during dry periods. The canopy cover of the tributary creeks is approximately 90 percent.

The main river channel has the same morphology as the highway crossing with various sand and gravel bars. The side channels have a lower velocity, pools, undercut banks, sand/silt and gravel flat bottom, and clear running water.

Description of Stream at the Proposed Highway Crossing: The stream gradient is one percent, the width of the main channel is 60 feet, the depth is three to five feet, and the water is glacial and has a low to medium velocity. Two other channels, one 15 feet wide and the other three feet wide, are in line with the highway crossing. The total river span width is 300 feet. The substrate is composed of gravel beds overlain by silt. The water is clear in these side sloughs, while the main channel is silty.

The north bank consists of gravel and lies adjacent to the floodplain. Alders and dead downed trees are present. The south bank is also gravel and two feet high with Sitka alders growing on top. Approximately 100 horizontal yards from the main river on the south side are the stable and vegetated mountains.

The canopy cover is non-existent in the main channel, but there are alders hanging low over the side channels. Sitka alder and spruce, western hemlock, cottonwood, willow, fireweed, equisetum, sedges, and grasses are the predominant vegetation species.

Fish Observed: Sculpins were observed in the intertidal pools on the beach. Fish traps were set, and coho smolt were captured and identified. They were observed in abundance rearing in the side sloughs. Adult pink salmon were also observed spawning at the mouth and up the river.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The Endicott River provides excellent habitat for fish. The side channels provide good rearing habitat, with low flows, adequate canopy coverage, and undercut banks. The gravel substrate and pools allow for good spawning habitat. Both spawning and rearing habitat were observed at the proposed bridge-crossing site.

Wildlife Observed: A river otter and harbor seal were seen at the mouth of the stream. Eagles, shrews, moose, great blue heron, and wolf tracks were observed.

Stream #5W – Class I

Location: LAT N 58° 48' 57.8" / LONG W 135° 16' 51" JUNEAU D4

Description of Overall Stream: This stream originates from a 700-foot high lake and flows down a moderate gradient. A large gravel bar is built up at the mouth of the stream. Potential tidal and wave action has caused this buildup and has currently blocked the entrance of the stream. The water from the stream percolates down into the built-up beach gravel.

At the mouth of the streams, two-foot boulders form a stair step pattern of falls. Pools, LWD, and undercut banks are present up to the bridge crossing. The banks are 10 feet high with erosion of sediment into the stream. The predominant vegetation is the same as the description of the highway crossing, and in addition, grasses and cow parsnip are seen close to the inlet.

Description of Stream at the Proposed Highway Crossing: The stream gradient is two percent, the width is five feet, the depth is up to one foot, and the water is clear and has a low velocity. The stream flows in a single meandering channel. The substrate, composed of cobbles and boulders, has an irregular bottom. Pools are formed behind the numerous boulders and LWD in and across the stream. Boulders line the banks, which are vegetated with trees, some of which are uprooted and slump into the stream. The stream's canopy cover is 50 percent, and the predominant vegetation is Sitka spruce and alder, willow, devils club, currant, goatsbeard, deer and shield fern, and various flowers.

Fish Observed: ADF&G found Dolly Varden in previous surveys.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream does not have adequate fish habitat because of its low velocity and depth and lack of spawning gravel. However, undercut banks, pools, canopy cover, and LWD are present for rearing habitat throughout the stream and in the vicinity of the proposed bridge-crossing site. The lack of water flowing directly into the inlet is the limiting factor for fish migration in this stream. Seasonal variations of water runoff could potentially open up this stream for fish migration.

Wildlife Observed: One harbor seal was seen south of the stream mouth.

Stream #6W – Class IIA

Location: LAT N 58° 49' 19.5" / LONG W 135° 17' 18" JUNEAU D4

Description of Overall Stream: This stream is located approximately 2.75 miles north of the Endicott River. It originates at 1,500 feet elevation and flows through a large gradient valley. The stream's general morphology is similar to that of the highway crossing. About 0.25 miles upstream from the highway crossing is a 2,000-foot waterfall. On the beach, the stream widens to about 25 feet, and is too shallow for fish to migrate, even at high tide. A mixture of shale, limestone, greywacke, and intrusive rocks were observed on the beach at the stream mouth.

Description of Stream at the Proposed Highway Crossing: The stream gradient is 10 percent, the width is 10 feet, the depth is up to two feet, and the water is clear and has a medium velocity. The stream is contained in a single straight channel. The substrate is composed of cobbles and spawning gravel. The water flows over two-foot boulders, forming a stair step pattern and pools. The moss-covered boulder banks are 2 feet high and stable. Undercutting is present along the banks. The canopy cover is 80 percent. The predominant vegetation is Sitka

spruce and alder, willow, hemlock, elderberry, devils club, goatsbeard, cow parsnip, sedges, and equisetum.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The substrate is too large for proper spawning habitat. This stream does have adequate rearing habitat, but access from the inlet is not probable due to the shallow depths at the mouth. The velocity is fairly high and could be a limiting factor for rearing in this stream. The waterfall found above the proposed bridge crossing blocks fish passage.

Wildlife Observed: Two mature bald eagles were seen in trees on the beach.

Stream #7W – Class I

Location: LAT N 58° 50' 48.7" / LONG W 135° 18' 41.6" JUNEAU D4

This stream has been submitted to the ADF&G to be cataloged as an anadromous stream for identification of pink salmon.

Description of Overall Stream: This stream is located approximately five miles north of the Endicott River. This stream originates at 3,000 feet elevation, from which a waterfall flows through a large contained valley. The waterfall is approximately 1,000 feet long, flows at a high velocity, and is located upstream from the highway crossing. The fall flows over bedrock and numerous large boulders in the streambed. The waterfall sits in a groove between 2,000-foot high bedrock cliffs.

The stream then flows through a single meandering, moderate gradient channel, approximately 600-feet long and into the inlet. This channel has a gradient of four percent, a width of 25 feet, a depth of three feet, and clear water with a moderate velocity. The substrate is irregular and consists of a gravel/cobble substrate intermixed with large boulders that are scattered throughout. Sand is deposited along the side banks.

The banks are stable and are lined with two-foot boulders and vegetation. The canopy cover is 10 percent. The predominant vegetation along the banks is Sitka spruce and alder, willow, elderberry, salmonberry, devils club, goatsbeard, yarrow, grasses, and sedges.

Towards the mouth of the stream, the grass-covered banks are stable and composed of boulders and sand. A beach gravel mound is formed in front of the stream from inlet wave action, creating a small spit in front. At high tide, the influx of water overflows the stream, and a small lagoon-pond forms behind the gravel spit. Sedges and grasses are the predominant species around the pond. Karst topography of limestone bedrock cliffs line the beach to the south of the inlet.

Description of Stream at the Proposed Highway Crossing: The proposed bridge crossing lies directly south of the falls and 500 feet up from the mouth of the stream. Spawning and rearing habitat is located south of the crossing site. Large boulders exist in this area, creating small drops two to three feet in height. The velocity at these small falls is high. Approximately 25 feet south of this site the velocity decreases, and spawning and rearing habitat exists.

Fish Observed: Pink salmon were observed spawning throughout the stream from the falls to the mouth. Sculpins were noted in the pond area.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream has the potential for pink salmon and chum salmon spawning. The short reach from the waterfall to the inlet provides adequate habitat for intertidal spawning; however, species that require long-term rearing probably do not use this system because of the constant tidal changes of the water level as well as high velocity, limited pools, and undercut banks.

Wildlife Observed: Twenty hooded mergansers were observed on the beach in front of the stream. One harbor seal was sighted in the inlet in front of the stream. Bear and deer tracks were observed on the beach.

Stream #8W – Class I

Location: LAT N 58° 51' 30" / LONG W 135° 19' 12" JUNEAU D4

Catalog #: 115-31-10380

Description of Overall Stream: The stream's morphology is similar to the highway crossing. The stream percolates down into the beach gravel instead of flowing into the inlet. This stream originates from 1,500 feet elevation and flows through a moderate gradient valley.

Description of Stream at the Proposed Highway Crossing: The stream gradient is one percent, the width is two feet, the depth is six inches, and the water is clear and has a low velocity. The stream runs in a single straight channel. The substrate is uniform with cobbles, gravel, and boulders scattered throughout. Water flows over moss-covered boulders in a stair step pattern, forming pools. The one-foot high cobble banks are stable with undercutting. The vegetation is predominantly Sitka spruce and alder, willow, devils club, currants, cow parsnip, sedges, and grasses. The canopy cover is 80 percent.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The water velocity is low, this stream functions primarily as a spring drainage system, and access to stream is limited, but pink salmon probably spawn intertidally at the mouth.

Wildlife Observed: Black bear and deer tracks were observed on the beach. Five orca whales were spotted in Lynn Canal.

Stream #8AW – Class III

Location: LAT N 58° 53’ 21.21” / LONG 135° 20’ 31.09” JUNEAU D4

Description of Overall Stream: This is a small stream that flows down a hill, until the gradient decreases to 12 percent through the lower 200 feet to the mouth. The steeper portion of the stream course has an average gradient of 21 percent. Immediately upstream of the lower portion is a 44 percent gradient for 50 feet, followed about 200 feet further upstream by a

section of the stream that is 60 percent gradient. This information was obtained by DOT&PF by examining LIDAR imagery of the area. No field studies were done.

Stream #9W & #9AW Sullivan River – Class I

Location: LAT N 58° 54' 24.5" / LONG W 135° 21' 11.4" JUNEAU D4

Catalog #: 115-31-10430 (#9W)

Species Identified by ADF&G: Chum salmon and Dolly Varden (1998)

Stream #9W has been submitted to the ADF&G to be cataloged as an anadromous stream for the identification of pink salmon (1994).

Description of Overall Stream: The Sullivan River flows 9 miles from its mountainous origin into Lynn Canal. The river flows between mountains originating at 4,000 feet in elevation for approximately four miles before meandering through a floodplain for the last five miles. The stream's morphology is similar to that of the highway crossing. Lower velocity and silty side channels are present downstream from the highway crossing. Fifty-percent canopy coverage is present over the side channels.

Description of Stream at the Proposed Highway Crossing: The gradient is two percent, and the width including all of the braided channels is approximately 400 feet. The average width of the current channel is 30 feet. The depth is one to three feet, and the water is glacial with a medium velocity. The stream meanders and flows through braided channels. The substrate is 90 percent sand/silt, with gravel along the side banks. Gravel bars with alders, root wads, and downed trees are scattered throughout the stream. The sand banks are fairly stable, but tree sloughing and undercut banks are present. Sitka spruce and alder, willow, cottonwood, devils club, currants, and cranberries are the predominant species. No canopy cover is present over the stream.

Stream #9AW: South of Sullivan River, there are small side sloughs that branch from the Sullivan River and run throughout the adjacent muskegs and floodplains. Hundreds of unidentified smolt, potentially coho salmon, were observed rearing in the small channels. This slough was found during the aerial flight surveys and vegetation study for the Juneau Access Project on August 30, 1994. Access to this area was by helicopter.

This system entered the beach and the inlet. Fish migration was possible in this channel and the entrance was located south of the mouth of the Sullivan River, adjacent to the floodplain. Pink salmon were observed intertidally spawning.

Fish Observed: Pink salmon were observed intertidally spawning south of the mouth of Sullivan River in the area of #9AW. Upstream from the mouth of the Sullivan's tributary, unidentified smolt, potentially coho, were found rearing in sloughs in the adjacent floodplain south of Sullivan River.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Due to siltation and size, the Sullivan River is probably limited in spawning and rearing habitat. Many tributary streams exist in this river system and contain very important rearing areas for anadromous fish. Suitable spawning areas also exist in the tributary streams. Access to some of these tributaries is not in line with the proposed bridge crossing. Good spawning gravel, pools, low velocity, LWD, and

undercut banks are present in the main channel of the stream, the tributaries, and in the area of the bridge crossing.

Wildlife Observed: A dozen great blue heron were seen on the beach. Black bear, deer tracks, and bear scat were seen.

Stream #10W Sullivan Creek (listed as unnamed in 1994) – Class I

Location: LAT N 58° 55' 27.5" / LONG W 135° 22' 44.4" JUNEAU D5

Catalog #: 115-31-10450

Species Identified by ADF&G: Pink and chum salmon

This stream has been submitted to the ADF&G to be cataloged as an anadromous stream for the identification of coho and pink salmon.

Description of Overall Stream: This stream flows three miles and empties into Snug Cove. This stream originates at 2,000 feet in elevation and flows through a wide, moderate gradient V-shaped valley. The average width is 10 feet and the depth increases to three feet in pools upstream. More channels and gravel bars are observed upstream from the proposed highway crossing.

The banks are heavily populated with alder, which form a low canopy cover over stretches of the stream making the access difficult. The average canopy cover over the whole stream is 30 percent. Sitka spruce and alder, willow, cow parsnip, fireweed, equisetum, lady fern, and flowers are the predominant species upstream. No blockages were observed in the stream section surveyed.

Description of Stream at the Proposed Highway Crossing: The stream gradient is three percent, the width is 10 to 20 feet, the depth is up to one foot, and the water is clear and has a low velocity. The highway crossing lies within the adjacent floodplain. The stream meanders and flows through braided channels. The substrate is fairly uniform, consisting of cobbles and spawning gravel. Gravel bars are scattered throughout the stream with shrubbery, grasses, and downed trees. Downed trees and other LWD are also observed in the stream. The two-foot high banks are fairly stable, but gravel sloughing at the toe of the slope is observed. Avens, grasses, and sedges are predominant on the banks. A quarter mile away from the proposed crossing location, western hemlock, Sitka spruce, and alder are predominant. Canopy coverage is 10 percent.

Fish Observed: Fish traps were set, but no fish were caught. Coho smolt were observed rearing in the system. During the aerial flight surveys, pink salmon were observed spawning throughout the stream.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The rearing potential of this stream appears to be very good. Numerous pools and bends in the stream provide suitable rearing habitat. Spawning habitat is also available. Adequate spawning gravel, pools, coverage, and LWD are available for fish habitat. Both spawning and rearing areas exist near the proposed bridge crossing.

Wildlife Observed: Black bear and deer tracks were observed on the beach. Two Arctic loons and six harbor seals were seen in the inlet in front of the stream. Two mature bald eagles were seen in the trees on the beach, and fish were jumping in front of the stream mouth. Sixty harbor seals were spotted on a rock island in the bay near the mouth.

Stream #11W – Class III

Location: LAT N 58° 57' 15.4" / LONG W 135° 23' 7.7" JUNEAU D5

This low-velocity waterfall originates in snow at 2,000 feet elevation. It flows through a narrow gully and dries up before it reaches the ocean. The banks are vegetated from sea level to about 600 feet.

Stream #12W – Class III

Location: LAT N 58° 57' 37.5" / LONG W 135° 23' 41.4" JUNEAU D5

This waterfall originates at 1,500 feet in a basin of bedrock outcrops and trees. The 70-degree waterfall has a medium velocity and flows through a narrow gully before landing on the beach.

Stream #13W – Class III

Location: LAT N 58° 58' 4.2" / LONG W 135° 24' 1.0" JUNEAU D5

Two streams form one main low-velocity waterfall that barely reaches the canal. It slopes 70 degrees over granite walls, and decreases to 50 degrees at lower elevations.

Stream #14W – Class IIB

Location: LAT N 58° 59' 18.6" / LONG W 135° 24' 8.9" JUNEAU D5

Description of Overall Stream: This stream originates from 1,500 feet and flows through a U-shaped valley and a floodplain. Downstream from the highway crossing is a 10-foot drop over downed trees and LWD. This blockage is probably not passable for fish migration. The canopy opens and the stream receives full sunlight. The stream divides into two branches, which are about 0.25 miles apart when they empty into the canal. Between the two stream channels are gravel bars with cobbles, LWD, and downed trees dispersed throughout. The banks are up to 10 feet high and become unstable, with trees sloughing down the side banks.

Description of Stream at the Proposed Highway Crossing: The stream gradient is four percent, the width is 30 feet, the depth is up to two feet, and the water is glacial and has a medium velocity. This stream is braided and meanders, without a main channel. The substrate is silt/sand with cobbles and gravel. The stream water table overflows up and over the level gravel and sand banks onto the forest ground about 50 horizontal feet. Vegetated gravel bars are interspersed between the channels. This old-growth forest is predominantly Sitka spruce, cottonwood, and devils club. The canopy coverage is 90 percent.

Fish Observed: Fish were not observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: Spawning is limited because there is no spawning gravel. There are no undercut banks or pools, and the velocity is too high for rearing.

Stream #14AW – Class III

Location: LAT N 59° 00' 4" / LONG W 135° 24' 9" SKAGWAY A2

This 1,000-foot, low-velocity waterfall barely reaches the canal. It passes through a deep gully with trees lining stable banks.

Stream #15W – Class IIB

Location: LAT N 59° 01' 1.6" / LONG W 135° 23' 47.5" SKAGWAY A2

Description of Overall Stream: This stream originates from snowfields and glaciers at 2,000 feet. The stream flows through a moderate gradient U-shaped valley. The stream's morphology is similar to that of the highway crossing. Downed trees in the stream form two-foot drops in a stair step pattern. These do not inhibit fish passage because of the high velocity and large pools formed at the bottom of these drops. The banks have erosion of cobbles at the toe of the slope. Higher velocity on the outside curve of the stream has caused trees to uproot and fall into the stream. The stream fans out to about 20 feet on the beach before it enters the canal.

Description of Stream at the Proposed Highway Crossing: The stream gradient is 10 percent, the width is 10 feet, the depth is one foot, and the water is clear and has a high velocity. The stream flows in a single meandering channel. The substrate is fairly uniform with cobbles and gravel. Downed trees and other LWD are in and across the stream. The stable banks are lined with 5-foot boulders, creating pools. The banks slope 30 degrees, with vegetation securing the slopes. Sitka alder, spruce, western hemlock, devils club, currants, salmonberry, goatsbeard, cow parsnip, and oak fern are the predominant species found. The canopy coverage is 70 percent.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream does not have adequate spawning habitat because of its high velocity and lack of adequate spawning gravel. Rearing habitat is also minimal, due to high velocity. Fish were not seen during the survey, and fish traps were not set by the field crew.

Wildlife Observed: A harbor seal was observed in front of the stream, and an eagle was observed in a tree on the beach.

Stream #16W – Class IIA

Location: LAT N 59° 01' 38" / LONG W 135° 23' 45.4" SKAGWAY A2

Description of Overall Stream: This stream originates from a 500-foot glacier and flows two miles down through a U-shaped valley and estuarine, alluvial delta. This stream is fast flowing and shows heavy washing action, evidenced by numerous fallen trees in this system. This stream exemplifies a classic braided pattern, and could change courses at any time. The highway crossing lies in the area of a triple braided section and flows downstream into one 20-foot-wide channel. A dry channel parallels the main channel to the inlet.

Numerous gravel bars with much LWD are also prevalent. The cobble and sand banks are stable with undercutting. The banks are up to 15 feet high and are sloughing from the toe of the slope. Numerous trees have uprooted and fallen into the stream. The stream fans out as it empties onto the beach.

Much alluvial deposit can be found on the beach at the mouth of the stream. Large amounts of sand deposited from the stream's flow are present on the beach. Large amounts of LWD are present near the stream mouth.

Description of Stream at the Proposed Highway Crossing: The stream gradient is six percent, the width is 30 feet, the depth is up to two feet, and the water is glacial and has a high velocity. Two 30-foot-wide main channels flow downstream with a third dry channel. The width across the triple braided section is approximately 100 feet in width. The stream is braided and meanders to the inlet.

The sand and cobble substrate is uniform. Gravel bars are observed on the side banks and in between the three channels. Sitka alder and cottonwood grow exclusively on the gravel bars. LWD and dead downed trees are lying on top of the gravel bars. The north banks are stabilized with boulders and vegetation. The south banks are up to 10 feet high, with sloughing of alders and sand. Sitka spruce and alder, cottonwood, and willow are the predominant vegetation species. Only 20 percent canopy covers the stream.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream does not have adequate spawning or rearing habitat because of the lack of pools, undercut banks, and canopy cover. Potential spawning and rearing could be available further upstream.

Wildlife Observed: Deer, wolf, grizzly bear tracks, moose tracks and scat were observed.

Stream #17W – Class IIA

Location: LAT N 59° 03' 54.5" / LONG W 135° 23' 44" SKAGWAY A2

Description of Overall Stream: This stream, which flows into a lake at 1,700 feet elevation, originates from glaciers at 2,000 feet. The stream flows through a moderate gradient mixed U-shaped valley. The stream's morphology is similar to the highway crossing. Lower velocity side channels were found with sand/silt substrate. Trucks, motorcycles, snow machines, heavy earth moving equipment, boats, buildings, and machinery were found in the woods south of the

stream. The south bank was armored with old cars. The forest resembled old growth with little evidence of an understory.

Description of Stream at the Proposed Highway Crossing: The stream gradient is four percent, the width is 10 feet, the depth is up to two feet, and the water is clear and has a medium velocity. The stream is contained in a single meandering channel. The substrate is uniform and is composed of cobbles and boulders along the banks. Numerous downed trees and LWD are found on the banks in the stream. The banks are stable and lined with one-foot high boulders. Sitka alder densely populates the stream's banks for the first 30 horizontal feet. Sitka spruce and black cottonwood dominate in the forest. Devils club, cow parsnip, currants, cranberry, and fireweed are present in both these areas. The canopy coverage is 10 percent, and the stream receives ample sunshine.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream does not show the basic fish habitat characteristics of appropriately sized spawning gravel, pools, canopy cover, undercut banks, and low velocity.

Wildlife Observed: Deer tracks were observed along the stream, and a harbor seal was observed in the inlet.

Stream #17AW Glacier River – Dry – Not Classified

Location: LAT N 59° 04' 28.7" / LONG W 135° 23' 30.6" SKAGWAY A1

Description of Overall Stream: This stream is shown on the quad map Skagway A1 as a river flowing from Davidson Glacier. This stream no longer exists and is evidenced by kettles, and a dry channel found in the previous stream's location. Since the publishing of this quad map in 1954, the Davidson Glacier has changed its course and #17BW is now the main channel. Small intertidal lakes were observed supporting small 2-inch sculpins. Avens, grasses, and sedges were abundant on the floodplain.

Description of Stream at the Proposed Highway Crossing: Although there is no existing flow at this date, this area should be bridged. Future channel diversions into this channel from Davidson Lake are very likely.

Stream #17BW – Class I

Location: LAT N 59° 06' 13.4" / LONG W 135° 24' 2.4" SKAGWAY A2

Catalog #: 115-32-10010

Species Identified by ADF&G: Dolly Varden and coho salmon

Description of Overall Stream: This is a large glacial river that flows 0.75 miles from Davidson Lake and empties into the Chilkat River. This stream originates from the lake at the terminus of the Davidson Glacier. The stream divides into two channels around a large gravel bar. The gravel bar has vegetation but is predominantly covered with LWD. Past the gravel bar, the

stream flows back into one channel, which empties into the inlet. The banks are only 5 feet high but stable. Close to the inlet, grasses and sedges are present.

Description of Stream at the Proposed Highway Crossing: The stream gradient is four to six degrees, the width is 25 feet, the depth is up to three feet, and the water is glacial and has a high velocity. The stream is contained in a single meandering channel. The substrate is predominantly sand/silt, cobbles, and gravel. Boulders are scattered throughout the stream. LWD is present on gravel bars, banks, and the floodplain. The north bank is up to 20 feet high, with gravel eroding from the toe of the slope. Trees on the shelf are uprooted and sliding down the 60-degree slopes. The south bank is the same, except the slope is 40 degrees. Sitka spruce and alder, western hemlock, devils club, sedges, and grasses are prevalent. The canopy coverage is 10 percent.

Fish Observed: No fish were observed, and no fish traps were set.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream lacks pools, undercut banks, spawning gravel, and canopy coverage. The velocity is much too high for spawning and rearing. However, in previous ADF&G studies, Dolly Varden and coho salmon were observed in the system. Spawning and rearing in this large glacial system appears to be possible if fish can migrate up the fast flow and into the lake.

Wildlife Observed: Black bear and moose tracks were observed.

Stream #18W – Class III

Location: LAT N 59° 06' 59.5" / LONG W 135° 26' 41.3" SKAGWAY A2

This medium velocity, steep waterfall empties directly into the canal. It originates from a lake at 2,700 feet and flows down a 30-degree slope through a deep gorge. Sitka spruce grows from sea level to about 600 feet, where Sitka alder take over.

Stream #19W Ludaska Creek – Class IIB

Location: LAT N 59° 07' 37.9" / LONG W 135° 27' 13.4" SKAGWAY A2

Description of Overall Stream: This creek originates from Rainbow Glacier at 3,000 feet. The gradient increases to 25 percent downstream from the highway crossing. The creek becomes more braided and four distinctive channels are formed. Each channel is up to 10 feet wide and three feet deep. The velocity is still high and the boulders and LWD form a stair step pattern to the inlet. The south channel has flooded banks with dead downed trees in the creek. The banks are stable and lined with boulders, but undercutting was observed. Medium velocity pools formed below the LWD in the creek. The canopy cover over the creek is 10 percent.

Description of Stream at the Proposed Highway Crossing: The stream gradient is 10 percent, the width is five to 10 feet, the depth is three feet, and the water is glacial and has a high velocity. The stream flows down multiple meandering channels. The substrate is fairly uniform with gravel, cobbles, and sand near the banks. The banks are up to three feet high and are fairly stable. These banks are lined with boulders and cobbles. Sitka alders have uprooted and slid into the creek. Large amounts of LWD are distributed throughout the creek. Sitka alder and

spruce, western hemlock, currants, salmonberry, devils club, cranberry, goatsbeard, and lady fern are the predominant species (vegetation). The canopy cover is 80 percent.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: The stream's velocity is much too high for fish spawning and rearing in this section of the stream.

Stream #20W Anchorage Point Stream – Class IIA

Location: LAT N 59° 10' 10.8" / LONG W 135° 28' 49" SKAGWAY A2

Description of Overall Stream: Anchorage Point Stream flows 3.5 miles from its glacial origin in the Chilkat range to the west and enters Chilkat River. This stream originates at a 1,500-foot elevation glacier and flows 3.5 miles down a U-shaped valley. A trapper's blind was observed in the woods, south of the bridge crossing. A 55-gallon drum and rusty cables were also spotted 100 yards away. Close to the inlet, a brick structure with a granite slab over it, resembling an old fire pit, was observed.

Wide strips of rubble and gravel border the stream. The banks at the mouth of the stream are 10 feet high and slope 30 degrees. Sloughing occurs from the toe of the slope. Sitka spruce and alders have uprooted from the shelf and have fallen down the slope. The stream becomes braided at the mouth and is approximately 100 feet in width. Large gravel bars covered with LWD are located between the stream's various channels. Small, low-velocity sloughs and dry channels were located in the forest to the south of the stream.

Description of Stream at the Proposed Highway Crossing: The stream gradient is three percent, the width is 10 feet per channel, the depth is three feet, and the water is glacial and has a high velocity. This braided stream is 50 feet wide, with multiple channels. The uniform substrate is composed of spawning gravel, sand, and boulders scattered throughout. Downed trees and root wads are found in the stream and on the gravel bars. The river overflows the banks, depositing sand on the forest floor. Trees have fallen into the creek from erosion. The canopy coverage over the stream is 10 percent. Predominant vegetation includes Sitka spruce and alder, hemlock, devils club, currants, and equisetum.

Fish Observed: No fish were observed.

Evaluation of Anadromous Habitat Type; Spawning and Rearing: This stream's velocity is much too high for spawning and rearing of fish.

Wildlife Observed: One Steller sea lion was seen in the inlet at the stream mouth, and a bald eagle was observed in a tree on the beach. Grizzly bear tracks were observed along the stream.

Stream #21W – Dry – Not Classified

Location: LAT N 59° 11' 4.0" / LONG W 135° 29' 23.5" SKAGWAY A2

This dry stream is located in an avalanche chute, with snow and shrubs. Three immature bald eagles were on the beach at the base of the chute.

Stream #22W Chilkat River – Class I

Location: LAT N 59° 12' 9.7" / LONG W 135° 30' 44.9" SKAGWAY A2

ADF&G Catalog # : 115-32-10250

Species Identified by ADF&G: King, coho, pink, chum, and sockeye salmon; steelhead and cutthroat trout; Dolly Varden; and whitefish.

This large river system empties into Chilkat River and supports all anadromous fish species. A large bridge would be constructed at the mouth of this river.

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ATTACHMENT B

1994 STREAM PHOTOGRAPHS

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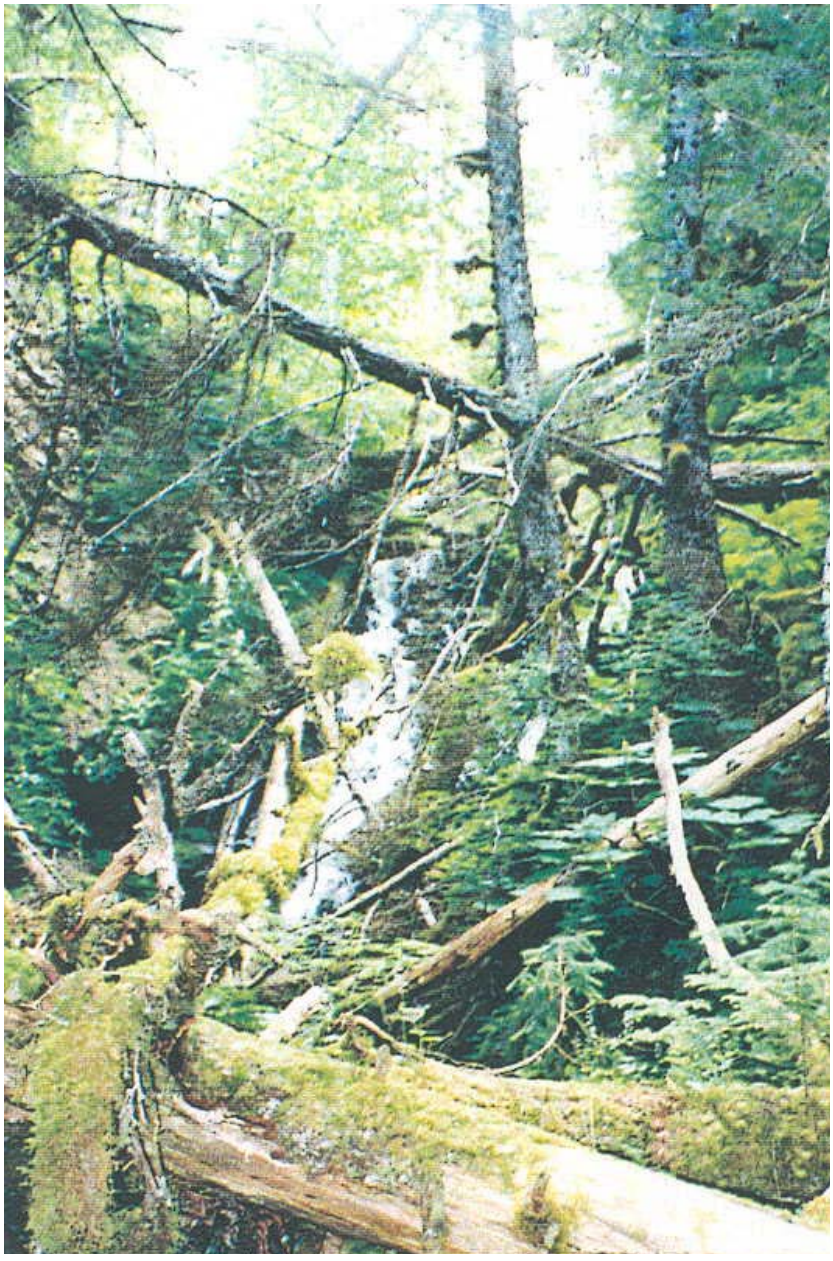
EAST SIDE: ECHO COVE TO SKAGWAY

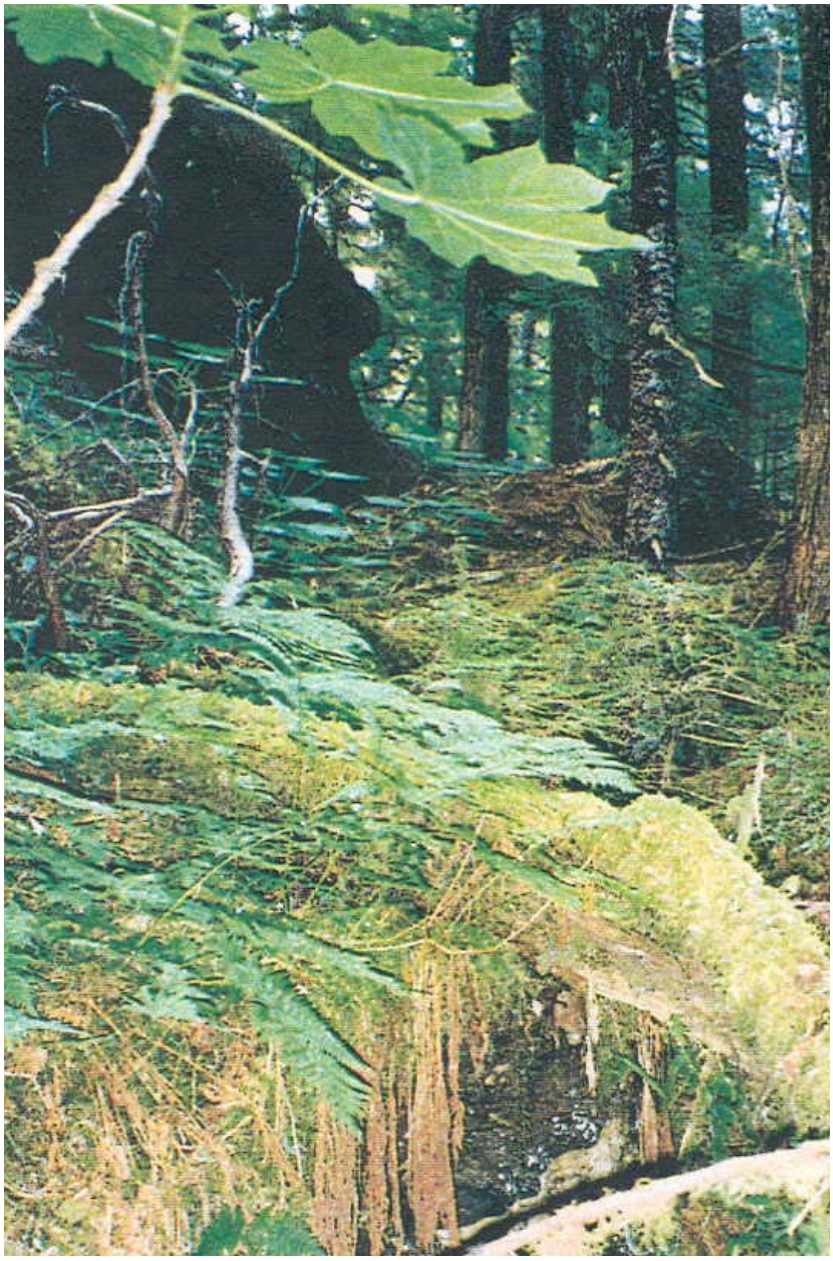
Typical Steep Gradient Stream East Lynn Canal

Stream #1E



Stream #2E

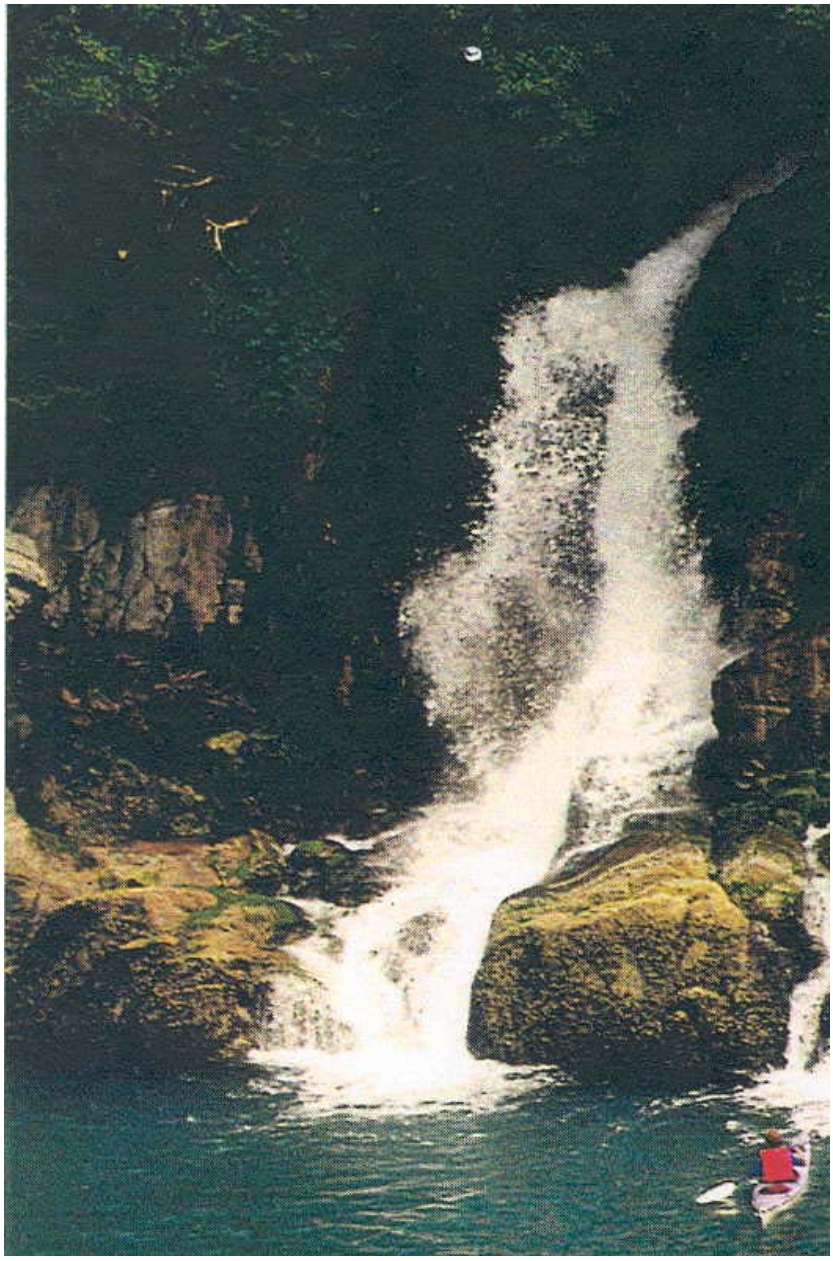
Stream #3E Mouth of Stream



Stream #3E

Stream #8E

Stream #8E



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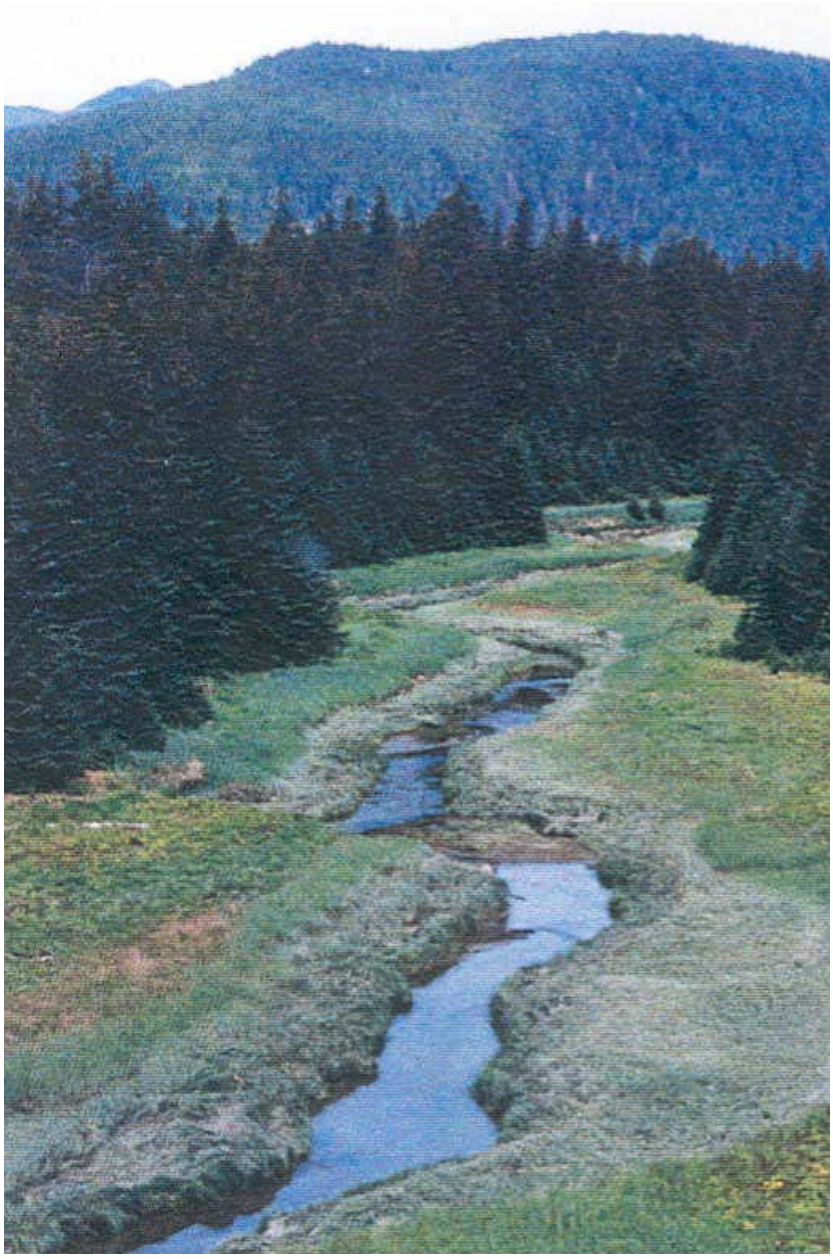
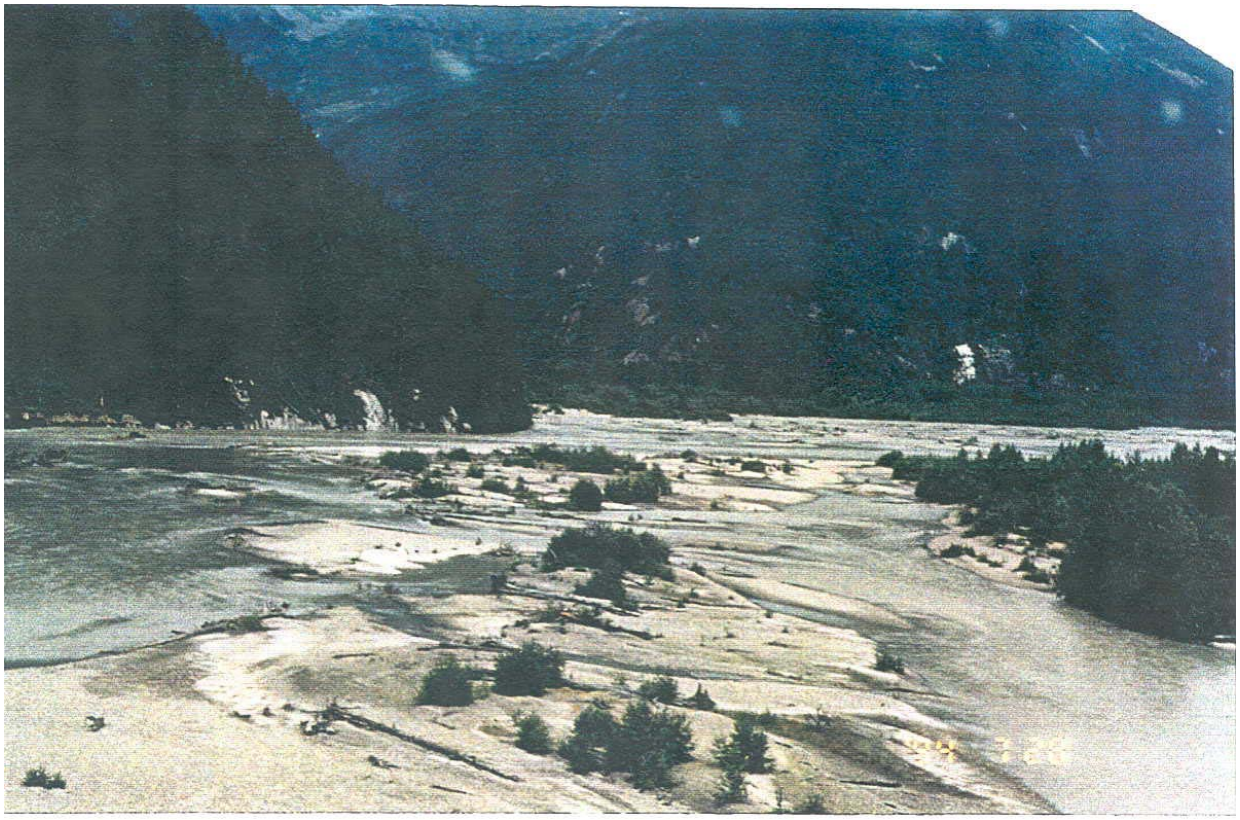


Stream #10AE

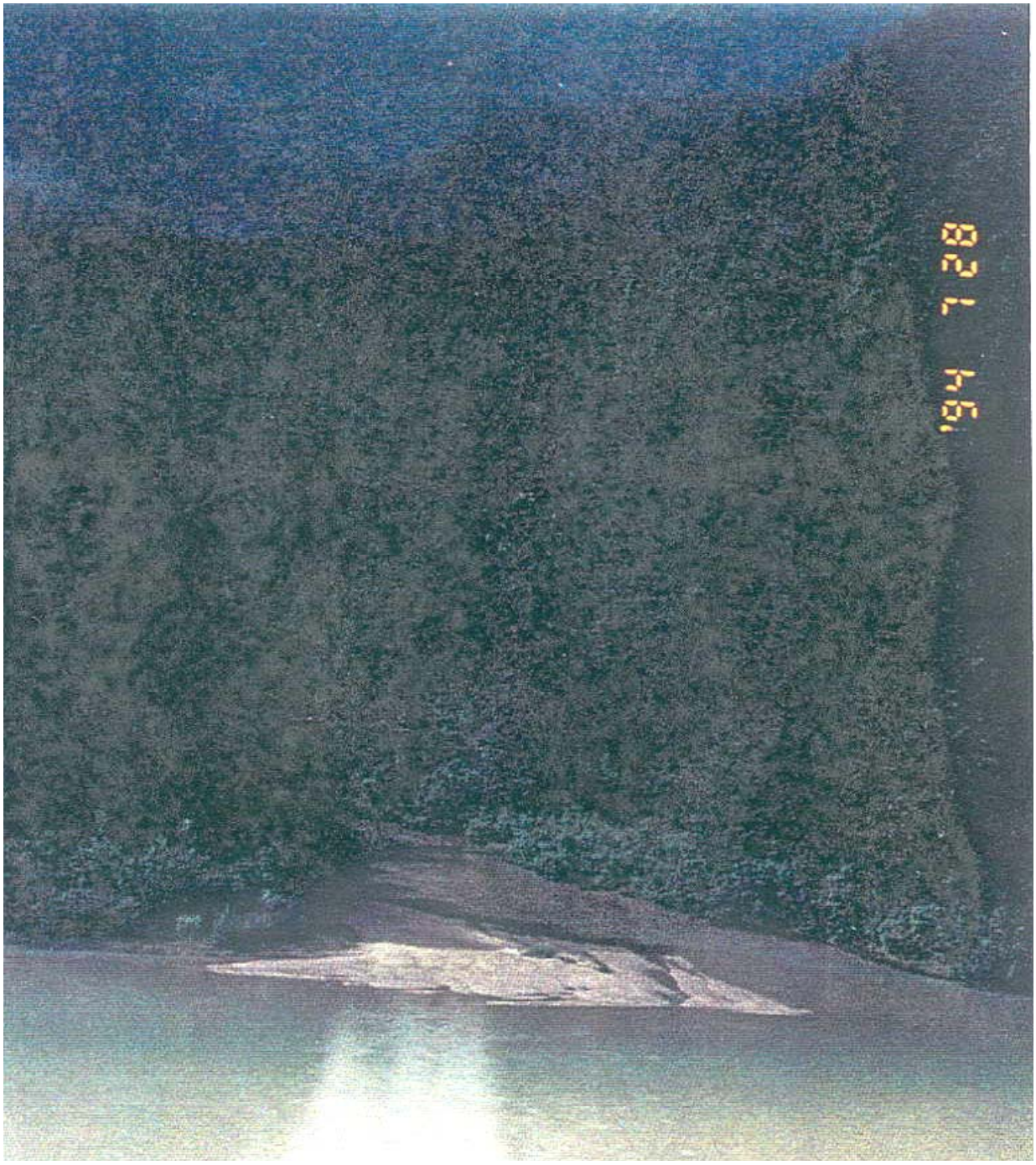
Stream #10AE



Stream #11E Antler River

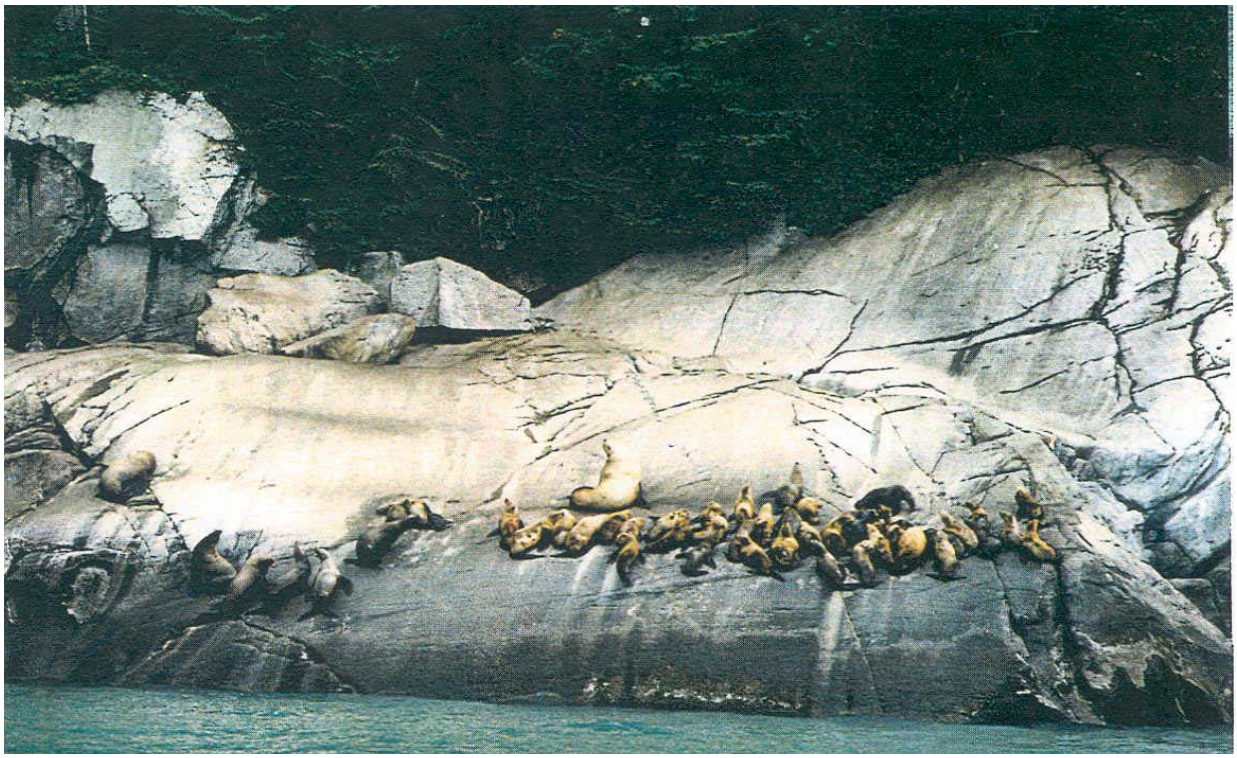
Stream #12E Lace River

Stream #12E Lace River



Stream #13AE Johnson Creek

Stream #15E



Gran Point Steller Sea Lion Haulout

Stream #46E Mouth of the Katzehin

Stream #46E Katzehin

WEST SIDE: WILLIAM HENRY BAY TO HAINES

Stream #1W Beardslee River

Stream #4BW Endicott River

Stream #7W Mouth and Spit

Stream #7W

Stream 9W Sullivan River

Stream #15W

Stream #16W

Davidson River as shown on the 1954 quad map was dry in 1994. The river flowing from Davidson Lake changed course to Stream 17BW.

Stream #17BW

Stream #17BW

Stream #18W

Stream #20W

ATTACHMENT C

1994 FIELD STUDY PERMITS

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STATE OF ALASKA
DEPARTMENT OF FISH AND GAME

P.O. Box 25526
JUNEAU, ALASKA 99802-5526

Permit No. SF-94-051

Expires 08/31/94

FISH RESOURCE PERMIT

(SCIENTIFIC COLLECTIONS)

This permit authorizes Rick Reed, FPE/Roen-Lochner Joint Venture (person, agency or organization) of P.O. Box 34797, Juneau, AK 99803 (address) to conduct the following activities from June 7, 1994 to August 31, 1994 in accordance with AS 16.05.930.

Capture and release fish in northern southeast Alaska.

Purpose: To document the distribution of fish in streams crossed by the two proposed highway alignments that would link Juneau, Haines, and Skagway by road.

Location: Streams on the west and east sides of Lynn Canal, from Berner's Bay to Skagway.

Species Collected: Any species of fish may be captured.

Method of Capture: Fish may be captured with minnow trap and dip net.

Final Disposition: All fish captured will be identified and then returned unharmed at the capture site.

-continued on back page-

REPORT DUE September 30, 1994. The report shall include species; numbers; dates and locations of collection and disposition; sex, age and breeding condition; lengths and weights of fish; other information as required.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.

2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.

3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.

4. Permits will not be renewed until detailed reports, as specified above, have been received by the department.

5. UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.

Mark Schwan
Division of Sport Fish

C. Meacham
Dep Commissioner

6-6-94
Date

Authorized Personnel: The following personnel may participate in collecting activities under terms of this permit:

Rick Reed
Joey Lynne Caterinichio
Denise Saigh

Contingencies: 1) Mike Bethers, Sport Fish biologist in Juneau, must be notified prior to the initiation of any collecting. 2) Bait eggs used in minnow traps must be disinfected prior to use. 3) A report of all collecting activities must be submitted to Mark Schwan, Sport Fish Biologist, Juneau, within 30 days after the expiration of this permit. This report must include a list of fish captured, by species, and also describe any sampling mortalities associated with the fish collection activities. A report of collections should also be forwarded to Ed Weiss, Habitat and Restoration Division, ADF&G, 333 Raspberry Rd, Anchorage, Alaska 99518.

cc: Rob Bentz, Sport Fish, Douglas
Mike Bethers, Sport Fish, Ketchikan
Lana Shea, Habitat, Douglas
FW Protection, Juneau