

# Taiya Inlet Stream Condition Assessment

July 2007



# The Taiya Inlet Watershed Council

In 2002, concerns over sustainable watershed management led Skagway area residents, business owners, the City of Skagway, the Skagway Traditional Council, the National Park Service, and others to come together to form the Taiya Inlet Watershed Council (TIWC), a broad-based watershed stewardship organization.



TIWC is not a management entity in itself and does not – in this assessment– seek to make management decisions which will impact these creeks and stakeholders. Rather, we hope that by using this information we can establish partnerships with stakeholders to help synergize action on issues impacting the health of these creeks and ultimately, the health of the Taiya Inlet Watershed.

The Taiya Inlet Watershed Council is a community partnership working to protect and improve the health of the watershed through education, communication, research and restoration.

This document synthesizes existing and new survey information about Taiya Inlet streams and suggests steps we can take to preserve and improve these creeks in the future.

Further information about TIWC can be found at [www.taiya.org](http://www.taiya.org) or by calling (907) 983-2426.



*Cover Photo: Mike Klensch, Alpenglow Photo*

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## Executive Summary

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**The purpose of this assessment was to report and describe riparian disturbances, fish habitat impairments and obstructions, and to identify areas for future Taiya Inlet Watershed Council restoration efforts.**

The Skagway community and surrounding area is directly affected by and tied to the health of its surrounding water bodies. Conservation and protection of these resources impacts the community's health, habitat, and future for years to come.

Without adequate information, TIWC and the Skagway community cannot make objective decisions to aid in protecting and restoring waterbodies in the Taiya Inlet Watershed.

The U.S. Fish and Wildlife Service Coastal Conservation program, along with the help of the Alaska Department of Fish and Game (ADF&G) allowed TIWC to jump-start the first ever reconnaissance-level stream condition assessment of Taiya Inlet streams and rivers.

Four major areas were outlined for this assessment: the Taiya River, the lower six miles of the Skagway River along with several of its main tributaries, Nelson Creek, and Matthews Creek.

Using the draft ADF&G Stream Survey User Guide for guidance, TIWC staff and volunteers inventoried each stream in 2005-2006 and completed a stream survey, brief culvert evaluation, and validated the Anadromous Water Catalogue (AWC). These surveys revealed adult anadromous fish in Nelson and Matthews Creeks. Juvenile fish were also observed in Matthews Creek, Lillegraven Creek, and Dairy Creek. Nomination of these creeks for inclusion or update in the AWC is one outcome of this assessment.

Culverts were assessed for fish passage, obstruction, size, and condition. Of the nine culverts surveyed, three culverts were identified as candidates for improvement (one of these culverts was replaced on Dairy Creek in 2005, after the survey was conducted).

Development and pedestrian, equestrian, and vehicle traffic are playing a role in loss of riparian vegetation, increased erosion, and habitat degradation in the Taiya Inlet Watershed. The opportunities for stream protection and restoration recognized through this assessment will improve fish passage, habitat, and stream water quality and are attainable with stakeholder participation.

## Summary Recommendations

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### General recommendations for the Taiya Inlet Watershed Area include:

- Commence activities to update the ADF&G Anadromous Waters Catalog. Sample fish distribution in Lillegraven, Dairy, and Matthews Creeks and nominate waterbodies appropriately based upon findings. Update locations (arcs) of all streams in the report to accurately reflect the length and position of each waterbody in AWC maps.
- Research and propose a city ordinance to preserve at least a fifty foot riparian buffer along anadromous streams.
- Catalog and assess Taiya Inlet Watershed stream conditions every three to five years.

### The following restoration and protection opportunity recommendations are offered for each stream:

#### Dairy Creek

- Construct a bridge for ATV traffic including appropriate restoration near Klondike Hwy.
- Discuss restoration work with private landowners; consider reintroducing channel meanders in previously straightened sections of the creek.
- Re-vegetate riparian zones throughout the length of the creek.

#### Nelson Creek

- Explore construction of a second bridge on Nelson Creek at the downstream crossing to accommodate vehicle, equestrian, bicycle, and pedestrian traffic.
- Conduct a mapping and observation project in the Dyea flats area to document all trails in the area and evaluate their usage will identify key recreational trails as well as unnecessary trails.
- Disturbed riparian areas should be cataloged and restored with native vegetation. Invasive plants should be removed and replaced with native plants.

#### Nelson Slough

- Maintain existing trails and crossings.
- Continue to monitor and remove invasive plants.
- Map and catalog Nelson slough tributaries that may provide fish habitat.

#### Lillegraven Creek

- Plant a vegetated buffer along the Liarsville visitor “gold panning” area and restrict foot access to the creek.
- Plant willow and cottonwood along the clearcut area near the tour operator parking pad.
- Design and construct simple stormwater/runoff treatment at the Chilkat Guides parking pad.

#### Matthews Creek

- Evaluate the Dyea Road culverts to determine if improved sediment transport and fish passage can be improved
- Modify or dismantle the driftwood dam at creek mouth to ensure fish passage.
- Remove trash and debris from the section of creek below Dyea Rd.
- Provide pet waste bags at the beach access trailhead.
- Provide public toilet facilities.

#### Pullen Creek

- Refer to the 2006 TIWC Pullen Creek Action Plan for a thorough discussion of opportunities.

## Introduction

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As TIWC seeks to protect and restore the Taiya Inlet Watershed, it must first identify threats to anadromous fish, coastal habitat, and the watershed as a whole. TIWC is generally aware of problems that exist, but lacks an overarching understanding of the

watershed and its threats and impairments. Through this project we were able to complete a reconnaissance-level stream condition assessment. The survey includes Nelson Creek, Nelson Slough, Mathews Creek, Dairy Creek, and Lillegraven Creek. Existing or



Downtown Skagway and Skagway River Valley.

*Photo: TIWC*

preliminary data for Taiya Side Channel, Pullen, Burro, and Reid Creeks is also included, briefly, in this report. The data collected will make initiating and completing future projects simpler and more efficient. With threatened and impaired sites

identified, TIWC can prioritize and address restoration sites in a logical manner. Now aided by an improved catalog of local

waterbody impairments, TIWC can educate the public on specific topics associated with the watershed and its stewardship.

### TIWC's Project Approach:

1. Select a stream habitat assessment protocol that allows TIWC to maximize the area surveyed.
2. Prioritize waterbodies surveyed:
  - a. The lower 6 miles of the Skagway River including tributaries Reid, Lillegraven and Dairy Creeks, and other tributaries suspected of supporting anadromous fish.
  - b. Taiya River: areas of Taiya River to be surveyed will be identified through consultation with the National Park Service to prevent overlap.
  - c. Nelson Creek and Nelson Slough
  - d. Mathews Creek
3. Identify areas of impaired habitat, restoration opportunities, and areas that may be impaired in the future by current use. Site specific details were documented to assist in the evaluation of future work. All fish passage obstructions were photographed with a digital camera and their locations were recorded using a handheld Global Positioning System (GPS) unit.
4. Identify and sample streams that have not yet been listed as anadromous fish streams. TIWC will report to the Alaska Department of Fish and Game (ADF&G) streams or stream reaches which may warrant nomination as anadromous fish streams.
5. Write and distribute a report and facilitate a public presentation on future restoration, research, and stewardship opportunities and map the impaired areas in the watershed.

**This report is organized with maps and descriptions of fish use, existing habitat conditions, human impacts, and opportunities for restoration for each water body. Also included are references to Pullen Creek, Reid Creek, and Burro Creek for inclusion in future assessment and opportunities.**

## Project Location and Watershed Description

The Taiya Inlet is located at the northern end of the Lynn Canal, 90 miles north of Juneau. The Taiya Inlet Watershed Council area of focus encompasses upper Taiya Inlet streams and rivers including the Skagway, Nourse and Taiya Rivers, and Burro, Kasidaya and Pullen creeks (Map 1). The main watersheds extend from tidewater to nearly 6,000 feet of elevation, and contain the White Pass (2,900') and the Chilkoot Pass (3,525'), two of the three passes into the Interior from this part of Alaska. Except for the Skagway and Taiya River valleys, most of the land is very steep and mountainous, carved by glaciers and dissected by many streams.

### Fish and Wildlife

The lower reaches of the Skagway River, the Taiya River, and Pullen Creek are catalogued anadromous fish streams and contain spawning and rearing habitat for chum, pink, and coho salmon, Dolly Varden char, sea-run cutthroat trout, stickleback, and sculpin. Spawning salmon, especially late runs of chum and coho, are an important fall food source for the area's bald eagles and black and brown bears. The river and bay waters also support locally valuable aquatic organisms such as halibut, crab, shrimp and eulachon. These, in turn, attract marine mammals such as seals and sea lions, and thousands of migrating ducks, gulls and other waterfowl to the area.

Two local hatcheries (Burro Creek and Pullen Creek) contributed to fish productivity in the area, including the production of pink, chum, coho, and chinook salmon.

### Vegetation

Coastal rainforest, sub alpine forest, alpine tundra, and boreal forest dominate the terrestrial landscape. Valleys that were once

glaciated are now rebounding, or rising up relative to sea level, and a succession of plants follows as the young post-glacial landscape evolves. Estuarine grasses are replaced by shrubs, which are in turn overshadowed by alder, Sitka spruce, and eventually western hemlock forest communities over time. This plant succession can be seen in the historic Dyea townsite, within the Klondike Gold Rush National Historic Park.

Throughout the area, varied habitats support assemblages of vegetation and wildlife more

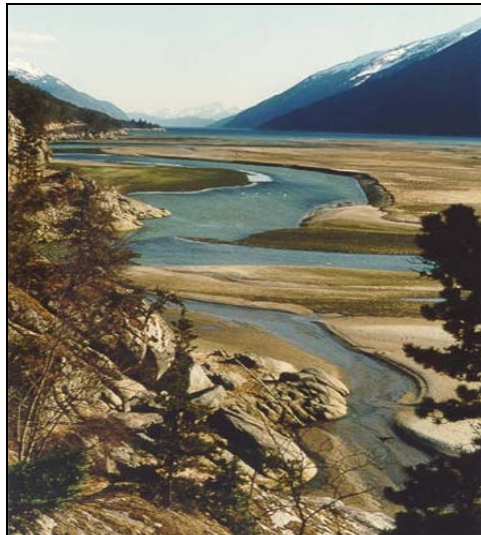
diverse than typical southeast Alaska environments. This rich biodiversity springs from the unusual combination of close proximity to the interior and a relatively dry climate.

### Public Use

The area's scenic lands rivers are appreciated by Skagway residents and support important subsistence and recreational resources.

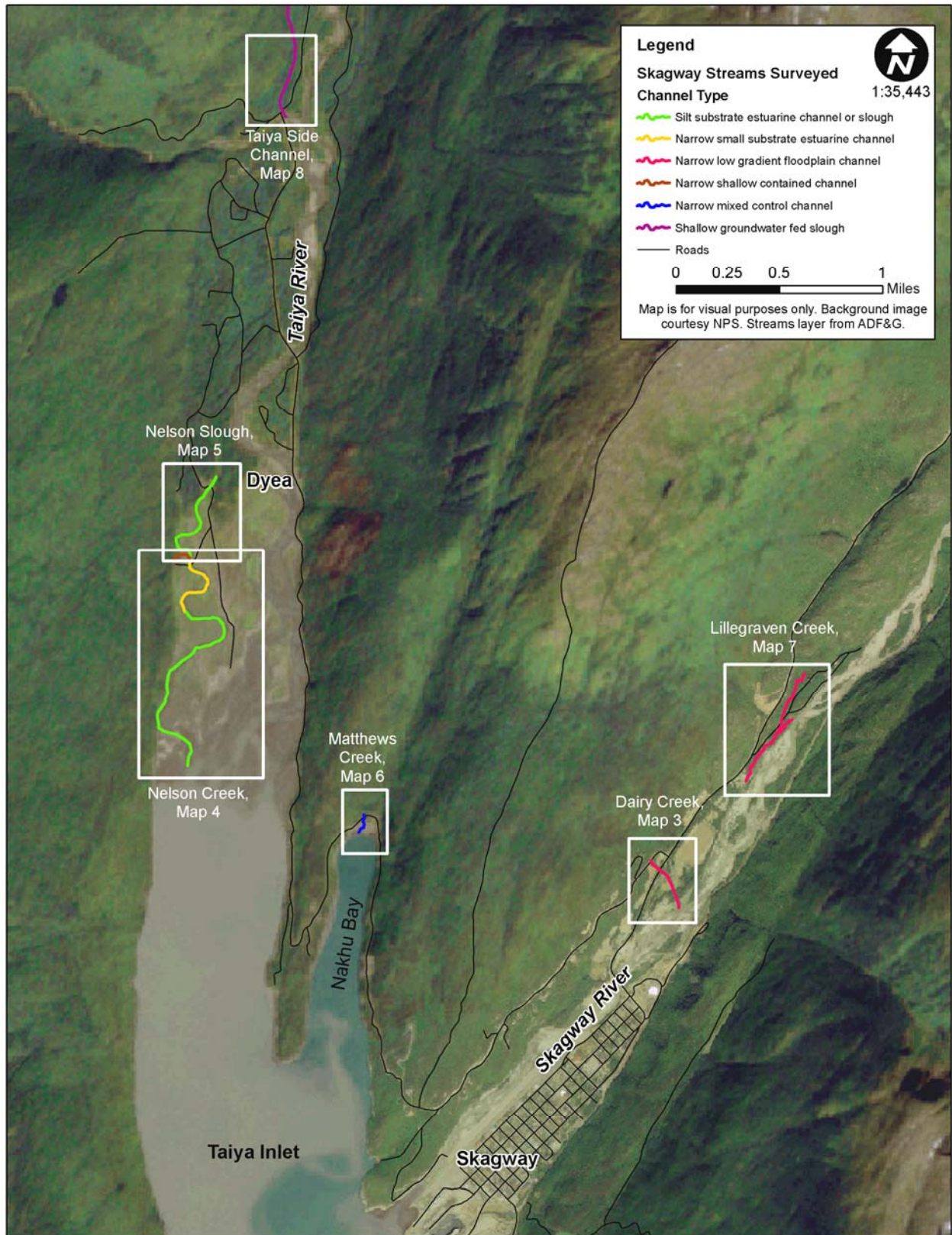
Subsistence and sport fishing is popular in the Taiya Inlet. Cruise ship

passengers tour downtown Skagway and are able to observe salmon returns and spawning at Pullen Creek. Many visitors explore the Dyea flats area on horseback and wheeled dog sled tours. National Park Service rangers lead hikes through downtown and the Dyea townsite; many summer visitors hike the Chilkoot Trail from Skagway to the Canadian headwaters of the Yukon River. Float trips along scenic Taiya River are also popular with summer visitors. Locals enjoy ATV, snowmobile, horseback, and hiking trails throughout the year. These uses, though benefiting the community, have potential to impact streams if not carefully managed.



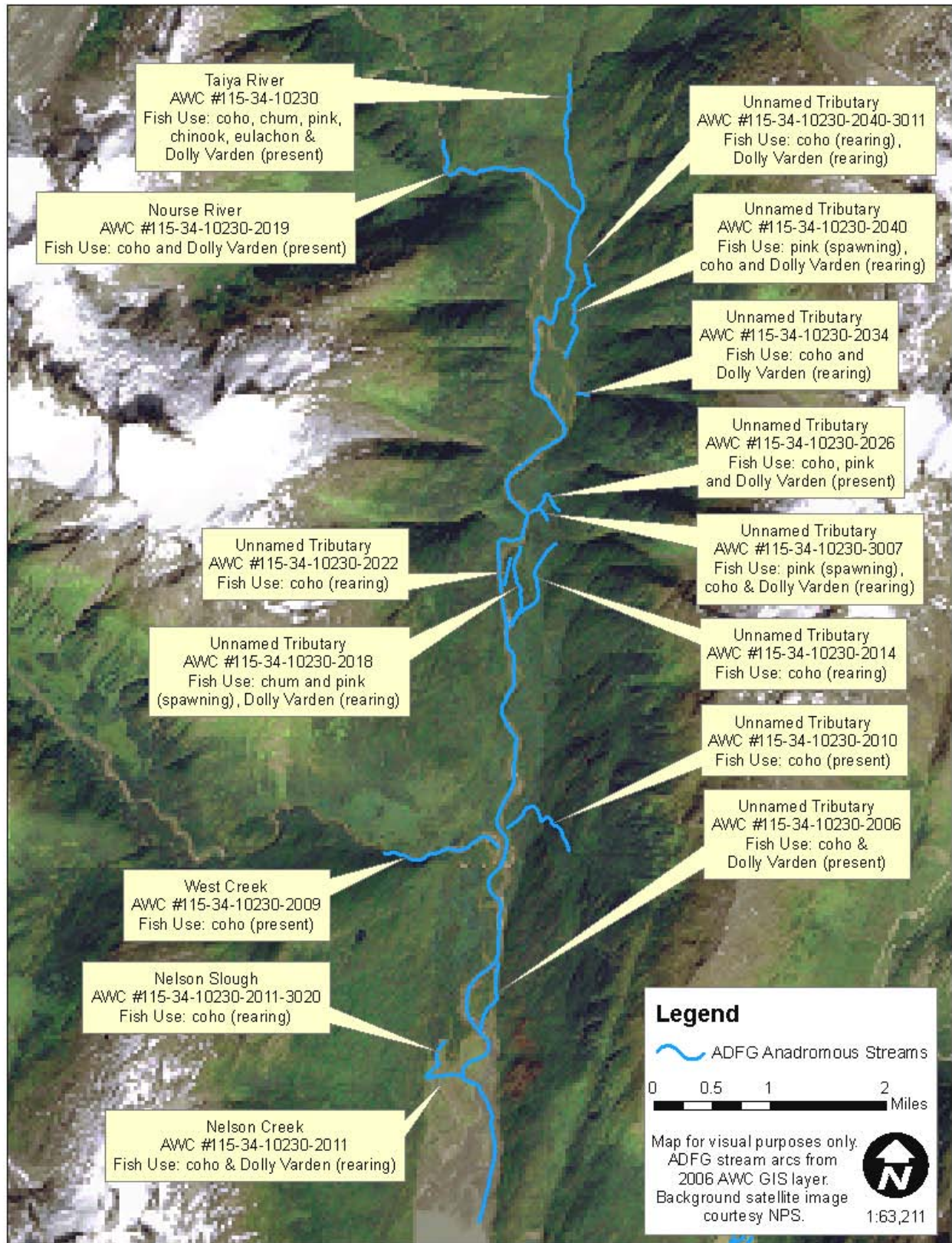
Dyea Flats and Taiya Inlet.  
Image: Mike Klensch

# Map 1: Stream Survey Locations





## Map 2: Taiya River Area Anadromous Waterbodies



## Dairy Creek

**Location:** Lat. 59.4739 N, Long. -135.2932 W  
**Local Topographic Map:** USGS Skagway B-1 NW  
**Anadromous Stream Catalog Number:** 115-34-10300-2017

Dairy Creek, located just north of the Skagway townsite, is a small floodplain tributary of the Skagway River fed by road ditch and hillside runoff. The creek runs through private property (once H.D. Clark’s Dairy Farm) and is impacted by land clearing; it passes under the Dyea Road and Klondike Highway and through a total of four culverts. Sections of Dairy Creek channel were extensively modified as the creek now flows through an angular riprap channel before joining the Skagway River at the Skagway River Flood Control project..

### Fish Use

Dairy Creek is listed in the ADF&G Anadromous Waters Catalog for rearing coho salmon (Johnson, 2007). Juvenile salmon, stickleback, and Dolly Varden char were observed up- and down-stream of the Klondike Highway culvert during streamwalks in June 2007.

### Existing Habitat Conditions

Much of the riparian area is impacted by gravel mining, recreational use, urban development and vehicle traffic. The creek flows through four culverts; the culvert furthest downstream was prone to blockage and at one time formed a barrier to fish passage but was improved in 2005 during Skagway River flood control project construction. Lack of stream channel complexity is a detriment to habitat in general, as exhibited in the paucity of pools, and large amount of riparian disturbance noted in the stream survey.

### Human Impacts

This creek passes under two paved roads via culverts which are prone to blockage by downed wood. Since much of the creek passes near roads and a pasture area likely to be developed in the future, stormwater runoff is a future threat to water quality. Sediment introduction from winter road maintenance may be a problem near the Klondike Highway crossing. Some refuse and debris have accumulated in the creek. All-terrain-vehicle (ATV) use from one ford crossing just upstream of the Klondike Highway culvert has resulted in some sediment input and channel widening.

	<b>Reach 1</b>
<b>Channel Type</b>	Narrow low gradient floodplain channel (FP3)
<b>Surveyed Distance (m)</b>	460
<b>Average Gradient (%)</b>	0.35 %
<b>Bankfull Width (m)</b>	1.2
<b>Incision Depth (m)</b>	0.4
<b>Pools (count)</b>	2
<b>Pool Density (p/m)</b>	0.004
<b>Large Wood (count)</b>	Zero
<b>LW Density (pieces/m<sup>2</sup>)</b>	Zero
<b>Key Piece (count)</b>	Zero
<b>Key Piece Density (pieces/m<sup>2</sup>)</b>	Zero
<b>Riparian Disturbance (m, both banks)</b>	80 (4 individual instances)
<b>Inventory Date:</b>	8/23/2005

## **Dairy Creek, *continued***

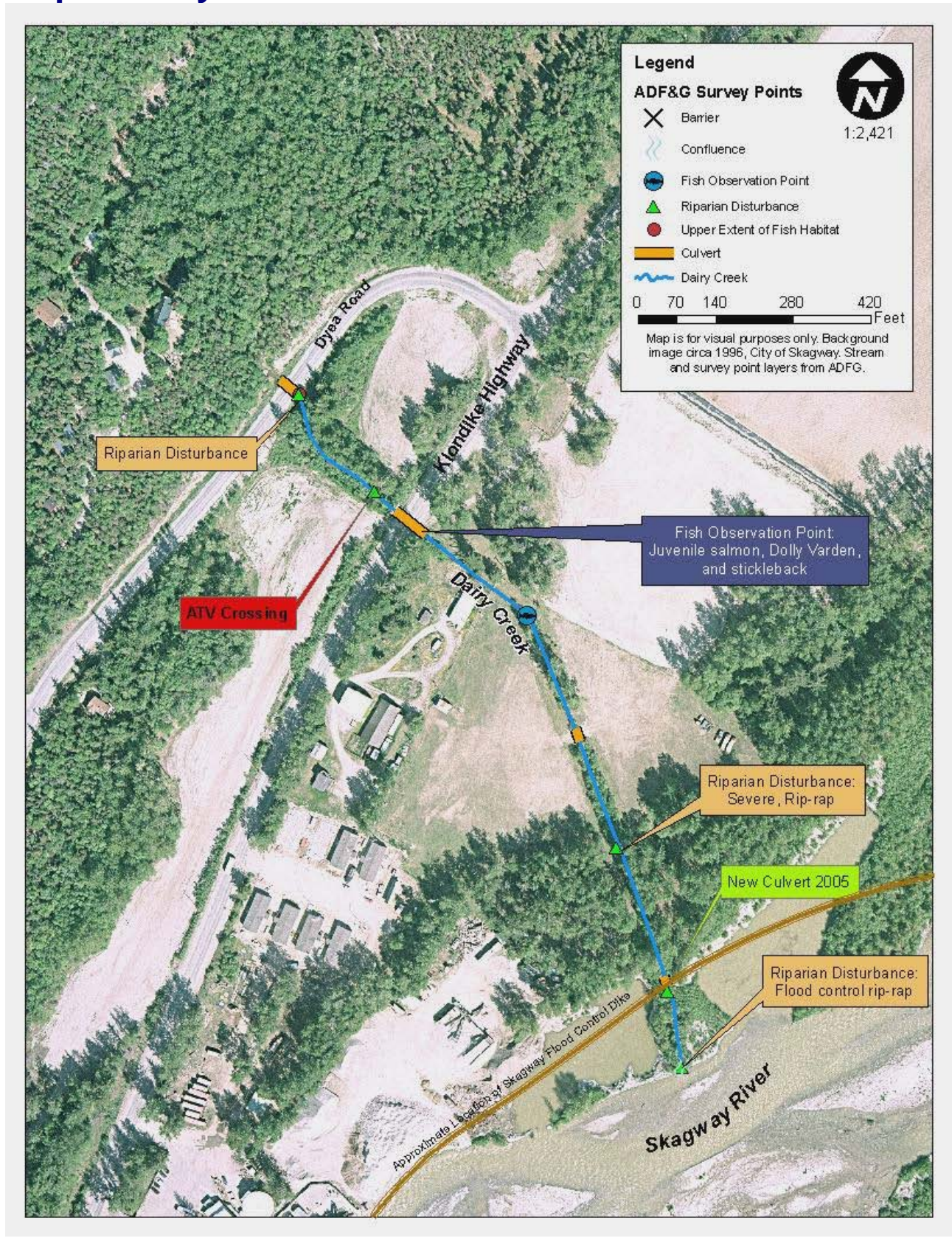
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### **Opportunities**

These options should be discussed with current landowners:

- Construction of a simple bridge for ATV use at the current ATV crossing site, along with some restoration work to reverse the impacts of past ATV traffic, will improve habitat and remove a source of sediment.
- Where feasible, reversing channel modification impacts by reintroducing channel meanders may improve fish habitat complexity and slow water velocities during periods of high flow.
- Re-vegetation of riparian zones throughout the length of the creek will provide shade and habitat for fish, stabilize banks to combat erosion at higher flows, and reduce sediment and debris inputs from adjacent roads.

### Map 3: Dairy Creek



## Dairy Creek Images

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Some short sections of Dairy Creek near its confluence with the Skagway River appear relatively undisturbed, exhibiting healthy riparian plant communities, clear water, and sinuousity.

*Image: A. Bethe, TIWC, August 2005.*



Sections of Dairy Creek were historically straightened. Restoration of these areas could include the reintroduction of stream meanders, revegetation of riparian areas, and construction of pool/riffle stream habitat.

*Image: A. Bethe, TIWC, August 2005.*

## Dairy Creek Images

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This ATV ford crossing, just upstream from the Klondike highway, degrades a stream reach densely populated by rearing juvenile salmon, Dolly Varden, and stickleback.

*Image: S. Seifert, USFWS, June 2007.*



View looking upstream from Klondike Highway culvert inlet. Some debris and trash are present in a small woody debris pile. Note road gravels atop the culvert.  
*Image: S. Seifert, USFWS, June 2007.*



View looking upstream at the outlet of the Klondike Highway culvert. Juvenile fish including salmon, Dolly Varden, and stickleback were observed at the time this image was taken.

*Image: S. Seifert, USFWS, June 2007.*

## Nelson Creek

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**Location:** Lat. 59.4908 N, Long. -135.3615 W

**Local Topographic Map:** USGS Skagway B-1 NW

**Anadromous Stream Catalog Number:** 115-34-10230-2011

Located seven miles northeast of downtown Skagway in the Dyea flats, Nelson Creek is initially a steep mountain cascade that becomes an estuarine channel upon reaching the floor of the Taiya River valley. Springs, groundwater, and hillside runoff travel down Face Mountain (4830 ft) before meandering parallel to the Taiya River through private and public lands into Taiya Inlet.

### Fish Use

Nelson Creek is listed in the ADF&G anadromous waters catalog as a coho salmon and Dolly Varden rearing waterbody (Johnson, 2007). In this survey, adult pink salmon were observed throughout the creek and seen spawning in several locations upstream of the main channel mouth. It is also likely that chum salmon are present since they are found in nearby Taiya River.

### Land Use

Land use around Nelson Creek is primarily public and commercial recreation. A tour operator houses sled dogs and offers wheeled dog sled tours on private property west of Nelson Creek. The same operator offers horseback tours of the Dyea Flats and Chilkoot Trail areas. The National Park Service offers interpreter-led hikes through the Dyea townsite daily in the summer season. Popular ATV, horseback, hiking, and bicycle trails meander through much of the flats area.

### Existing Habitat Conditions

**Reach 1:** This steep, narrow upstream reach flows west to east before joining Reach 2 at the valley floor. The lower 150 meters of creek were surveyed. Extensive riparian disturbance was found along a total of 157 meters of bank (both banks were included in the total). A dog lot and horse crossing have somewhat degraded adjacent riparian areas and offers an opportunity for improvement. A waterfall makes this reach the upper extent of fish habitat. A lack of pools limits the rearing potential of this reach, though coho salmon and Dolly Varden will spawn in this type of channel where suitable gravels are present.

**Reach 2:** This reach is a long, tidally influenced estuarine channel. Sediment deposition limits spawning habitat value to anadromous fish, but juvenile coho, pink, and chum salmon frequently use this type of channel prior to outmigration. One riparian area of concern is the 150 foot length of creek in and around a ford crossing just downstream from a small footbridge that provides access to private property. Stream and riparian habitat along this stretch require attention. Reclaiming trails within 50 feet of the creek would improve riparian conditions, reduce sediment and turbidity inputs, and reduce the likelihood of erosion.

**Reach 3:** This lengthy downstream reach is a broad, depositional estuarine channel where ocean tides strongly influence stream flow and depth. Fine sediments accumulate here, limiting anadromous fish spawning habitat value. Coho, chum, and pink salmon juveniles use similar channels for rearing before outmigrating. Areas accessible to fish appear to be in good condition with little to no disturbance. Bank sensitivity to riparian disturbance is moderate. Tidal ebb or flood currents may undermine bank sediments and cause erosion if riparian areas are disturbed.

## Nelson Creek, *continued*

### Human Impact

The downstream crossing presents a significant problem as vehicles and horses ford the creek regularly, creating turbidity, erosion and disturbing riparian vegetation. Commercial horse tours cross the creek here and multiple, parallel ATV, truck, and horse trails occur the lower reaches of creek riparian areas.

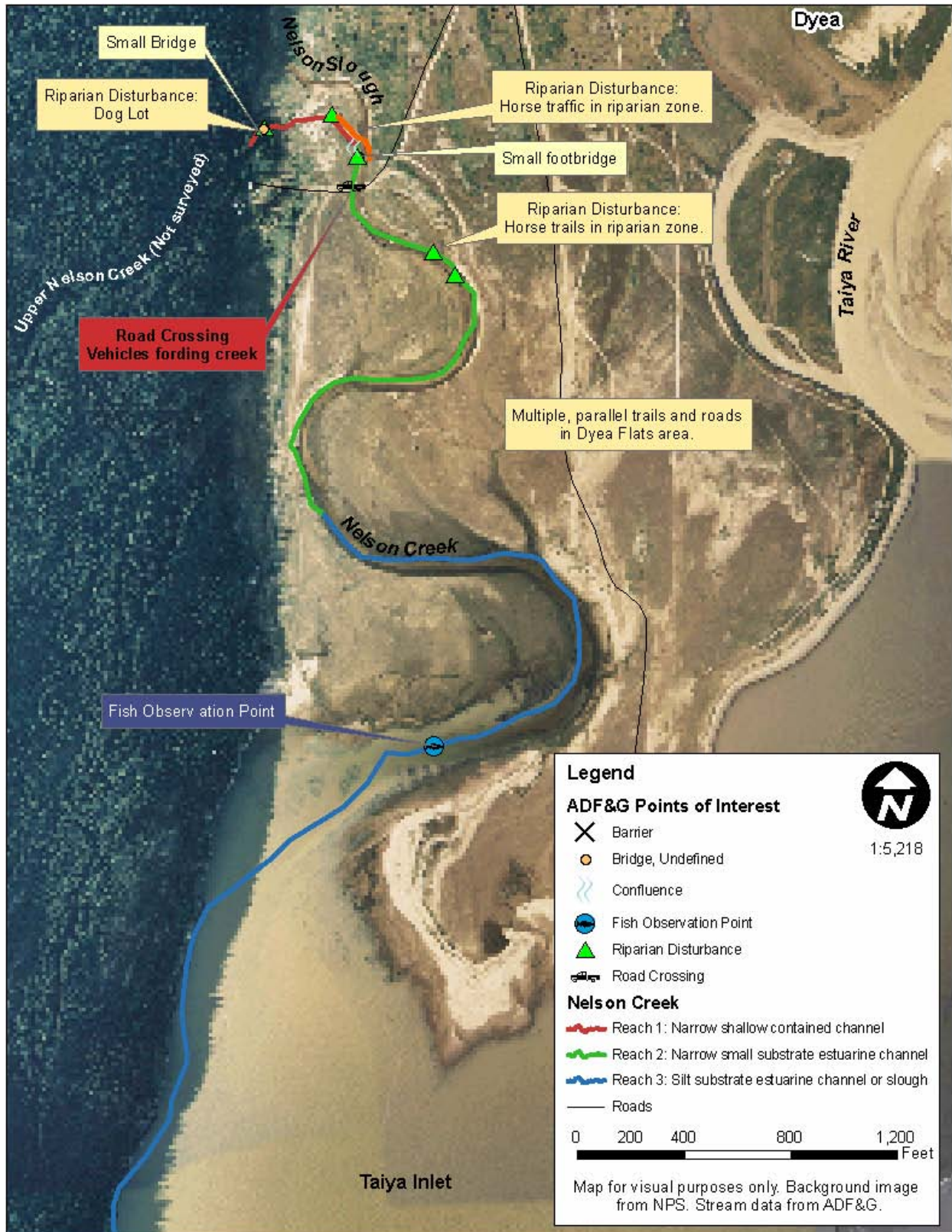
### Opportunities

- Explore construction of a second bridge on Nelson Creek at the downstream crossing to accommodate vehicle, equestrian, bicycle, and pedestrian traffic. As outlined in the ADFG anadromous waters catalog, fording of the creek by vehicle, equestrian, and foot traffic without a permit to do so is out of compliance with AS 41.14.870 (Johnson, 2007).
- A mapping and human-use evaluation in the Dyea flats to document all trails in the area and evaluate their usage will identify key recreational trails as well as unnecessary paths. Public land managers may then use this information to select a handful of trails for maintenance and set aside all other trails for reclamation and restoration projects to minimize impacts to estuarine wetlands and fish habitat.
- Disturbed riparian areas should be restored with native vegetation to reduce erosion and provide habitat. These areas should also be inspected for invasive plants; any invasives should be removed aggressively to prevent spreading to nearby undisturbed areas.
- Consider updating Nelson Creek as a pink salmon spawning stream in the ADFG anadromous water body catalog. The current ADFG catalog map erroneously depicts Nelson Creek as a tributary of Taiya River; this should be corrected.

	Reach 1	Reach 2	Reach 3
<b>Channel Type</b>	Narrow shallow contained channel (MC1)	Narrow small substrate estuarine channel (ES2)	Silt substrate estuarine channel or slough (ES1)
<b>Surveyed Distance (m)</b>	150	660	1,870
<b>Average Gradient (%)</b>	1.0 %	0.83 %	0.5 %
<b>Bankfull Width (m)</b>	6.0	12.0	Not collected
<b>Incision Depth (m)</b>	1.0	1.5	1.0
<b>Pools (count)</b>	Zero	Zero	Zero
<b>Pool Density (p/m)</b>	Zero	Zero	Zero
<b>Large Wood (count)</b>	Zero	Zero	Zero
<b>LW Density (pieces/m<sup>2</sup>)</b>	Zero	Zero	Zero
<b>Key Piece (count)</b>	Zero	Zero	Zero
<b>Key Piece Density (pieces/m<sup>2</sup>)</b>	Zero	Zero	Zero
<b>Riparian Disturbance (m, both banks)</b>	157 (2 instances)	120 (2 instances)	none
<b>Inventory Date</b>	8/23/2005		



# Map 4: Nelson Creek



## Nelson Creek Images

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Nelson Creek Reach 2. Narrow Small Substrate Estuarine Channel (ES2). View looking downstream toward Taiya Inlet.

*Image: A.Bethe, TIWC, August 2005.*



Nelson Creek Reach 3. View looking downstream toward Taiya Inlet.

*Image: A.Bethe, TIWC, August 2005.*



Nelson Creek Reach 3. Narrow small substrate estuarine channel (ES1). View looking upstream toward Dyea Flats.

*Image: A.Bethe, TIWC, August 2005.*

## Nelson Creek Images



Nelson Creek Reach 3. Narrow small substrate estuarine channel (ES1). View looking upstream. Tours on horseback are seen near the stream with tour buses in the background.

*Image: A. Bethe, TIWC, August 2005.*



Nelson Creek Reach 3. View looking downstream; erosion at ford crossing location. It is common for commercial tours on horseback and in large passenger vehicles to ford the creek at this site.

*Image: S. Seifert, USFWS, June 2007.*



Multiple parallel roads and trails located in and around riparian areas on the Dyea Flats (view looking south). It is recommended that these trails are inventoried, that necessary existing trails are marked, and unnecessary trails are reclaimed and revegetated.

*Image: S. Seifert, USFWS, June 2007.*

## Nelson Slough

**Location:** Lat. 59.4994 N, Long. -135.3627 W

**Local Topographic Map:** USGS Skagway B-1 NW

**Anadromous Stream Catalog Number:** 115-34-10230-2011-3020

Nelson Slough, a dominantly estuarine channel, is sourced by groundwater and springs and contains coho salmon rearing habitat immediately upstream of Nelson Creek. Much of the contributing area of this slough is emergent wetland. Nelson Slough was historically the west branch of the Taiya River (1940s) and portions of the slough still follow abandoned side channels today. The tidal range in Taiya Inlet (as great as 7.3 meters in 6 hours) can raise the stage of Nelson Slough to 1.5 meters at high tide (NPS.; Muchmore, 1999).

### Fish Use

Nelson Slough is listed in the ADF&G anadromous waters catalog as a coho salmon rearing waterbody (Johnson, 2007). During this survey, adult pink salmon were observed throughout the creek and seen spawning in several locations upstream of the main channel mouth. It is also likely that chum salmon are present since they are found in nearby Taiya River.

### Existing Habitat Conditions

Surveyed reaches of the creek were found to be in good condition with little to no disturbance.

### Human Impacts

There are two bridge crossings of Nelson Slough: one for foot traffic at the National Park Service parking area, and one for vehicle traffic along the Dyea flats road. Both appear to be in good condition. Several restoration projects in the Nelson Slough area, including construction of the vehicle bridge (in 1998) and revegetation of the NPS Dyea flats trailhead area (in 2004) appear to be impacting riparian areas positively.

	Reach 1
<b>Channel Type</b>	Silt substrate estuarine channel or slough (ES1)
<b>Surveyed Distance (km)</b>	0.90
<b>Average Gradient (%)</b>	0 %
<b>Bankfull Width (m)</b>	12.0
<b>Incision Depth (m)</b>	2.5
<b>Pools (count)</b>	1
<b>Pool Density (p/m)</b>	.001
<b>Large Wood (count)</b>	Zero
<b>LW Density (pieces/m<sup>2</sup>)</b>	Zero
<b>Key Piece (count)</b>	Zero
<b>Key Piece Density (pieces/m<sup>2</sup>)</b>	Zero
<b>Riparian Disturbance (m, both banks)</b>	15 (1 instance)
<b>Inventory Date</b>	8/23/2005

## **Nelson Slough, *continued***

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### **Opportunities**

- Maintain existing trails and crossings so that they do not become problem areas in the future.
- Continue to monitor and aggressively remove invasive plants from riparian areas.
- Commence monitoring to update Nelson Creek as a pink salmon spawning waterbody in the ADFG anadromous waters catalog.
- Map and catalog Nelson Slough tributaries that may provide additional anadromous fish rearing habitat.

# Map 5: Nelson Slough



## Nelson Slough Images

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Nelson Slough footbridge and National Park Service Restoration site. View looking upstream from Left bank.

*Image: S.Seifert, USFWS, June 2007.*



Nelson Slough Tributary (unmapped). View looking south toward Taiya Inlet. Fish were observed at the confluence of this channel and Nelson Slough.

*Image: S.Seifert, USFWS, June 2007.*



Nelson Slough channel above Nelson Slough Bridge. View looking upstream from Left bank.

*Image: S.Seifert, USFWS, June 2007.*

## Nelson Slough Images

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Nelson Slough Bridge. View looking upstream. This area was restored after the new Nelson Slough Bridge was constructed downstream of a ford site.

*Image: S.Seifert, USFWS, June 2007.*



## Matthews Creek

**Location:** Lat. 59.4791 N, Long. -135.3369 W

**Local Topographic Map:** USGS Skagway B-1 NW

**Anadromous Stream Catalog Number:** none

Matthews Creek is a short, narrow mixed control channel stream located at the head of Nahku (Long) Bay named for historic Dyea homesteader Bill Matthews. The creek passes through private property as a series of steep riffles and then flows under the Dyea Road through a pair of culverts before emptying into Nahku Bay.

### Fish Use

Adult pink salmon and other juvenile salmon were observed at the mouth of the creek during the survey. This creek is not identified in the ADFG catalog of anadromous fish streams.

### Existing Habitat Conditions

This is a steep, short creek. Of the streams surveyed, Matthews Creek contained the most woody debris and pools and had the highest average gradient (4.63%) Vegetation downstream of the Dyea Road provides good cover and habitat value. Storm-thrown driftwood piles indicate the high tide line on the beach and a driftwood dam currently appears to present a barrier to fish at the mouth of the creek. Fish habitat upstream of the culverts is moderate quality.

### Human Impacts

There are two parallel culverts at the crossing under Dyea Road. These culverts are installed at 4% gradient, potentially creating a partial or full creating a fish passage barrier. When these culverts are blocked by debris, flooding occurs over the road and backwaters inundate upstream private property. Pet waste seems to be a minor issue along the beach access trail. Refuse and debris are found in the lower reaches of the creek, probably remnant from beach camp and picnic sites.

	Reach 1
<b>Channel Type</b>	Narrow mixed control channel (MM1)
<b>Surveyed Distance (km)</b>	0.19
<b>Average Gradient (%)</b>	4.63 %
<b>Bankfull Width (m)</b>	3.5
<b>Incision Depth (m)</b>	2.0
<b>Pools (count)</b>	8
<b>Pool Density (p/m)</b>	0.042
<b>Large Wood (count)</b>	15
<b>LW Density (pieces/m<sup>2</sup>)</b>	0.023
<b>Key Piece (count)</b>	1
<b>Key Piece Density (pieces/m<sup>2</sup>)</b>	0.001
<b>Riparian Disturbance (m, both banks)</b>	5 (1 instance)
<b>Inventory Date</b>	8/23/2005

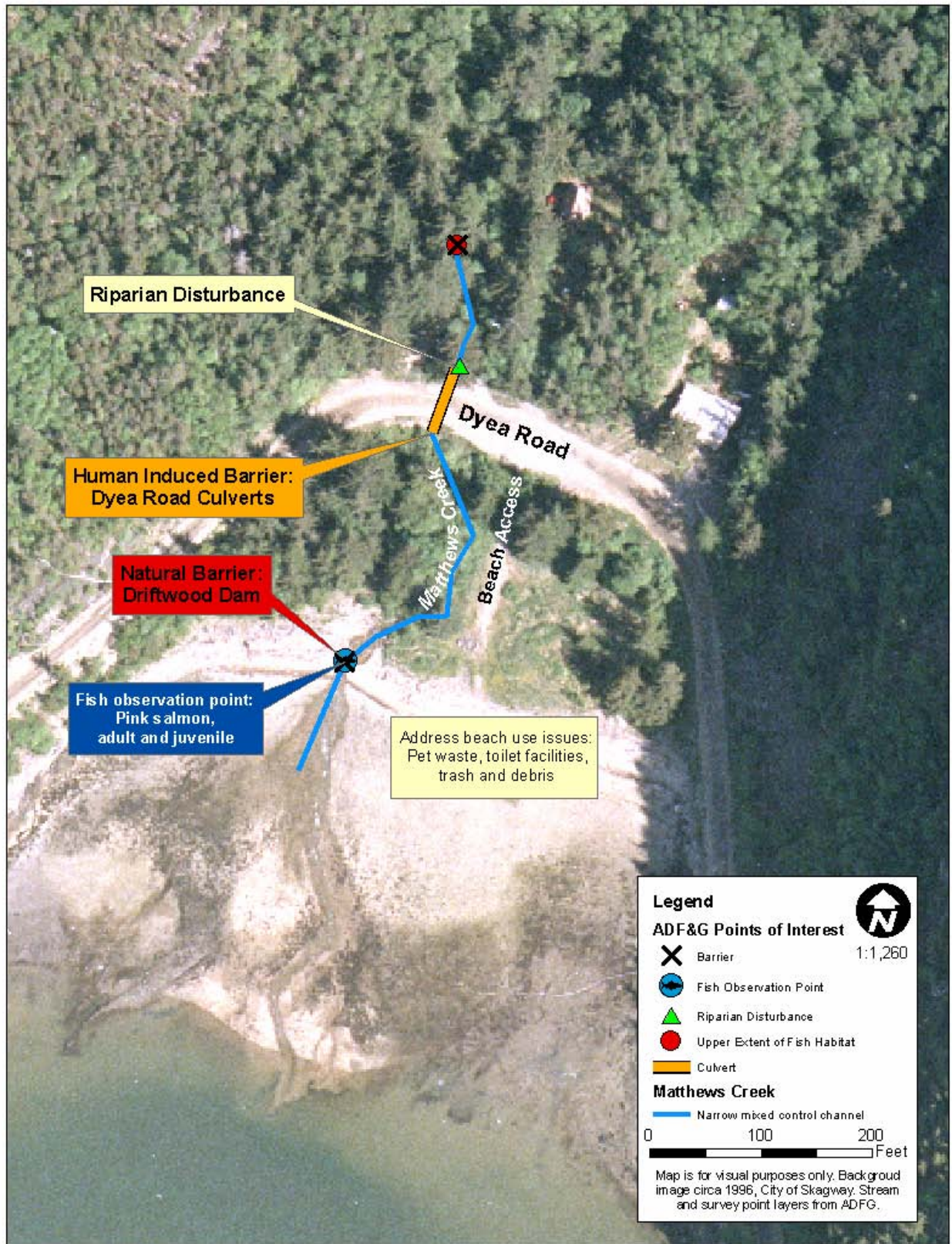
## Matthews Creek, *continued*

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### Opportunities

- Culverts running under the Dyea Road crossing should be quantitatively evaluated for potential fish passage and sediment transport improvements.
- The driftwood dam at the mouth of the creek should be dismantled or modified to ensure fish passage.
- Relatively minor riparian area disturbances just upstream of the culverts could be addressed by revegetating the area and constructing stairs for water access.
- Pet waste may be controlled by providing biodegradable pet waste bags at the trailhead along with a small dumpster.
- A beach cleanup effort to remove trash and debris would improve area aesthetic values.
- Commence monitoring to add Matthews Creek as a pink salmon spawning waterbody in the ADFG anadromous waterbody catalog.

# Map 6: Matthews Creek



## Matthews Creek Images

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One of two culverts under Dyea Road at Matthews Creek. Note the steep grade. These culverts likely present a sediment transport and fish passage problem.  
*Image: A. Bethe, TIWC, August 2005.*



Narrow mixed control channel (MM1). View looking upstream from culvert inlets.  
*Image: A. Bethe, TIWC, August 2005.*



Narrow mixed control channel (MM1). View looking downstream toward culvert inlets and Dyea Road.  
*Image: A. Bethe, TIWC, August 2005.*

## Matthews Creek Images

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Culvert outlets downstream of Dyea Road. Note: Culvert pictured at right is perched (~12" above grade).

*Image: S. Seifert, USFWS, June 2007.*



Mouth of Matthews Creek at beach (looking upstream). The stranded driftwood pictured has formed a small dam at the mouth of the creek which may present a barrier to fish passage.

*Image: S. Seifert, USFWS, June 2007.*



Driftwood dam at mouth of Matthews Creek (looking upstream).

*Image: S. Seifert, USFWS, June 2007.*

## Lillegraven Creek

**Location:** Lat. 59.4877 N, Long. -135.2752 W

**Local Topographic Map:** USGS Skagway B-1 NW

**Anadromous Stream Catalog Number:** 115-34-10300-2031

Lillegraven Creek is a small, spring fed creek located north of the Skagway townsite, paralleling the Liarsville Road. The name may have come from Olav Lillegraven, a southeast Alaska entrepreneur. The creek flows through privately owned, Alaska Mental Health Trust, and State lands. All fish-accessible portions of the creek were surveyed.

### Fish Use

Lillegraven Creek is listed as a coho and Dolly Varden rearing waterbody in the ADFG anadromous waters catalog (Johnson, 2007), though only a portion of the creek is drawn on the ADFG catalog map. No fish data were collected during this survey.

### Existing Habitat Conditions

Riparian areas are largely functional throughout the creek, though significant riparian degradation exists at several sites (see map). Some reaches of creek have been straightened and lack pools or other rest areas for migrating fish. As a low gradient floodplain channel, this channel type is valuable for spawning and rearing habitat for anadromous fish. The large number of pools indicates good overwintering habitat enhanced by a high density of large woody debris.

	Reach 1	Reach 2
<b>Channel Type</b>	Narrow low gradient floodplain channel (FP3)	Narrow low gradient floodplain channel (FP3)
<b>Surveyed Distance (km)</b>	0.53	0.65
<b>Average Gradient (%)</b>	0.67 %	0.67 %
<b>Bankfull Width (m)</b>	1.8	2.8
<b>Incision Depth (m)</b>	0.5	0.2
<b>Pools (count)</b>	11	13
<b>Pool Density (p/m)</b>	0.021	0.020
<b>Large Wood (count)</b>	36	22
<b>LW Density (pieces/m<sup>2</sup>)</b>	0.038	0.012
<b>Key Piece (count)</b>	1	2
<b>Key Piece Density (pieces/m<sup>2</sup>)</b>	0.001	0.001
<b>Riparian Disturbance (m, both banks)</b>	90 (3 instances)	178.5 (10 instances)
<b>Inventory Date</b>	8/23/2005	

## Lillegraven Creek, *continued*

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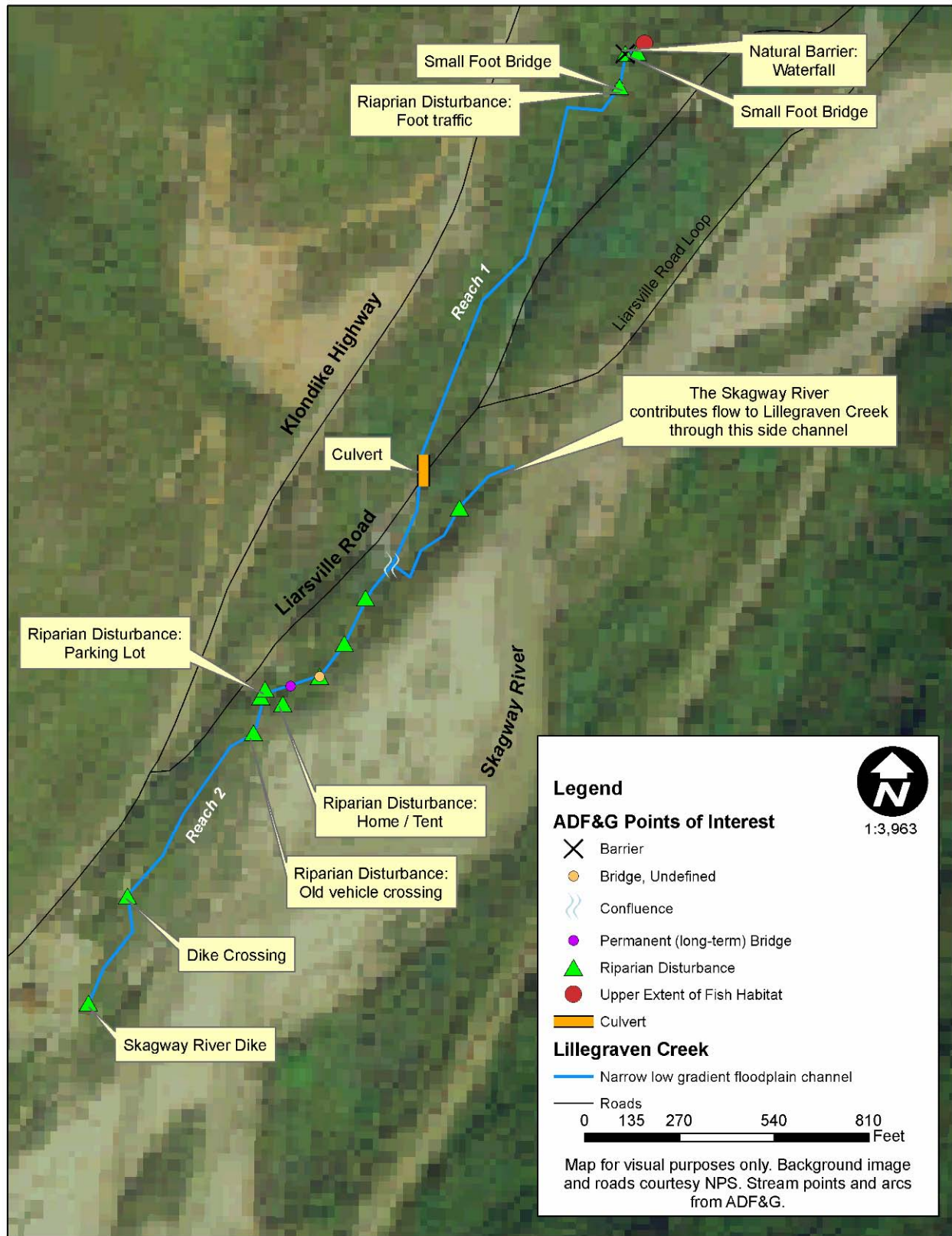
### Human Impact

This creek was historically straightened, circa 1945, and still is a prominent disturbance. The most apparent human impact occurs on property recently purchased and developed by a local tour operator and other landowners adjacent to the creek. Much of the riparian vegetation was removed from a site where a gravel pad was installed for vehicle and trailer parking. Rapid colonization by skunk cabbage, devil's club, horsetail, and grasses is aiding natural restoration of the riparian area and TIWC is working with the landowner to improve the site. Tree and brush removal activity along the Liarsville access road shoulder is encroaching upon the riparian zone (at points within 6-8 feet of the stream) for about 150 feet upstream of the road crossing culvert. A lower priority zone of riparian disturbance exists at the upper extent of fish habitat, where tourist foot traffic at stream access points near the waterfall has inhibited vegetation re-growth.

### Opportunities

- Planting a vegetated buffer along the Liarsville visitor “gold panning” area and restricting foot traffic access to the creek with vegetation, fence rails, and/or paths will restore and protect riparian habitat.
- Planting willow and cottonwood along the clear cut area near the tour operator parking pad will reduce erosion potential and provide riparian habitat.
- Consider introducing meanders and constructed riffles to the historically straightened reach near the new parking pad to slow velocities and restore rearing habitat.
- Design and construct simple stormwater/runoff treatment for parking pads to ensure that pet waste, sediment, and hydrocarbons do not enter the stream during storms or spring snowmelt.
- Commence monitoring to determine if Lillegraven Creek and its tributaries are anadromous fish *spawning* (and rearing for unidentified tributaries) waterbodies to update the ADFG anadromous waterbody catalog.

# Map 7: Lillegraven Creek





## Lillegraven Creek Images

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Reach 1 – Narrow Low Gradient Flood Plain Channel (FP3).

*Image: A. Bethe, TIWC, August 2005.*



Reach 1 – Narrow Low Gradient Flood Plain Channel (FP3).

*Image: A. Bethe, TIWC, August 2005.*



Reach 2 - Culvert under Liarsville Road. View looking downstream.

*Image: A. Bethe, TIWC, August 2005.*

## Taiya Side Channel

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**Location:** Lat. 59.5290 N, Long. -135.5290 W

**Local Topographic Map:** USGS Skagway B-1 NW

**Anadromous Stream Catalog Number:** None

This isolated channel located north of and contributing to West Creek appears to have originated as a side channel of the Taiya River. It is spring or groundwater fed and flows through a forested floodplain. This survey did not include the full lengths of two tributaries.

### Fish Use

Fish traps were set on May 10, 2006 and 12 juvenile Dolly Varden char were captured in scour pools located throughout Reach 1. Adult salmon have been anecdotally reported to migrate up the Taiya side channel in previous years. This stream has not yet been cataloged as an anadromous fish stream; further sampling may result in nomination.

### Existing Habitat Conditions

This low gradient channel exhibits ample spawning habitat favorable to coho salmon and Dolly Varden char. An old upstream “V” log structure located near the creek mouth was constructed for an unknown purpose. A more thorough habitat inventory for this stream is necessary.

### Human Impact

An old “V” log structure (see image) located 100’ above the confluence with West Creek may have been installed historically to create a scour pool. However, this structure was undermined by upstream erosion of bed material, a classic failure of this type of structure, and is probably not a barrier to fish passage. Two 60” culverts at the only Dyea Road crossing appear to be in good condition, but are reportedly prone to blockage by downed wood and thereby present a fish passage and flooding risk if not properly maintained. The unimproved road crossing the creek at the culvert site may contribute fine sediment during heavy rainfall or snowmelt events.

### Opportunities

- A more detailed and extensive stream assessment would inform further development activities in and around this creek and identify additional tributaries or reaches accessible to fish.
- Further data collection and sampling on this creek may result in nominating reaches to the AWC. A more thorough stream assessment and assessment of the unexplored tributaries upstream is warranted.
- Assess the impact of leaving the old log “V” structure in place versus removing the structure regarding fish habitat.
- Improved maintenance of the culverts at the only creek crossing, including removal of debris from the culvert inlet area is needed. When the existing road is upgraded in the future, construction of a small bridge or improved culvert design at the creek crossing should be considered.

## Taiya Side Channel, *Continued*

	Reach 1	Reach 2	Reach 3
<b>Channel Type</b>	Narrow low gradient floodplain channel (FP3)	Narrow low gradient floodplain channel (FP3)	Not recorded
<b>Surveyed Distance (m)</b>	Not recorded	Not recorded	Not recorded
<b>Average Gradient (%)</b>	0.1 %	0.5 %	0.1 %
<b>Bankfull Width (m)</b>	8.0	4.2	10.5
<b>Incision Depth (m)</b>	1.5	1.5	0.1
<b>Pools (count)</b>	3	0	1
<b>Pool Density (p/m)</b>	n/a	0	n/a
<b>Large Wood (count)</b>	123	17	22
<b>LW Density (pieces/m<sup>2</sup>)</b>	n/a	n/a	n/a
<b>Key Piece (count)</b>	5	1	0
<b>Key Piece Density (pieces/m<sup>2</sup>)</b>	n/a	n/a	0
<b>Riparian Disturbance (m, both banks)</b>	n/a	n/a	n/a
<b>Inventory Date</b>	5/10/2006		

## Taiya Side Channel Images



Reach 1: This Dyea Road 2 x 60" culvert crossing is prone to blockage by downed wood.

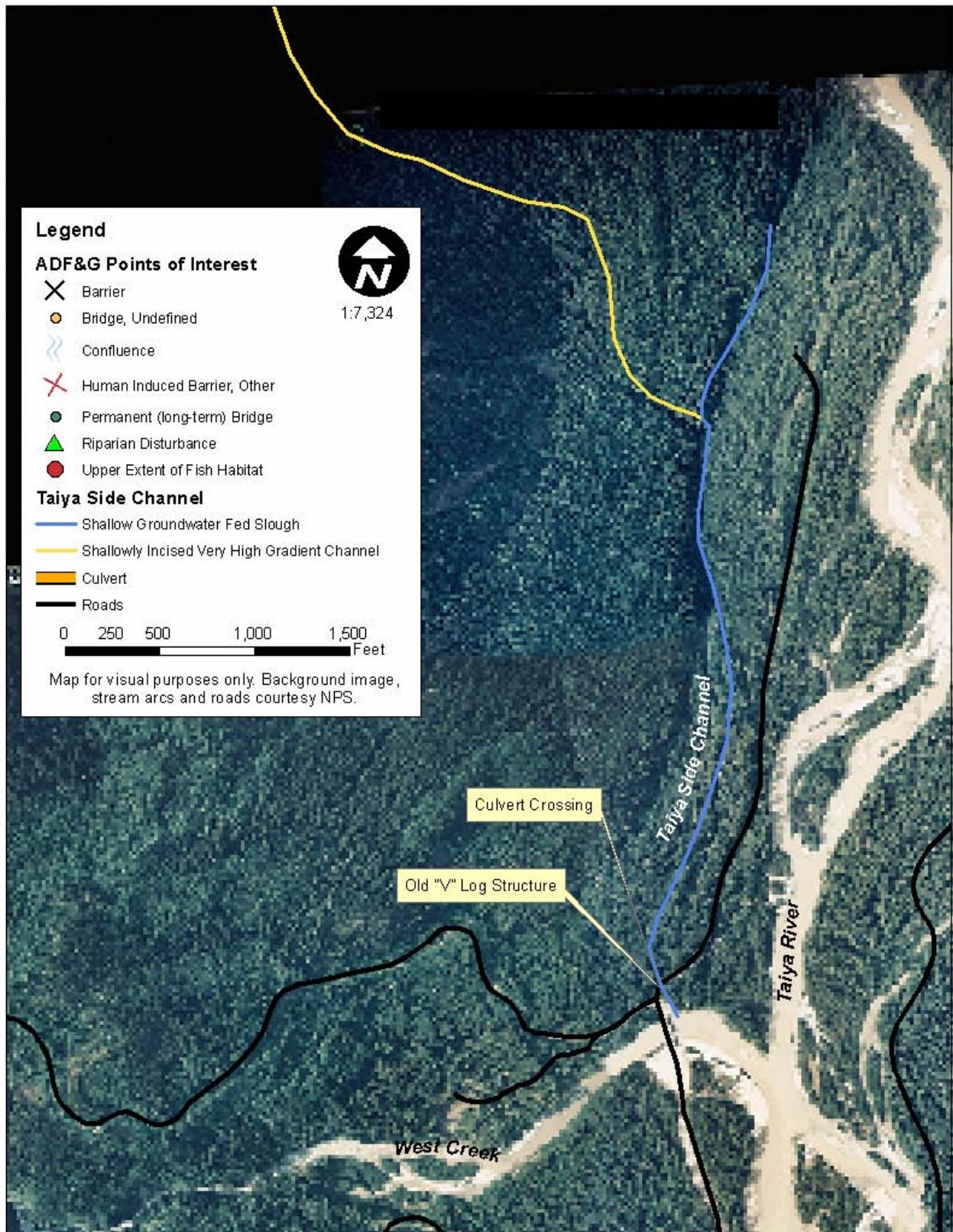
*Photo: S. Seifert, USFWS, June 2007*



Reach 1: This old "V" log structure has failed, but likely passes fish at all flows.

*Photo: A. Bethe, TIWC, May 2006*

# Map 8: Taiya Side Channel



## Skagway River

**Location:** Lat. 59.4672 N, Long. -135.2833 W

**Local Topographic Map:** USGS Skagway B-1 NW

**Hydrologic Unit:** 19010303

**Anadromous Stream Catalog Number:** 115-34-10300

The Skagway River drains a watershed area of roughly 145 mi<sup>2</sup> and flows roughly 19 miles north to south, entering the Taiya Inlet after passing through Skagway. Dairy Creek, Lillegraven Creek, and Reid Creek are within the Skagway River watershed. Major tributaries of Skagway River are East Fork and White Pass Fork. USGS discharge records for Skagway River (station number 15056100) exist from 1964-1986 and demonstrate a mean annual discharge of 560 cfs for the period of record. High summer flows are associated with snowmelt and glacial activity and generally occur June through August. Peak flows associated with stormwater generally occur October to November. The City of Skagway has constructed flood control projects throughout the Skagway River area, such as dike construction and bank armoring. Refer to the City of Skagway's *Skagway River Flood Control Master Plan* (Montgomery Watson, 1997) for more flood control information. The lower river reaches and uplands are designated as an Area Meriting Special Attention (AMSA) in the Alaska Coastal Management Program (ACMP).

### Fish Use

The Skagway River and its tributaries are listed in the AWC as habitat for coho and Dolly Varden rearing, and chum and eulachon presence (ADFG, 2006). Chinook salmon have been observed rearing in Skagway River (Bethers, 2002). AWC mapped reaches in the Skagway River area are shown in Map 9: Skagway River.

### Human Impacts

Gravel mining has impacted lower reaches as sand and gravel are extracted from the streambed. Skagway River is now disconnected from its floodplain by the Skagway Flood Control Project which has fixed channel width with extensive dike construction and bank armoring. Rip-rap armoring of banks associated with flood control has removed riparian vegetation. The mouth of the river is constricted by the Skagway Airport runway. Metal and other debris have accumulated in the riverbed over the last 100 years in lower reaches of Skagway River.



Skagway River Valley, view looking north from the Klondike Highway Bridge.

*Photo: City of Skagway.*

# Map 9: Skagway River and Pullen Creek Anadromous Waters



## Pullen Creek

**Location:** Lat. 59.5290 N, Long. -135.5290 W

**Local Topographic Map:** USGS Skagway B-1 NW

**Anadromous Stream Catalog Number:** 115-34-10310

This creek named for Harriet Pullen, an early Skagway entrepreneur, flows through parts of downtown Skagway and is an extensively modified, small urban stream. The creek passes through 31 culverts and receives supplemental water (up to 40 cfs) from the AP&T hydroelectric plant. Pullen Creek appears on the state 303d list of impaired waterbodies. A small chinook salmon hatchery operates in the lower creek reach. An action plan and accompanying assessment for Pullen Creek was published by TIWC in 2006; therefore, this creek was not surveyed as a part of this assessment. Information from the Pullen Creek Action Plan is summarized below.



Pullen Creek restored reach.

*Photo: TIWC*

### Fish Use

Pullen Creek is listed in the ADFG AWC (Johnson, 2007). Species present include coho, chum, and pink salmon and Dolly Varden char. Coho and pink salmon spawn in reaches of Pullen Creek, and coho and Dolly Varden char juveniles use rearing habitat throughout the year. Trapping efforts by the Skagway Traditional Council confirmed that coho salmon and Dolly Varden use the creek year-round and in its entirety as rearing habitat. In 2005, AP&T conducted several escapement surveys for Pullen Creek as part of the Dewey Lake Hydro relicensing. Pink, chinook and coho salmon were observed. An estimated total peak count for pinks was 660 on August 17, 2005. For chinook, a peak of 142 was recorded. Coho were also counted, and for unknown reasons there were fewer fish than in previous years, and a peak of 20 was recorded on October 20, 2005 (Martin 2005). Many areas in this region had low returns for coho salmon in 2005 .



### Existing Habitat Conditions

Pullen Creek continues to have issues that affect fish habitat including water quality, fish passage obstructions, changes in hydrology, debris accumulation and urban runoff. Restoration efforts may help to improve fish habitat in Pullen Creek, potentially improving fish returns.



## Pullen Creek, *continued*

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### Opportunities

The Taiya Inlet Watershed Council published a detailed action plan for this stream in February 2006, which lists restoration and improvement opportunities by reach. Please refer to the [Pullen Creek Action Plan](#) for more detailed information. A summary of opportunities is included below:

#### Reach 1:

- Ongoing enhancements at Pullen Pond are coordinated with the Congress Way restoration project.

#### Reach 2:

- Re-establish vegetation and implement pedestrian control measures at an area upstream of the footbridge at the Dewey Lakes trailhead.
- Work with WP&YR to establish and maintain native riparian vegetation.
- Complete Congress Way restoration project between Pullen Pond and footbridge, which will replace culverts, riparian vegetation, and in-stream habitat.

#### Reach 3:

- Site monitoring should continue and further plantings be completed at the day-lighted reach of Pullen Creek located just upstream of the AP&T tailrace to ensure a riparian area is established and maintained.
- Work with WP&YR to establish and maintain native vegetation.
- For a 1-block segment from 10<sup>th</sup> and 11<sup>th</sup> Streets, the gabions and sidewalk could be replaced. If feasible, re-meander this site and plant with aquatic and riparian vegetation.
- Multiple sites along the creek that require improvements to restore fish passage including a culvert removal or replacement, dam removal, and other structures. These are listed in detail in the Pullen Creek Action Plan.

#### Reach 4:

- Several sections of this reach could be improved by introducing meanders and functional hydrology and re-establishing riparian vegetation.
- Work with WP&YR to establish and maintain native vegetation and implementing BMPs to encourage long-term sustainability of re-vegetation efforts.
- There is potential for a wetland development project at the spring located near the east end of 10<sup>th</sup> Avenue. This wetland could treat stormwater runoff from the surrounding area while improving wildlife habitat and aesthetics.

#### Reach 5:

- Where possible, work with private landowners to re-meander the creek channel and re-establish riparian buffer zones.
- Explore the possibility of relocating the creek where urbanization has irreversibly impacted stream hydrology and habitat.
- Several sites were identified for fish passage improvement projects.
- Organize a clean-up to remove litter and debris from this section of creek.

#### Reach 6:

- Work with WP&YR to establish and maintain native vegetation and BMPs to encourage long term sustainability of re-vegetation efforts.

## Burro Creek

**Location:** Lat. 59.43722 N, Long. -135.36662 W

**Local Topographic Map:** USGS Skagway B-1 NW

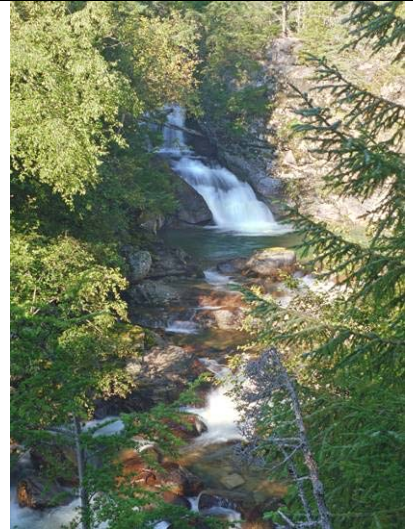
**Anadromous Stream Catalog Number:** None

Burro Creek, located 6 km SW of downtown Skagway, is accessible only by boat. Steep topography beyond the mouth of Burro Creek makes this stream of low priority for anadromous fish projects.

*Burro Creek was not surveyed in this assessment.*

### Fish Use

The Burro Creek Hatchery, a non-profit hatchery owned and operated by the Richards family, developed over 20 years raising pink, chum, silver and king salmon. Burro Creek Farms (Incorporated 1979) was permitted to produce 3 million chum salmon, 100,000 coho salmon, and 100,000 chinook salmon (AK Division of Investments, 2007). The hatchery ceased operations in 2002.



Burro Creek Falls.

*Photo: Mike Klensch*

### Opportunities

- Survey and assess stream conditions along the lowest reach of Burro Creek.

# Reid Creek

**Location:** Lat: 59.48054 Lon: -135.28238

**Local Topographic Map:** USGS Skagway B-1 NW

**Anadromous Stream Catalog Number:** None

Located northeast of the Skagway River Bridge, Reid Creek flows westerly from Dewey Lakes and joins the Skagway River to Taiya Inlet. The creek is named for Frank Reid, a Skagway prospector buried in the nearby Gold Rush Cemetery who was responsible for shooting the notorious outlaw Soapy Smith. The extent of anadromous fish habitat is very short, terminating about 300 feet upstream from the Skagway River confluence in spectacular Reid Falls. *Reid Creek was not surveyed in this assessment.*



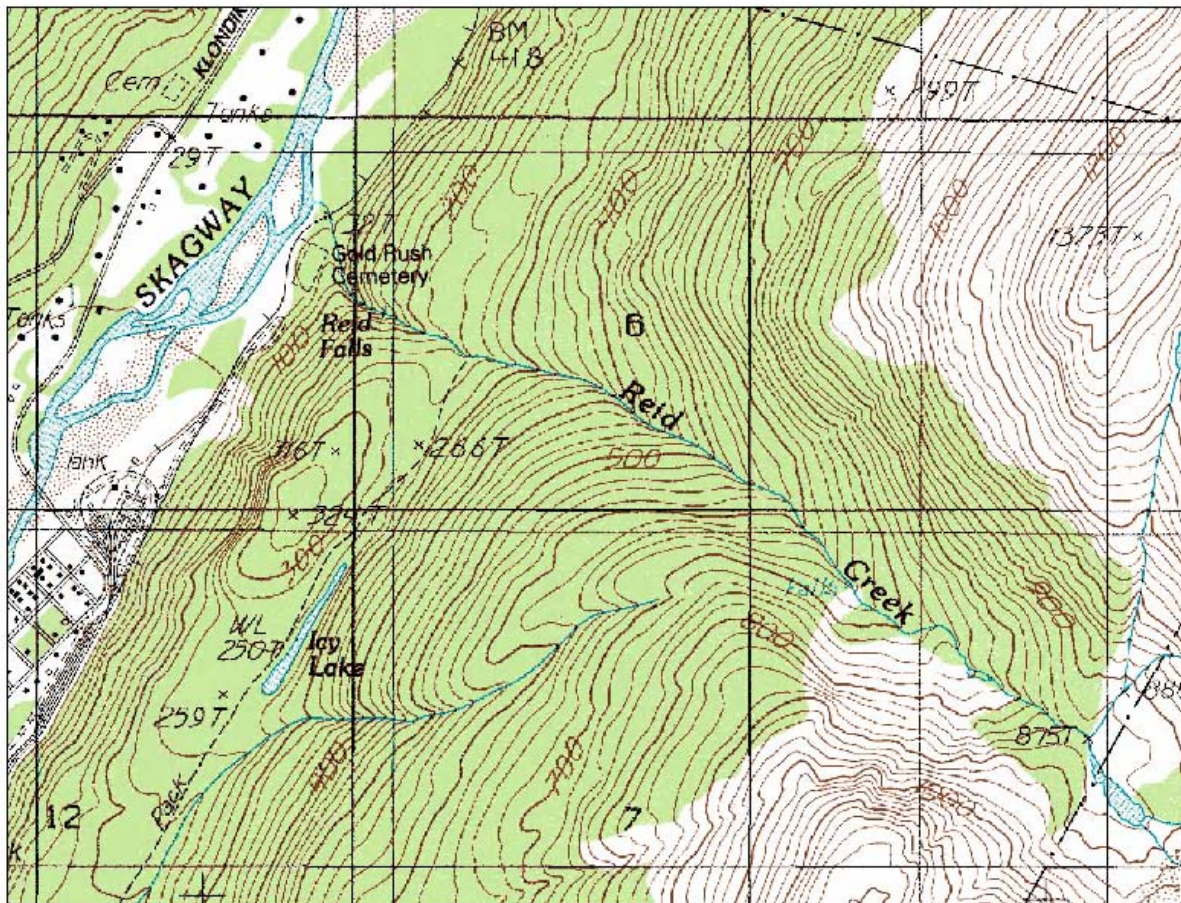
## Fish Use

Reid Creek is known to host resident fish populations above the falls.

## Opportunities

- Survey and assess stream conditions along the lowest reach of Reid Creek.

Reid Creek Falls.  
Photo: Tom Ogg



**Map of Reid Creek**, located north of downtown Skagway. Modified from the USGS Skagway B-1 Quadrangle map available online at <http://agdc.usgs.gov>.

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## Conclusion

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Information gathered in this reconnaissance-level stream condition assessment will be employed by the Taiya Inlet Watershed Council to identify and prioritize restoration opportunities and inform the landowners in the Taiya and Skagway watersheds. To date, the stream assessment has given TIWC an understanding of the past and present land uses that impact several local streams and rivers. Water quality and fish habitat in the Skagway area have been affected by debris accumulation, heavy metals contamination, fish passage obstructions, urban runoff, stream bank and upland erosion, flood control efforts, development, recreational impacts, and urbanization. Identifying and prioritizing watershed preservation and restoration actions to mitigate these impacts are the next steps toward realizing healthy, productive streams and wetlands in the Taiya Inlet Watershed.

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Skagway City Community Volunteers  
Mike Klensch, Alpenglow Photo

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## Appendix A: ADF&G Project Codes and IDs

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### ADF&G Project Codes and IDs

	<b>Project Code</b>	<b>Reach ID</b>	<b>CTV Point ID</b>
<b>Dairy Creek</b>	DAI15	775006	1A043
<b>Nelson Creek</b>	NEL15	775002	1A089
	NEL15	775004	1A076
	NEL15	775005	1A055
<b>Nelson Slough</b>	NSL15	775003	1A102
<b>Matthews Creek</b>	MAT15	775001	1A117
<b>Lillegraven Creek</b>	LIL15	89052	1A024
	LIL15	89053	1A033
<b>Taiya Side Channel*</b> <b>Skagway River*</b>	TAI16	None	None
	SKA16	None	None

\* Taiya Side Channel and Skagway River surveys were not finalized and are not included in the ADFG database. Side channels were not well represented by the draft ADFG survey methods at the time the surveys were conducted and these areas should be revisited once the ADFG methods are revised.

## Appendix B: Study Channel Process Types and Process Group Table

The following channel type definitions and management considerations are condensed from the USFS Channel Type User Guide.

Symbol	Process Group	Channel Type	Management Considerations		
			Hydrology	Aquatic Habitat	Riparian Management
ES1	Estuarine	Silt substrate estuarine channel or slough	Ocean tides influence water flow and depth. Fine sediment deposition occurs due to low stream energy.	Spawning is limited by sediment deposition. Coho, chum, and sockeye salmon juveniles use ES1 channels for rearing before outmigrating.	Sediment retention is high, bank sensitivity is moderate. Strong tidal ebb or flood currents may undermine bank sediments.
ES2	Estuarine	Narrow small substrate estuarine channel	Channel is influenced by ocean tides. Sediment deposition occurs due to low stream energy.	Coho, pink, and chum salmon frequently use ES2 channels as rearing areas prior to outmigration. Spawning habitat is of low value due to sediment retention.	Streambanks often consist of fine materials and are susceptible to riparian disturbance.
FP3	Flood Plain	Narrow low gradient floodplain channel	Sediment deposition occurs due to low stream energy, but high runoff events may mobilize streambed materials.	Used by most salmonoids for spawning, rearing, and overwintering. Sediment deposition and retention adversely impacts spawning habitat quality.	Coarse to fine textured alluvial soils are moderately sensitive to disturbance. However, sediment contributed by bank erosion will likely be deposited and retained.
MC1	Moderate Gradient Contained	Narrow shallow contained channel	Moderate gradients and flow containment maintain sufficient stream energy to transport most sediments. Inchannel storage of fine sediment is minor.	Where accessible, some coho salmon and Dolly Varden char spawn in limited habitat. Coho and Dolly varden juveniles rear in pools in summer. Shallow pool depths limit overwintering.	Banks are moderately stable due to significant bedrock control and well contained channels for stream beds and banks.
MM1	Moderate Gradient Mixed Control	Narrow mixed control channel	Moderate stream energy due to channel gradient and flow containment provided by stable banks transports sediments. High large woody debris volume has moderate sediment retention.	Coho, pink, and chum salmon & Dolly Varden char spawn in MM1 channels. Rearing coho and Dolly Varden char are present. Abundant inchannel woody debris provides overwintering habitat.	Streambank vegetation is important for coarse alluvial/colluvial sediment bank stabilization. Large woody debris traps cobble and gravels used by spawning fish and forms pools.