

*Akun Island*  
*2008 Fish Presence Surveys*  
*Field Report*

*Prepared for:*  
State of Alaska  
Department of Transportation  
and Public Facilities  
P.O. Box 196900  
Anchorage, AK 99519-6900

*Prepared by:*  
HDR Alaska, Inc.  
2525 C Street, Suite 305  
Anchorage, AK 99503

*November 2008*



## **Table of Contents**

|       |  |   |
|-------|--|---|
| 1.0   | INTRODUCTION.....  | 1 |
| 1.1   | Project Background and Purpose .....                                   | 1 |
| 2.0   | FIELD METHODS .....  | 1 |
| 3.0   | RESULTS .....  | 2 |
| 3.1   | North Surf Bay Access Surveys .....                                    | 2 |
| 3.1.1 | Lake #4 and Stream #10.....  | 2 |
| 3.1.2 | Stream #12.....  | 3 |
| 3.1.3 | Stream #13.....  | 3 |
| 3.1.4 | Stream #14.....  | 3 |
| 3.1.5 | Stream #15.....  | 4 |
| 3.1.6 | Lake #5.....   | 4 |
| 3.1.7 | Lake #6 and Pond #3 .....  | 4 |
| 3.2   | Trident Bay Access Surveys.....  | 4 |
| 3.2.1 | Stream #3.....   | 5 |
| 3.2.2 | Seep #1, Lake #7, Ponds #4 and #5.....                                 | 5 |
| 3.2.3 | Streams #18 and #19, Ponds #6 and #7, and Associated Tributaries ..... | 6 |
| 3.2.4 | Stream #20, #21, #22.....  | 6 |
| 3.2.5 | Stream #16.....  | 7 |
| 3.2.6 | Stream #17.....  | 7 |
| 3.3   | Proposed Airport Site .....  | 7 |
| 3.3.1 | Stream #9.....   | 7 |
| 4.0   | DISCUSSION AND CONCLUSIONS (2005, 2006, & 2008).....                   | 8 |
| 5.0   | REFERENCES.....  | 9 |

## **List of Figures**

- Figure 1 Akun Island – Fish Survey Index Map  
Figures 2-12 Akun Island – Fish Survey Results: 2005, 2006, & 2008

## **Appendices**

- Appendix A Fish Resource Permit, Application, and Study Plan  
Appendix B Field Data  
Appendix C Field Photographs  
Appendix D Summary of Fish Presence and Waterbody Habitat Characteristics  
Appendix E Length-Frequency Histogram for coho salmon captured in 2008



## 1.0 INTRODUCTION

### 1.1 Project Background and Purpose

The Alaska Department of Transportation and Public Facilities (ADOT&PF), in cooperation with the Federal Aviation Administration (FAA), are proposing to construct a land-based airport on Akun Island. The proposed airport would service the village of Akutan, which is located approximately 7 nautical miles to the west. HDR is developing the airport conceptual designs and associated environmental reports for ADOT&PF. The primary purpose of the fisheries work described in this report was to describe fish distribution and provide a general description of aquatic habitat in two areas adjacent to the proposed project area. These are north Surf Beach and Trident Bay.

Based on the desire to investigate alternative access points to the project, the study area was expanded to the northern end of Surf Bay and east to Trident Bay (Figure 1). The purpose of the 2008 field work was to further characterize fish species distribution and describe aquatic habitats within the expanded project area. This report is the most recent in a series of two previous reports describing fish resources on Akun Island. There are currently no plans to utilize north surf beach or Trident Bay to Access the Akutan Airport.

### 1.2 Previous Reports

Fisheries-related field surveys were conducted in 2005 and 2006 under Fish Resource Permit (FRP) numbers SF2005-104 and SF2006-170, respectively, to identify fish distributions in the project area to support the Environmental Assessment. In 2005, the Alaska Department of Fish and Game (ADF&G) Anadromous Fish Catalog did not list any anadromous waterbodies on Akun Island ([http://gis.sf.adfg.state.ak.us/AWC\\_IMS/viewer.htm](http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm)). No known fish studies had been conducted on the island prior to the 2005 fish sampling effort, although local residents indicated at least one of the streams (i.e., Stream #1; Figure 1) was known to provide habitat for sockeye salmon (*Oncorhynchus nerka*), pink salmon (*O. gorbuscha*), and coho salmon (*O. kisutch*).

Seven fish species were identified during the 2005 survey efforts, including sockeye, pink, and coho salmon, Dolly Varden char (*Salvalineus malma*), Sculpin (*Cottus* sp.), three-spine stickleback (*Gasterosteus aculeatus*), and a left-eyed starry flounder (*Platichthys stellatus*) (HDR 2005, 2006). The ADF&G Anadromous Fish Catalog has since been updated to include anadromous water bodies on Akun Island identified during the 2005 study. No other waterbodies on Akun Island are listed as anadromous.

## 2.0 FIELD METHODS

Sampling methods included minnow trapping, backpack electrofishing, and direct observation via foot surveys. Study methods were reviewed by ADF&G (memo to ADF&G dated August 5, 2008) and a FRP SF2008-217 was issued by ADF&G prior to conducting the fieldwork. The sampling plan, permit application, and permit are provided in Appendix A.

The field team set a total of 72 ¼-inch mesh minnow traps baited with commercially processed salmon eggs. Traps were fished for varying periods of time, ranging from less than one hour to 48 hours. Set and pull times were recorded for each location and are provided in Appendix B. The field team used a backpack electrofisher (Smith-Root Model LR-24) to capture fish in areas unsuitable for minnow traps (i.e., shallow water; adult salmon presence). Captured fish were identified to species if possible, counted,

and measured to fork length (FL). Fork length is the measured length from the fork of the tail to the nose of the fish before being returned live at the point of capture.

The field team recorded visual observations during minnow trap and electrofishing surveys, and relied solely on visual observation in areas where habitat conditions precluded the effectiveness of in-water sampling gear (i.e., shallow, densely vegetated areas). Polarized sunglasses were used to maximize the effectiveness of this approach. The field team recorded global positioning system (GPS) locations for each sample site, and documented general habitat and stream channel characteristics, such as stream width and depth (Appendix B). Field photographs are included in Appendix C.

### **3.0 RESULTS**

The 2008 field efforts were conducted in two general areas (Figure 1):

- 1) North Surf Bay along an approximate 200-foot wide corridor; and
- 2) East to Trident Bay in the vicinity of an existing trail.

A total of 12 streams, four lakes, and five ponds were sampled during the 2008 field effort. Catch diversity in 2008 was representative of fish species known to be present in the study area (HDR 2005, 2006). Similar to results from previous field efforts, 2008 results showed that three-spine stickleback was the most abundant species captured followed by Dolly Varden. A total of 396 (74%) Dolly Varden and 139 (26%) juvenile coho salmon were captured in 2008 (numbers exclude three-spine stickleback and Sculpin). Spatially, Dolly Varden was the most widely distributed species on the island; Dolly Varden were documented in 10 of the 12 streams and two of the four lakes sampled in 2008.

A detailed description of the study findings for each waterbody is presented below. Survey results from 2008 are shown on Figures 2 through 4 and Figures 8 through 12; results from 2005 and 2006 are displayed on Figures 5 through 7. A summary of the fish species and habitat characteristics for each area examined in 2005, 2006 and 2008 is provided in Appendix D. A length frequency histogram for juvenile coho salmon captured in 2008 is provided in Appendix E.

#### **3.1 North Surf Bay Access Surveys**

The north surf bay access corridor (Figure 1; Figures 2 through 4) included five streams, three lakes, and one pond. Dolly Varden char were captured from four streams and two lakes; three-spine stickleback were captured from two of those lakes; and Sculpin were captured from three streams and one lake. The field team did not capture or observe any fish in Stream #14, Lake #6, or the pond in the vicinity of the north surf bay corridor.

##### **3.1.1 Lake #4 and Stream #10**

Lake #4 is located at the northern end of Surf Bay approximately 3 kilometers (km) north of Stream #1 (Figure 2). The surface area of Lake #4 is approximately 37 acres. The lake bottom consists mainly of sands, silts, and some large cobbles; lake depth was not measured. The lake is currently isolated with no surface outlet. It is separated from North Surf Bay by a narrow strip of land covered with gravels, cobbles, driftwood, and other debris. The driftwood along the lake's north shore indicates transport occurs during storms, or may be evidence of a past connection to Surf Bay. The lake is fed primarily by streams #10 and #11 (Figure 2) along its northern perimeter, and multiple seeps were observed along the lake's western perimeter. Stream #10 flows into the lake from the north; it is less than 0.6 meters (m) wide and 0.2 m deep. Stream #11 is a larger stream that flows from the northeast.

A total of 9 minnow traps in the Lake #4 captured 21 Dolly Varden that ranged in size from 48 millimeters (mm) to 145 mm, 224 Sculpin, and 94 three-spine sticklebacks. Two minnow traps set in

Stream #10 captured four Dolly Varden that ranged from 65 mm to 89 mm and two Sculpin. Surveys were not conducted in the streams draining into the lake's northeast corner. Based on fish species captured from the lake and stream and the lack of connection to saltwater, it was assumed species composition in Stream #11 would be similar to Stream #10.

### **3.1.2 Stream #12**

Stream #12 (Figure 2) drains into north Surf Bay at a point approximately 200 m south of Lake #4. Four minnow traps captured 19 Dolly Varden, ranging in size from 70 mm to 145 mm, and one Sculpin.

The lower 200 m of Stream #12 is characterized by shallow riffles flowing over a sand-dominated substrate. The lower area is primarily riffle habitat with some pools and large woody debris present. The downstream most minnow trap was set approximately 60 m upstream from the mouth, and the second trap was set approximately 140 m farther upstream. Upstream from this point, the channel becomes moderately incised; substrate is dominated by cobbles and gravels; and habitat is composed primarily of shallow riffles with some small pools present. Depth and width measure at minnow trap locations ranged from 0.1 m to 0.3 m and 0.4 m to 0.8 m, respectively. The upstream most minnow trap was set approximately 400 m upstream from the mouth. A wetland complex is located upstream from this point.

### **3.1.3 Stream #13**

Stream #13 drains into north Surf Bay approximately 60 m south of Stream #12 (Figure 2). Minnow trapping results yielded a total of 10 Dolly Varden ranging in size from 82 mm to 124 mm. A minnow trap set in the upper reaches of Stream #13 (approximately 300 m from the mouth) did not capture any fish. However, this upstream area appears to provide suitable fish habitat with no apparent passage barriers downstream.

Approximately 100 m upstream from the mouth the substrate composition is primarily sand and organics; aquatic and submerged vegetation is present. Stream width and depth was measured as 1.0 meter and 0.3 m, respectively. Farther upstream the stream channel is deeper, narrower, and more deeply incised with a substrate that consists primarily of organic material; aquatic and submerged vegetation is abundant. The stream's width and depth were measured as 0.5 m.

### **3.1.4 Stream #14**

Stream #14 drains into north Surf Bay approximately 900 m south of Lake #4 (Figure 3). . The field team electrofished and set three minnow traps in this drainage; no fish were captured or observed. A 2- meter waterfall is located approximately 100 m upstream from its mouth. The waterfall flows through compacted sand sediment into a relatively shallow plunge pool. The waterfall currently presents a barrier to fish movement.

Habitat in the stream's lower portion is comprised of shallow riffles flowing across a sand-dominated substrate with areas of large woody debris along the high tide line. Above the waterfall, stream depth averaged 0.02 m. The field team electrofished approximately 27 m below the waterfall and 20 m above the waterfall.

The stream flows through a wetland complex at a point approximately 100 m upstream of the waterfall; the channel is less defined. One small channel drains into the wetland complex from the east while a smaller channel flows into the wetland complex from the northeast. Unstable banks were observed in upstream areas where the stream was incised, but were not considered common. Shallow water depth in the northeast channel precluded the use of minnow traps.

### **3.1.5 Stream #15**

Stream #15 is located approximately 580 m south of Stream #14 (Figure 3). Stream #15 does not maintain a channel that drains directly into Surf Bay; instead, the stream flows subsurface into the sand at a point approximately 200 m upstream from where the mouth would be expected.

A 1-meter waterfall is located approximately 60 m upstream from the point at which the stream flow becomes subsurface. Below the waterfall, the stream flow widens as it flows across the sand, with an average depth of less than 0.1 m. The channel is shallow with sandy substrate until approximately 400 m above the waterfall, where the channel gradually becomes deeper and more incised; vegetation becomes more abundant; and the substrate is dominated by sand and organics.

The field team observed three Dolly Varden from the bank. The first fish observed was located approximately 350 m above the waterfall. The substrate in this area is dominated by sand; the channel is approximately 0.6 m wide and 0.1 m deep. Minnow trapping efforts in this area captured eight Dolly Varden with fork lengths that ranged from 81 mm to 154 mm. No fish were captured from the small tributary stream that flows southwest into Stream #15.

### **3.1.6 Lake #5**

Lake #5 is located approximately 120 m north of Stream #15 (Figure 3). The lake's surface area is approximately seven acres. The lake bottom is sand. The lake is currently isolated. Initial review of available imagery suggested a connection between the lake and Stream #15, but no such connection was observed at the time of the survey. The lake is fed primarily by a stream draining a hillside from the north/northeast. The hillside to the northeast is vegetated; otherwise the lake is surrounded by unvegetated sand. Minnow trapping efforts within the lake produced four Dolly Varden that ranged from 89 mm to 150 mm and 224 three-spine sticklebacks.

A small stream draining into the northeast corner of the lake was visually surveyed but not otherwise sampled for fish presence. No fish were observed in the stream channel at the time of the survey. The stream is less than 0.1 m deep and approximately 0.4 m wide where it drains into the lake and has a sandy substrate. Approximately 10 m upstream the stream channel has a steeper gradient and becomes narrow (less than 0.2 m wide) as it drains the hillside. It is possible that fish such as Dolly Varden use this channel at higher water; however, given the lack of available fish habitat, it is unlikely this stream supports a large fish population.

### **3.1.7 Lake #6 and Pond #3**

Lake #6 is located approximately 250 m to the east of large unvegetated sand dunes and Pond #3 is approximately 500 m to the south (Figure 4). The lake's surface area is approximately 2 acres and the pond surface area is approximately 0.25 acres. A small stream drains into the lake from the northeast. Minnow trapping efforts did not capture any fish and no fish were visually observed.

## **3.2 Trident Bay Access Surveys**

The existing access trail to Trident Bay begins near the beach at Surf Bay and runs roughly parallel to Stream #1 (Figure 1; Figures 8 through 11). At its closest point, the centerline of the access trail is roughly 4 m from the bank. The trail continues east, runs south of Lake #1, and crosses streams #2 and #3. The trail ends near the beach at Trident Bay, just north of the mouth of Stream #18. In 2005, juvenile coho salmon and Dolly Varden were captured from streams #1, #2, and #3 and Lake #1. Additionally, adult pink salmon were observed throughout Stream #1 and one sockeye salmon was observed near its mouth. Three-spine stickleback and Sculpin were captured from Stream #1 and Lake #1.

In 2008, the field team surveyed farther upstream in the Stream #3 drainage, including its main channel, small seeps draining through wetlands, and two ponds (ponds #4 and #5, see Figure 9). Coho salmon and Dolly Varden were captured from Stream #3, while Dolly Varden was the only species captured from the wetlands and small tributaries. No fish were captured or observed from either pond.

The field team surveyed six streams (#16 through #22), one lake (Lake #7), and two ponds (ponds #6 and 7) that ultimately drain into Trident Bay. Dolly Varden were captured from all six streams; coho salmon were captured from three streams (#16, #17, #18); and three-spine stickleback were captured from two of those streams. Dolly Varden and coho salmon were the primary fish captured from Stream #18, the stream nearest to the access trail. Three-spine stickleback was the only species captured from either pond, and no fish were captured from the lake. No Sculpin were captured or observed in any one of the waterbodies sampled during the Trident Bay surveys.

Two of the three streams (Stream #16 and #17) where Dolly Varden and juvenile coho salmon were observed are located north of the Trident Bay access trail corridor, by approximately 1 km and 1.5 km, respectively. Adult pink salmon were observed in both streams and three adult coho salmon were observed in the stream that is farthest north (Stream #16).

### **3.2.1 Stream #3**

In 2005, the field team electrofished the lower portion of the stream near its mouth and approximately 300 m upstream, where the stream channel is approximately 2.0 m wide and up to 1.0 m deep. Fish captured during the electrofishing surveys included one juvenile coho salmon that measured 49 mm and three Dolly Varden ranging in size from 45 mm to 105 mm.

In 2008, minnow trapping and electrofishing captured fish farther upstream in this drainage, resulting in the capture of 52 Dolly Varden that ranged from 59 mm to 170 mm, 15 juvenile coho salmon that ranged from 72 mm to 105 mm, and one Sculpin.

Multiple tributaries, seeps, and associated wetland complexes feed into this drainage from the north (relative to the proposed road alignment). The field team electrofished multiple shallow channels within two large wetland complexes and set traps where water depth was sufficient. Dolly Varden was the only species captured from these areas (Figure 8).

### **3.2.2 Seep #1, Lake #7, Ponds #4 and #5**

Seep #1 is located just south of the Trident Bay access trail and approximately 2.5 km west of Trident Bay (Figure 9). This groundwater seep begins at the base of a 4-meter high sandy bluff and drains south into a wetland complex. Flow from the seep appears to feed the Stream #3 drainage (Surf Bay) and the Stream #18 drainage (Trident Bay). Shallow depth (less than 0.1 m) and abundant vegetation precluded use of the backpack electrofisher. The field team visually inspected the seep's channel for fish presence; no fish were observed and fish use is considered to be unlikely.

Minnow traps were set in Lake #7, Pond #4 and Pond #5. No fish were captured or observed. The lake's surface area is approximately 2.5 acres. The lake is surrounded by wetlands to the north-northwest and to the east. Review of available imagery suggests water from the lake may flow east into the wetland complex, and eventually to Stream #18, which drains into Trident Bay. However, no distinct outlet channels were observed during the field visit. The ponds are located south of the lake and appear to drain into the Stream #3 drainage.

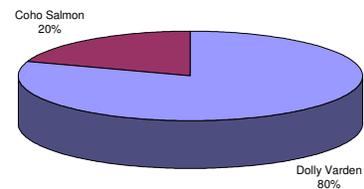
### 3.2.3 Streams #18 and #19, Ponds #6 and #7, and Associated Tributaries

Stream #18 drains into the south lobe of Trident Bay from the west-northwest, about 100 m south of the existing Trident Bay access trail (Figure 9). The stream is a low gradient channel with variable habitat including riffles, pools, and runs. Substrate is dominated by gravels and cobbles near the mouth; organics and fines are more dominant within the portion of stream flowing through the wetland complex; and gravels are more common farther upstream as the channel becomes more deeply incised.

A total of 14 minnow traps were set in the Stream #18 drainage. For practical purposes, this drainage includes the main channel of Stream #18, a tributary that flows from the southwest (Stream #19), and two small ponds (ponds #6 and #7). Ponds #4, #5 and #7 yielded a combined total of 461 three-spine stickleback.

Chart 1 shows the relative abundance of Coho salmon and Dolly Varden captured from the Stream #18 drainage. Dolly Varden was the most abundant species captured from the stream system; a total of 84 were captured ranging from 54 mm to 148 mm. The minnow traps captured 20 Coho salmon that measured between 62 mm and 143 mm, and five three-spine stickleback.

Chart 1: Relative Abundance of Coho Salmon & Dolly Varden. Stream #18 Drainage - Trident Bay - Akun Island. August 2008. (total number of fish captured=101).



A single brightly colored Dolly Varden with a FL of approximately 320 mm was visually observed just upstream from the mouth of Stream #18. The size and color of this fish indicates that the Dolly Varden population may be a combination of anadromous and resident stocks (see Appendix C for photos).

### 3.2.4 Stream #20, #21, #22

Stream #20 flows into Trident Bay approximately 1 km south of Stream #18 (Figure 10). The stream is approximately 0.5 m wide and between 0.3 and 0.6 m deep. The stream channel has a moderate gradient in the lower reaches and becomes steeper and fairly incised farther upstream.

Minnow trapping efforts captured 32 Dolly Varden that ranged in size between 52 mm and 144 mm. It should be noted that this stream is currently being used as a water source. A small wooden structure has been placed in the stream approximately 150 m upstream from the mouth. Although fish were captured above and below the structure, it appears that the structure currently presents a barrier to fish movement.

Stream #21 is located roughly 50 m farther east. It is a very small stream that is too shallow to set traps in most of its length. One trap was set above a small bridge/culvert. No fish were captured from this stream.

Stream #22 is a very shallow stream located an additional 50 m farther east. The stream, multiple seeps, and small stream channels were visually inspected for fish presence; no fish were observed.

Stream #23 is located approximately 265 m east of Stream #20. Stream #23 did not maintain channel continuity to Trident Bay at the time of the survey; instead a small amount of water flowed over the large cobbles on the beach into the Bay. The lower reaches of Stream #23 are relatively low gradient. Substrate is predominantly sand and cobbles. The channel was on

average 0.35 m deep and up to 1 meter wide. Habitat is composed of small pools and riffles with abundant overhanging vegetation; habitat in this stream appears suitable for rearing. The channel becomes quite steep and moderately incised farther upstream.

Minnow trapping efforts captured seven Dolly Varden, ranging in size from 78 mm to 123 mm. A juvenile Dolly Varden was also visually observed in this stream.

### 3.2.5 Stream #16

Stream #16 drains into the northern lobe of Trident Bay from the north (Figure 12). The stream is a low gradient channel with variable habitat dominated by riffles and runs in the lower 150 m. The average stream channel width is approximately 4.5 m. Substrate is dominated by gravels and cobbles near the mouth; organics and fines were observed upstream from the mouth.

Chart 2 shows that sampling efforts yielded more Coho salmon than Dolly Varden in Stream #16. In most other streams sampled, Dolly Varden has been the most abundant species captured.

Minnow trapping efforts captured 55 juvenile coho salmon ranging in size from 51 mm to 110 mm, 40 Dolly Varden ranging from 45 mm to 154 mm, and three three-spine stickleback. Approximately 40 adult pink salmon and three adult coho salmon were also present in this stream.

### 3.2.6 Stream #17

Stream #17 drains into the middle lobe of Trident Bay from the northwest (Figure 11). The stream is a low gradient, meandering channel with variable habitat including riffles, small pools, and runs. The average stream width is approximately 3 m. Substrate is dominated by gravels and cobbles near the mouth; organics and fines were observed upstream from the mouth.

Minnow traps with a minimal soak time (<3 hours) captured 110 Dolly Varden that ranged in size from 38 mm to 150 mm and 49 coho salmon that measured between 62 mm and 143 mm. Approximately 35 adult pink salmon were present in this stream.

## 3.3 Proposed Airport Site

### 3.3.1 Stream #9

Streams #9, (Figure 5) which flows into Surf Bay from the east-southeast, was visually inspected on August 28, 2005 and again during the 2008 field effort. No fish were observed during either field event. Insufficient depths prevented minnow trapping efforts. Electrofishing was conducted in an associated wetland complex, located approximately 250 m upstream from the mouth. No fish were observed or captured. Given the steep nature of the terrain just upstream of the mouth and the lack of fish observed in the stream, we assume this stream does not support a fish population.

Chart 2: Relative Abundance of Coho Salmon & Dolly Varden. Stream #16 - Trident Bay - Akun Island. August 2008. (total number of fish captured=95).

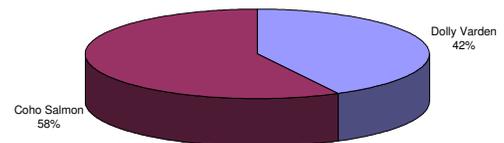
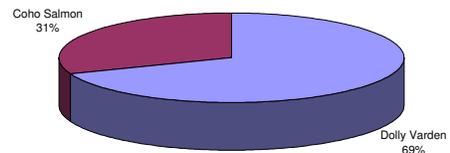


Chart 3: Relative Abundance of Coho Salmon & Dolly Varden. Stream #17 - Trident Bay - Akun Island. August 2008. (total number of fish captured=159).



#### **4.0 DISCUSSION AND CONCLUSIONS (2005, 2006, & 2008)**

Twenty streams, six lakes, and seven ponds have been examined in an effort to determine the presence of anadromous fish species and document fish habitat on Akun Island. In 2005, three streams (Stream #1, #2, #3) and one lake (Lake #1) were identified as anadromous. In 2008, three additional anadromous streams (#16, #17, #18) were identified and the presence of anadromous fish was recorded farther upstream in Stream #3. Pink, sockeye, and coho salmon and Dolly Varden char were the anadromous salmon species identified during the sampling efforts to date. Although chum salmon are common in the Aleutian region, none were found to be present on Akun Island.

Three-spine stickleback was the most abundant species captured throughout the surveys and was the only species captured from any one of the ponds. The field team captured three-spine stickleback from three streams, three lakes, and two ponds. Sculpin were captured from four streams and two lakes in the Surf Bay drainage; no Sculpin were captured from the Trident Bay drainage. However, three-spine stickleback and Sculpin have not been considered key evaluation species so were excluded from analysis.

Based on the results from all three years, Dolly Varden char is the most widely distributed species on the Akun Island. The presence of Dolly Varden has been identified in 14 streams and three lakes. Juvenile coho salmon rearing was observed in all seven anadromous waterbodies, including six streams and one lake. However, spatial distribution of juvenile coho salmon across the island was somewhat limited; juvenile coho salmon were only observed in Streams #1 through #3 and Lake #1, in the vicinity of the Trident Bay access trail near the proposed airport site and in three streams that flow into Trident Bay.

Aside from three-spine stickleback, Dolly Varden was the most abundant species captured. A total of 576 (77%) Dolly Varden and 168 (23%) juvenile coho salmon have been captured from Akun Island (2005, 2006 and 2008 data combined).

In 2008, three adult coho salmon were observed in Stream #16, which drains into the northernmost cove of Trident Bay. In general, adult coho salmon would be expected to return later in the fall, with peak spawning dates from late October through late November (Schwarz 2005). No adult coho salmon were observed in 2005.

In 2005, a one adult sockeye salmon (female) was observed near the mouth of Stream #1; no sockeye salmon were observed in 2008. In general, sockeye salmon return to their natal streams in mid-summer (Heard 1991). It is possible the peak run of sockeye salmon would have already occurred by the time the surveys were conducted and perhaps more adult sockeye salmon would be observed in late July and early August. No juvenile sockeye or pink salmon were captured during the survey. Pink salmon fry generally emerge in late winter and out migrate in the spring (Heard 1991) so their presence at the time of this survey was not expected. However, adult pink salmon were observed in three streams (Stream #1, #16, #17).

It should be noted that both anadromous and non-anadromous (resident) forms of Dolly Varden char occur in Alaska. It is presumed that Akun Island supports both resident and anadromous populations of Dolly Varden; though the proportion of each is not known. Both forms generally reach sexual maturity in 3 to 6 years (Scott and Grossman, 1973). Anadromous Dolly Varden generally spawn in freshwater streams; the majority of spawning in this area would be expected to occur in late October (Schwarz 2005). In 2008, the field team observed only one brightly colored Dolly Varden (FL 320 mm) at the mouth of Stream #18. All other Dolly Varden captured ranged in size between 38 mm and 170 mm. The scarcity of anadromous spawning adults was not surprising, due to the natural timing of spawning for this species in this area.

There is a general lack of life history information regarding resident Dolly Varden. Non-anadromous forms can generally be separated into stream residents (fish that reside in streams) and stream-lake residents (fish that use both streams and lakes) (Armstrong and Morrow). Dwarf populations of both resident forms that reach sexual maturity at an early age have been documented in Alaska; one stock was found to reach maturity at age 3 and 4 with an average FL of 114 mm (Armstrong and Morrow). Therefore, relying on FL without further study (age analysis) to determine sexual maturity is difficult. Based on the presence of Dolly Varden in landlocked areas on Akun Island as well as the anadromous Dolly Varden observed in 2008, it is presumed that Akun Island supports both anadromous and non-anadromous populations. Again, the proportion of each is not known.

## 5.0 REFERENCES

- Alaska Department of Fish and Game (ADF&G). *Catalog of Waters Important to the Spawning, Rearing or Migration of Anadromous Fishes –Akun Island*. Available at: ([http://gis.sf.adfg.state.ak.us/AWC\\_IMS/viewer.htm](http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm), as viewed on 20 April 2005).
- Armstrong, Robert H and James E Morrow. *Chapter 2: The dolly Varden char (Salvelinus malma) in Perspectives of Vertebrate Science, Volume 1: CHARRS Salmonid Fishes of the Genus Salvelinus*. Series Editor: Eugene K. Balon.
- Lamb, Andrew and Edgell, Phillip. 1986. *Coastal Fishes of the Pacific Northwest*. Published by Harbour Publishing Co., Ltd. Madeira Park, BC, Canada.
- Schwarz, Len. 2005. Personal Communication with Len Schwarz, Division of Sport Fish, Kodiak. Email correspondence (Re: timing of fish runs – Aleutian Region) with Erin Cunningham, HDR-Alaska, on December 8, 2005.
- Scott, W.B., and E.J. Crossman, 1973. *Freshwater Fishes of Canada*. Department of Ichthyology and Herpetology. Fisheries Research Board of Canada, Ottawa 1973. Bulletin 184.
- HDR 2005. Akun Island Anadromous Fish Stream Survey (unpublished). Prepared for Alaska Department of Transportation and Public Facilities.
- HDR 2006. Akun Island Addendum Anadromous Fish Stream Survey (unpublished). Prepared for Alaska Department of Transportation and Public Facilities.
- Heard, William R. 1991. *Life History of Pink Salmon (Oncorhynchus gorbuscha)*. Auke Bay Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Auke Bay, Alaska 99821, pg 121 in *Pacific Salmon Life Histories*, University of British Columbia, Vancouver, B.C., edited by C. Groot and L. Margolis, 1991.

