Technical Paper No. 430

# Local and Traditional Knowledge of Stikine River Chinook Salmon: a Local Perspective on a Vital Commercial, Sport, and Subsistence Fish

by
Joshua T. Ream
and
Jessie Merriam

June 2017

Alaska Department of Fish and Game Division of Subsistence

## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in Division of Subsistence reports. All others, including deviations from definitions listed below, are noted in the text at first mention, in the titles or footnotes of tables, and in figures or figure captions.

**Weights and measures (metric)**

| | |
|---|---|
| centimeter | cm |
| deciliter | dL |
| gram | g |
| hectare | ha |
| kilogram | kg |
| kilometer | km |
| liter | L |
| meter | m |
| milliliter | mL |
| millimeter | mm |

**Weights and measures (English)**

| | |
|---|---|
| cubic feet per second | $ft^3/s$ |
| foot | ft |
| gallon | gal |
| inch | in |
| mile | mi |
| nautical mile | nmi |
| ounce | oz |
| pound | lb |
| quart | qt |
| yard | yd |

**Time and temperature**

| | |
|---|---|
| day | d |
| degrees Celsius | °C |
| degrees Fahrenheit | °F |
| degrees kelvin | K |
| hour | h |
| minute | min |
| second | s |

**Physics and chemistry**

*all atomic symbols*

| | |
|---|---|
| alternating current | AC |
| ampere | A |
| calorie | cal |
| direct current | DC |
| hertz | Hz |
| horsepower | hp |
| hydrogen ion activity (negative log of) | pH |
| parts per million | ppm |
| parts per thousand | ppt, ‰ |
| volts | V |
| watts | W |

**General**

| | |
|---|---|
| Alaska Administrative Code | AAC |
| all commonly-accepted abbreviations | e.g., Mr., Mrs., AM, PM, etc. |
| all commonly-accepted professional titles | e.g., Dr., Ph.D., R.N., etc. |
| at | @ |
| compass directions: | |
| east | E |
| north | N |
| south | S |
| west | W |
| copyright | © |
| corporate suffixes: | |
| Company | Co. |
| Corporation | Corp. |
| Incorporated | Inc. |
| Limited | Ltd. |
| District of Columbia | D.C. |
| et alii (and others) | et al. |
| et cetera (and so forth) | etc. |
| exempli gratia (for example) | e.g. |
| Federal Information Code | FIC |
| id est (that is) | i.e. |
| latitude or longitude | lat. or long. |
| monetary symbols (U.S.) | $, ¢ |
| months (tables and figures) | first three letters (Jan,...,Dec) |
| registered trademark | ® |
| trademark | ™ |
| United States (adjective) | U.S. |
| United States of America (noun) | USA |
| U.S.C. | United States Code |
| U.S. states | two-letter abbreviations (e.g., AK, WA) |

**Measures (fisheries)**

| | |
|---|---|
| fork length | FL |
| mideye-to-fork | MEF |
| mideye-to-tail-fork | METF |
| standard length | SL |
| total length | TL |

**Mathematics, statistics**

*all standard mathematical signs, symbols and abbreviations*

| | |
|---|---|
| alternate hypothesis | $H_A$ |
| base of natural logarithm | e |
| catch per unit effort | CPUE |
| coefficient of variation | CV |
| common test statistics | (F, t, $\chi^2$, etc.) |
| confidence interval | CI |
| correlation coefficient (multiple) | R |
| correlation coefficient (simple) | r |
| covariance | cov |
| degree (angular ) | ° |
| degrees of freedom | df |
| expected value | E |
| greater than | > |
| greater than or equal to | ≥ |
| harvest per unit effort | HPUE |
| less than | < |
| less than or equal to | ≤ |
| logarithm (natural) | ln |
| logarithm (base 10) | log |
| logarithm (specify base) | $log_{2,}$ etc. |
| minute (angular) | ' |
| not significant | NS |
| null hypothesis | $H_O$ |
| percent | % |
| probability | P |
| probability of a type I error (rejection of the null hypothesis when true) | α |
| probability of a type II error (acceptance of the null hypothesis when false) | β |
| second (angular) | " |
| standard deviation | SD |
| standard error | SE |
| variance: | |
| population | Var |
| sample | var |

*TECHNICAL PAPER NO. 430*

# LOCAL AND TRADITIONAL KNOWLEDGE OF STIKINE RIVER CHINOOK SALMON: A LOCAL PERSPECTIVE ON A VITAL COMMERCIAL, SPORT, AND SUBSISTENCE FISH

by

Joshua T. Ream and Jessie Merriam
Alaska Department of Fish and Game Division of Subsistence, Anchorage

Alaska Department of Fish and Game
Division of Subsistence
333 Raspberry Road
Anchorage, AK 99518

June 2017

The Division of Subsistence Technical Paper Series was established in 1979 and represents the most complete collection of information about customary and traditional uses of fish and wildlife resources in Alaska. The papers cover all regions of the state. Some papers were written in response to specific fish and game management issues. Others provide detailed, basic information on the subsistence uses of particular communities which pertain to a large number of scientific and policy questions.

Technical Paper series reports are available through the Alaska Resources Library and Information Services (ARLIS), the Alaska State Library and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone editorial and professional review.

*Joshua T. Ream and Jessie Merriam*
*Alaska Department of Fish and Game Division of Subsistence*
*333 Raspberry Road, Anchorage, AK 99518-1565 USA*

*This document should be cited as:*
*Ream, J. T. and J. Merriam. 2017. Local and Traditional Knowledge of Stikine River Chinook Salmon: a Local Perspective on a Vital Commercial, Sport, and Subsistence Fish. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 430, Anchorage.*

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

**If you believe you have been discriminated against in any program, activity, or facility please write:**
ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK, 99811-5526
U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA, 22203
Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW, MS 5230, Washington, D.C. 20240

**The department's ADA Coordinator can be reached via phone at the following numbers:**
(Voice) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648, (Juneau TDD) 907-465-3646, or (Fax) 907-465-6078

**For information on alternative formats and questions on this publication, please contact:**
ADF&G Division of Subsistence at http://www.adfg.alaska.gov/index.cfm?adfg=contacts.anchorage

# TABLE OF CONTENTS

**List of Tables** ..... iii

**List of Figures** ..... iii

**List of Plates** ..... iii

**List of Appendices** ..... iv

**Abstract** ..... v

**1. Introduction** ..... 1
- Project Justification ..... 1
- Project Goals and Objectives ..... 1
- Project Communities ..... 2
  - Wrangell ..... 2
  - Petersburg ..... 3
- Background: Local Chinook Fishery Regulation ..... 3
  - Commercial ..... 5
  - Sport ..... 6
  - Subsistence ..... 6

**2. Methods** ..... 7
- Community Scoping Meetings ..... 7
- Key Respondent Selection ..... 7
- Interview Protocol ..... 8

**3. Results** ..... 9
- Biological Observations ..... 9
  - Stock Changes Over Time ..... 9
    - *Size* ..... *10*
    - *Run Timing* ..... *12*
  - Habitat and Spatial Distribution ..... 13
    - *Stikine River (United States)* ..... *13*
      - *Navigation and Flooding* ..... *13*
      - *Chinook Salmon Observations* ..... *15*
    - *Stikine River (Canada)* ..... *17*
    - *Bradfield River and Canal* ..... *19*
  - Predation and Prey ..... 21
    - *Marine Mammals* ..... *21*
      - *Whales* ..... *22*
      - *Pinnipeds* ..... *25*
    - *Nonsalmon Fish* ..... *28*
      - *Herring* ..... *28*

# TABLE OF CONTENTS, CONTINUED

*Eulachon (Hooligan)* ..... *30*
Regional Use and Harvest ..... 30
Commercial Fishing (Freshwater) ..... 30
Commercial Fishing (Marine) ..... 32
*Trawling* ..... *33*
*Trolling* ..... *35*
*Gillnetting* ..... *36*
*Seining* ..... *38*
*Canneries* ..... *39*
Sport and Subsistence Fishing ..... 42
*Petersburg and Wrangell Derbies* ..... *42*
*Charter Operations* ..... *45*
*Sport Fishing* ..... *46*
*Subsistence Gillnetting* ..... *48*
Practices and Preferences ..... 51
Traditional Trade, Harvest, and Use ..... 51
Preferences ..... 53
Research and Management ..... 54
Hatchery Operations ..... 54
Mining Development (Canada) ..... 58
Fishery Regulations ..... 61
*Alaska Regulations* ..... *61*
*Federal Regulations and Treaties* ..... *62*

**4. Conclusion ..... 67**

**Acknowledgments ..... 70**

**References Cited ..... 71**

# LIST OF TABLES

**Table** **Page**

3-1.–Estimated commercial and food fish harvests, Stikine River, 2014. .....31

# LIST OF FIGURES

**Figure** **Page**

3-1.–Approximate distribution of Clarence Strait harbor seal stock. .....27

# LIST OF PLATES

**Plate** **Page**

1-1.–This jet boat on the Stikine River is loaded with subsistence setnet gear. .....6
3-2.–Landslide on the Tahltan River—May 21, 2014. .....17
3-3.–Subsistence-caught salmon from the Stikine River. .....43
3-4.–Wizard Island subsistence setnet site. .....50

# LIST OF APPENDICES

**Appendix** **Page**

A: Maps ..... 75
B: Conditions of the 2014 Lower Stikine River Commercial Salmon License ..... 87
C: Pacific Salmon Treaty Annex IV as Applied to the Stikine River ..... 93
D: Wrangell Chinook Salmon Derby Winner Statistics, 1953–2013 ..... 101
E: Historic Salmon Smolt Releases by the Southern Southeast Regional Aquaculture Association from 1990–2012 ..... 103
F: Chinook salmon collections from Andrew's Creek for aquaculture operations, 1976–1983 ..... 109
G: Stikine River Federal Subsistence Fishery Management DRAFT Briefing, USDA Forest Service, Alaska Region, March 7, 2016 ..... 111
H: Timeline of Commercial Herring Fisheries in Southeast Alaska, 1867–2008 ..... 115
I: 2014/2015 Fishing licenses and conditions issued by Fisheries and Oceans Canada for Aboriginal Communal Fishing ..... 123
J: Directed and Incidental Commercial Salmon Harvests and Permits Over Time ..... 127
K: Chronological History of Salmon Canneries in Southeast Alaska ..... 135
L: Stikine River Subsistence Salmon Harvest Tables, 2004–2013 ..... 145
M: Stikine River Chinook salmon surveys in United States tributaries over time ..... 149
N: Stikine River Chinook salmon counts at Andrew Creek weir, 1977–1998 ..... 159

# ABSTRACT

In Alaska, statewide declines of Chinook salmon led to the development of the Chinook Salmon Research Initiative—a program aimed at better understanding these declines. Among the indicator stocks chosen for this study was the Stikine River in Southeast Alaska. This watershed is a dynamic system that influences the lives of people in Canada and Alaska, both contemporarily and since time immemorial. Its salmon runs support commercial, sport, and subsistence harvest activities. While American and Canadian entities have long studied Stikine River Chinook salmon stocks to affect improved management, rarely has Local and Traditional Knowledge (LTK) of these stocks been compiled and analyzed alongside of Western science and management. This study reports on LTK shared by commercial, sport, and subsistence users of Chinook salmon in Wrangell and Petersburg, Alaska. The knowledge, perceptions, and observations of these fishers provides stakeholder perspective on the Stikine River's Chinook salmon, their habitats, human consumption, economics, and fisheries management over time. This information may help to better inform the study and management of Chinook salmon in this important transboundary river.

Keywords: Stikine River, Wrangell, Petersburg, Chinook salmon, king salmon, local traditional knowledge, LTK, traditional environmental knowledge, TEK, subsistence, transboundary river, Pacific Salmon Treaty

# 1. INTRODUCTION

## Project Justification

Statewide declines in the productivity and abundance of Chinook salmon[1] (*Oncorhynchus tshawytscha*) stocks in recent years have affected many communities and stakeholder groups across Alaska (ADF&G Chinook Salmon Research Team 2013). In response, the Alaska Department of Fish and Game (ADF&G) recognized a need to 1) more precisely characterize trends in Chinook salmon productivity and abundance; 2) acquire data that may help to understand Chinook salmon declines; and 3) to establish better means of tracking future Chinook salmon population trends.

In 2012, ADF&G worked with federal and academic partners to develop a comprehensive planning approach to increase Alaska's stock assessment capabilities for Chinook salmon. These meetings combined with the proceedings of a public forum and written comments resulted in the publication of ADF&G's "Chinook Salmon Stock Assessment and Research Plan, 2013," which outlined research priorities identified during this process. The research plan also prioritized filling knowledge gaps as they pertain to 12 indicator stocks in Alaska that represent "diverse life history and migratory characteristics across a broad geographic range" (ADF&G Chinook Salmon Research Team 2013).

**CHINOOK SALMON**
became the official state fish of Alaska on March 25, 1963.

ADF&G, 2017, Species profile: Chinook Salmon
http://www.adfg.alaska.gov/index.cfm?adfg=chinook.main

Increasing the availability of local and traditional knowledge (LTK) as it pertains to patterns and trends of use in each stock was among the methods suggested by the research plan for enhancing the stock assessment programs (ADF&G Chinook Salmon Research Team 2013). The plan recognized that LTK can provide scientists and managers with detailed observations on Chinook abundance, distribution, run timing, condition, and habitat at a variety of temporal and spatial scales. In addition to empirical data, these observations can also elucidate questions and hypotheses for future research.

To address the LTK component of the stock assessment plans, the Division of Subsistence at ADF&G was funded through a state appropriation from the Chinook Salmon Research Initiative to develop a series of research projects aimed at documenting this knowledge in communities proximal to each of the indicator stocks. This report examines the findings of the LTK research initiative associated with the Stikine River indicator stock, including knowledge, observations, and perceptions of stock user groups from the communities of Wrangell and Petersburg. LTK is defined here as knowledge that has either developed as a result of personal observation or that which is both local and intergenerational. Maps of this region and many annotations mentioned within this text are included in Appendix A.

## Project Goals and Objectives

The goal of this project was to collect and analyze local and traditional knowledge (LTK), concerns, and perspectives regarding Chinook salmon stocks and their habitats in the Stikine River region of Alaska over time. This data was intended to supplement existing biological knowledge of Chinook salmon for the purpose of developing a broader understanding of these stocks and associated human interactions with them. In addition, the project served to document local perceptions and stakeholder concerns regarding this species and to compile various sources of information in response to these. Furthermore, this project sought to document and archive valuable historical and ethnographic information among stakeholder groups in the region.

1. King salmon and Chinook salmon are used interchangeably throughout this report.

While this project was focused on obtaining information specifically pertaining to Chinook salmon, many respondents offered LTK about other species and harvest activities. These tangential topics informed on larger changes to socio-ecological systems that ultimately affect Chinook salmon. Respondents in this study offered theories based on their understanding of local conditions but often felt they lacked sufficient data to draw definitive conclusions. This study documented these perceptions and integrated known literature to expand discussions of these topics. Ultimately, this documentation allows researchers and managers to address perceptions and concerns by providing education and outreach opportunities within the study communities.

## Project Communities

The Stikine River flows for approximately 335 mi from its headwaters in the Spatsizi Plateau region of British Columbia, Canada to its mouth in southeastern Alaska (Penn 2001). Only one community, Telegraph Creek, British Columbia, occurs along the river banks (Alaska Geographic Society 1979). Telegraph Creek was established in 1861 following the discovery of placer gold nearby, and the community is considered the link between the river and the continental road system (Alaska Geographic Society 1979). Another community, Glenora, was established approximately 12 miles downstream of Telegraph Creek in 1874 (and again in 1898). Recent census records for this area are incomplete but a regional government official believes there to be a minimum of 160 residents of the three adjoining reserves[2] near Telegraph Creek, approximately five non-reservation residents of Telegraph Creek proper, and approximately 35 residents of Glenora[3].

While Tlingit, Tahltan, and Kaska Dena Indians utilized the Stikine River and its abundant resources for millennia, Captain George Vancouver is considered to have been the first European to venture near the mouth of this river in 1792 (Alaska Geographic Society 1979). In 1799 American fur traders discovered the river, followed quickly by Russian fur traders. In 1898 the Klondike Gold Rush began, and the river was used by many prospectors as a means of accessing the interior of British Columbia and the Yukon Territory. Commercial steamboats and sternwheelers were common on the Stikine from 1862 through 1969, but regular boat service ended thereafter (Alaska Geographic Society 1979). Today, river travel is mostly undertaken by recreational users, hunters, and anglers. Several charter operations provide regular summer excursions from the Alaskan communities of Wrangell and Petersburg to Telegraph Creek.

Only the last 40 miles of the Stikine River occur in Alaska, and this distance is entirely surrounded by the Stikine-Leconte Wilderness Area, a 448,926 acre parcel of federally protected land[4]. Two coastal communities, Wrangell and Petersburg, occur in proximity to the Alaska portion of the Stikine River. For this study, LTK was collected from knowledgeable fish harvesters who reside in these communities.

## Wrangell

The community of Wrangell is located on the northernmost tip of Wrangell Island, approximately 3 mi south of the mouth of the Stikine River. It is 155 miles south of Juneau and 89 miles northwest of Ketchikan[5]. The community is within the traditional homeland of the Stikine Tribe of the local Tlingit Indians, but no village was established at this location until it became a fur trading center for the Tlingits and the Russians

2. In Canada an Indian Reserve is defined as a tract of land set aside for the exclusive use of an Indian band. http://indigenous-foundations.arts.ubc.ca/home/government-policy/reserves.html
3. Andrew Webber, Manager of Planning and Economic Development, Regional District of Kitimat-Stikine, personal communication, March 2016.
4. Recreation.gov. "Stikine-LeConte Wilderness, AK." Accessed December 2014. http://www.recreation.gov/recreationalAreaDetails.do;jsessionid=38A19124696AB6E6334996868A6368F0.web06-ny?contractCode=NRSO&recAreaId=13277
5. Alaska Department of Commerce, Community, and Economic Development (ADCCED), Juneau. n.d. "Alaska Community Database Online: Community Information." Accessed December 2014. http://commerce.alaska.gov/cra/DCRAExternal/community/Details/7dc49d03-4394-46d6-a4f2-850b79e3f2b8

in 1811. At this time, a large Tlingit village called Kotzlitzna (often referred to as Old Town) was present approximately 13 miles south.

In 1834, Russia established a stockade named Redoubt St. Dionysius at the site of current day Wrangell[6]. The fort was then leased by the British Hudson Bay Company in 1840, and the name was changed to Fort Stikine. The fort was abandoned in 1849 when furs were depleted, but it remained under the British flag until 1867 when Alaska was purchased by the United States. In 1868, a United States military post was established, and the name was once again changed, this time to Fort Wrangell. The community continued to grow throughout the latter half of the 19th century as Wrangell served as a central outfitter for gold prospectors in the Cassiar District of British Columbia and the Klondike.

Wrangell was incorporated as a city in 1903 and fishing and forest products were its major industries[7]. By 1930 Wrangell was home to four canneries and a cold storage plant. The timber industry continued to grow and Alaska Pulp maintained a sawmill that became Wrangell's largest employer. This sawmill closed in 1994, reopened on a smaller scale in 1998, and dismantled permanently in 2008. Today, tourism, seafood processing, and marine services are the largest industries in Wrangell, which was reincorporated as the City and Borough of Wrangell on May 20, 2008. As of 2010, the population of Wrangell was 2,369 and the mean per capita income was estimated at $28,267[8]. The 2015 AK Department of Labor estimate was 2,442 residents[9].

## Petersburg

The community of Petersburg is located at the northwest end of Mitkof Island where the Wrangell Narrows meets Frederick Sound[10]. It is about 120 miles south of Juneau, 120 miles north of Ketchikan, and 16 miles northwest of the mouth of the North Arm of the Stikine River.

The present day location of Petersburg is known to historically be the site of a summer fish camp for Tlingit Indians from Kake. In the late 1890s, a Norwegian immigrant named Peter Buschmann (the city's namesake) arrived in the area and by 1900 built the Icy Strait Packing Company cannery, a sawmill, and a dock there. The community then saw an influx of Scandinavians and became a city in 1910. Alaska's first shrimp processor was founded there in 1916; a cold storage plant was built in 1926, and the cannery has never closed. Petersburg (also known as Little Norway), has become one of Alaska's leading fishing communities and was incorporated as a borough on January 3, 2013. As of 2010, Petersburg had a population of 2,948 and a mean per capita income of $32,874. The 2015 AK Department of Labor population estimate was 3,199 for the borough[11].

## Background: Local Chinook Fishery Regulation

Since the ratification of the Pacific Salmon Treaty in 1985 between the United State and Canada, the local Chinook fisheries of the Stikine River watershed have been regulated by the Treaty (with regularly updated

6. Alaska Department of Commerce, Community, and Economic Development (ADCCED), Juneau. n.d. "Alaska Community Database Online: Community Information." Accessed December 2014. http://commerce.alaska.gov/cra/DCRAExternal/community/Details/7dc49d03-4394-46d6-a4f2-850b79e3f2b8
7. Alaska Department of Commerce, Community, and Economic Development (ADCCED), Juneau. n.d. "Alaska Community Database Online: Community Information." Accessed December 2014. http://commerce.alaska.gov/cra/DCRAExternal/community/Details/7dc49d03-4394-46d6-a4f2-850b79e3f2b8
8. Alaska Department of Commerce, Community, and Economic Development (ADCCED), Juneau. n.d. "Alaska Community Database Online: Community Information." Accessed December 2014. http://commerce.alaska.gov/cra/DCRAExternal/community/Details/7dc49d03-4394-46d6-a4f2-850b79e3f2b8
9. Alaska Department of Labor and Workforce Development, Juneau. n.d. "Research and Analysis, Population estimates." Accessed March 2016. http://labor.alaska.gov/research/pop/popest.htm
10. Alaska Department of Commerce, Community, and Economic Development (ADCCED), Juneau. n.d. "Alaska Community Database Online: Community Information." Accessed December 2014. http://commerce.alaska.gov/cra/DCRAExternal/community/Details/78593b20-120d-43e3-ae1d-d75cdcaccfac
11. Alaska Department of Labor and Workforce Development, Juneau. n.d. "Research and Analysis, Population estimates." Accessed March 2016. http://labor.alaska.gov/research/pop/popest.htm

terms) as implemented by the Pacific Salmon Commission (PSC) and managed by the Department of Fisheries and Oceans Canada (DFO) and the Alaska Department of Fish and Game (ADF&G). The updated Annex IV of the Treaty, effective 2009–2018, emphasizes the need for abundance-based management on the Stikine, outlines the formula for allowable catch to determine the opening of directed fisheries in both Canada and the U.S., stipulates that historical runs will be under week-by-week management during the openings to avoid over-harvesting of specific components of the Chinook run, and initiates the Chinook genetic stock identification (GSI) program (section 3). For regulatory purposes, "large" Chinook are designated in the Treaty as at least 659mm (about 26in) mid-eye to fork length (Pacific Salmon Commission 2014rev).

In Canada, the Stikine River Salmon Management Advisory Committee provides direction to DFO. The Integrated Fisheries Management Plan (IFMP) for salmon in the Stikine River, B.C. identifies the First Nations[12] fishery as the longest-standing and the most prioritized Stikine fishery, followed by commercial and recreational fisheries[13]. The commercial fishery is divided between the upper and lower river: the upper river includes only the mainstem Stikine between the confluence with the Chutine River and the confluence with the Tahltan River; the lower river area stretches from the confluence with the Flood River downstream to the international boundary and includes the first 1.5km of the Iskut River from its confluence with the Stikine but no tributaries. Parts of the lower fishing area may be subject to emergency conservation closures. The commercial and recreational seasons are late April through October (the majority of Chinook spawn in August in the Stikine), with any additional recreational fishery closings published in the B.C. Freshwater Salmon Supplement[14]. Landing stations on the lower Stikine are used to declare fish and process them or transport them to Wrangell or Petersburg (Pacific Salmon Commission 2014rev). According to the 2014 Lower Stikine River Commercial Salmon License, only one gillnet (drift or set) is allowed per license holder, with a net length of 135m, mesh size between 100 and 204mm. Set gillnets must be 150m apart and set for no more than 12 consecutive hours before emptied (Appendix B).

The First Nations fisheries occur upstream from the Chutine River up to the mouth of, and in the lower reaches of, the Tahltan River, as well as in the lower Tuya River and the outlet of Tahltan Lake (Pacific Salmon Commission 2014rev). In Canada, two groups, the Tahltan Band Council and the Iskut First Nation, were licensed under the Aboriginal Fisheries Strategy to harvest up to 2,000 Chinook salmon each for "food, social, and ceremonial purposes" using fish wheels, gaffs, gillnets, dipnets, rod and reel, traps, and temporary weirs[15].

Though the subsistence fishery on the U.S. side of the Stikine is limited to 125 Chinook per year according to the treaty, because Chinook rear in marine waters, they are available to U.S. commercial and sport fishers year-round. The historical hybridization of subsistence and sport as well as sport and commercial fisheries and the ambiguities of fish caught for home use (home pack) with commercial gear will be discussed in further detail in the Regional Use and Harvest section of this report.

Importantly, Alaska administrative Code 5 AAC 29.060 describes the allocation of king salmon in the Southeastern Alaska-Yakutat Area[16]:

> The department shall manage the commercial and sport king salmon fisheries in the Southeastern Alaska-Yakutat Area in accordance with the conservation and harvest goals of the Pacific Salmon Treaty, as implemented by the Pacific Salmon Commission.

12. First Nations is a term used to describe the aboriginal peoples of Canada who are not Metis or Inuit. http://www.thecanadianencyclopedia.ca/en/article/first-nations/
13. Division of Fisheries and Oceans Canada. "Pacific Region Integrated Fisheries Management Plan Salmon Stikine River, B.C." Accessed March 2016. http://www.dfo-mpo.gc.ca/Library/327689.pdf
14. Division of Fisheries and Oceans Canada "2013–2015 British Columbia Freshwater Salmon Supplement." Accessed March 2016. http://publications.gc.ca/collections/collection_2013/mpo-dfo/Fs1-43-1-2013-eng.pdf
15. Division of Fisheries and Oceans Canada. 2014. Aboriginal Communal Fishing License Number XFSC-95-2014 for Stikine River Watershed.
16. ADF&G. "2015–2018 S.E. Alaska/Yakutat Areas Commercial Salmon Fishing Regulations. Accessed May 2016. http://www.ADF&G.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2015_2018_se_yakutat_salmon_regulations.pdf

The department shall manage the sport and commercial net and troll fisheries in accordance with the annual harvest ceiling established by the Pacific Salmon Commission. During a directed king salmon fishery in District 8 and District 11, an allowable catch above the baseline harvest level will not be counted towards the annual harvest ceiling. The annual harvest allocation of the annual harvest ceiling for each fishery is as follows:

Purse seine fishery: 4.3 percent of the annual harvest ceiling

Drift gillnet fishery: 2.9 percent of the annual harvest ceiling

Set gillnet fishery: 1,000 king salmon

Troll fishery: 80 percent, after the net fishery allocations in (1)–(3) of this subsection are subtracted from the annual harvest ceiling

Sport fishery: 20 percent, after the net fishery allocations in (1)–(3) of this subsection are subtracted from the annual harvest ceiling.

When computing the harvest allocation under this section, the department shall take into consideration that the Pacific Salmon Commission's annual harvest ceiling includes a pretreaty base level of 5,000 Alaska hatchery-produced king salmon and the risk factor for computing the Alaska hatchery distribution. Alaska-hatchery produced king salmon above 5,000 fish base and the risk factor are excluded from the annual harvest ceiling. In determining each fisheries allocation of the Pacific Salmon Commission's harvest ceiling, the department shall apportion the risk factor for computing the Alaska hatchery contribution and the 5,000 fish base into components for each fishery.

For the purpose of calculating the king salmon harvest, the annual harvest period shall begin with the opening of the winter salmon troll season. For the purpose of calculating harvest performance of the king salmon fisheries under this section, the harvest in the sport and commercial net and troll fisheries will be applied to the cumulative harvest on an annual basis, as opposed to the harvest ceiling.

## Commercial

The 2015–2018 SE Alaska/Yakutat Areas Commercial Salmon Fishing Regulations (5 AAC 29.060) stipulate that the department (ADF&G) manages both sport and commercial net and troll fisheries for Chinook in the Southeastern Alaska Area. The regulations allocate the harvest as follows:

purse seine fishery: 4.3% of the annual harvest ceiling

drift gillnet fishery: 2.9% of the annual harvest ceiling

set gillnet fishery: 1,000 king salmon

After these allocations are subtracted from the annual harvest ceiling, 80% of the remainder is allocated to the troll fishery and 20% to the sport fishery (5 AAC 29.060). Any Alaska hatchery fish in excess of the PSC's established base level of 5,000 hatchery Chinook do not count toward the annual harvest ceiling, thus there are also experimental spring troll fisheries that target Alaska hatchery-produced Chinook (5 AAC 29.090).

According to the Pacific Salmon Commission, one of its goals is to restore the Chinook stock in the Stikine region to allow for the year-round fishery that existed prior to 1981[17]. Respondents in this study described commercial concerns including problems with simultaneous openings for trolling and gillnets, as well as problems with enforcement for nonlocal user groups and escapement estimates based on under-reporting and illegal harvest.

17. Pacific Salmon Commission. "The Pacific Salmon Treaty—1985." Accessed February 2016. http://www.psc.org/about_treaty.htm.

## Sport

Sport fishing gear is defined as "a single line attached to not more than one plug, spoon, spinner, or series of spinners, or two flies or two hooks,[18]" and respondents noted that sport anglers also troll[19] for Chinook salmon by dragging baited lines, typically attached to a rod and reel, behind their boats and that sport fishing is an excellent means of acquiring Chinook salmon for "subsistence" purposes. Sport regulation concerns among local respondents included under-reporting, as well as charters and other sport anglers retaining multiple limits in one day. According to ADF&G sport fishing regulations for both residents and nonresidents, Chinook salmon measuring 28 inches or longer must be recorded on the individual's harvest record. In marine waters, the limits are established by emergency order in accordance with the Southeast Alaska King Salmon Management Plan (ADF&G). The heavy targeting of large fish and high probability of death for smaller fish caught and released not only in seasonal sport fishing by nonlocal users but in annual derbies is also of concern to some respondents. The derbies conducted in Petersburg and Wrangell are governed by state sport fish regulations and overseen by the local chambers of commerce. Sport fishing regulations also currently allow anglers to use two rods for Chinook salmon fishing in marine waters in winter months in the Petersburg and Wrangell areas.

## Subsistence

The State of Alaska provides a priority for subsistence uses of fish by state residents and regulation is set by the Alaska Board of Fisheries. Under the Alaska National Interest Lands Conservation Act (ANILCA), the Federal government also gives preference for subsistence uses of fish, specifically to rural residents of Alaska. A third body, the Pacific Salmon Commission, ensures the tenets of the Pacific Salmon Treaty are being met. In 2005, a Federal Subsistence Chinook fishery was established on the Stikine. The regulations stipulate that in the mainstem Stikine River, a Federal subsistence fishing permit (limit one per household) is required for fishing for Chinook, coho, and sockeye salmon. The Stikine subsistence fishery regulations are outlined in Annex IV of the Pacific Salmon Treaty (an annual limit of 125 Chinook salmon, directed subsistence fishery May 15 until June 20 in the mainstem river with a requirement to submit weekly catch reports) (Appendix C). Chinook salmon can be taken incidentally in the sockeye and coho salmon seasons but must be reported and count towards the annual total of 125 (Appendix C). According to the Pacific Salmon Treaty Annex IV, inseason, inriver abundance must reach 24,635 Chinook salmon before the U.S. subsistence fishery is opened, a delay that respondents in Petersburg and Wrangell thought to be disproportionate to subsistence regulations in Canada (2,000 Chinook per year). Respondents from the Petersburg and Wrangell communities address their support and concerns about the Stikine subsistence fisheries in the Alaska Regulations section of Regional Use and Harvest portion of this report.

Photograph by Seth Perry

*Plate 1-1.–This jet boat on the Stikine River is loaded with subsistence setnet gear.*

18. Alaska Department of Fish and Game Division of Sport Fish. 2014. "2014 Southeast Alaska Sport Fishing Regulations Summary." n.p.: Alaska Department of Fish and Game.

19. Trolling is a common method of fishing with a bait or lure used by both sport and commercial anglers. The Southeastern Alaska-Yakutat Area Salmon Troll Fishery is a legally-defined commercial fishery with additional regulations governing gear, limits, and open areas (5 AAC 29.001–200).

# 2. METHODS

## Community Scoping Meetings

It is the protocol of the Division of Subsistence to conduct research scoping meetings with partner communities before beginning a research initiative. These meetings serve to inform local and tribal governments and residents about the details of the intended research, and to garner formal support from these entities.

On 24 September 2013, a presentation was delivered by ADF&G Division of Subsistence Subsistence Resource Specialist Joshua Ream to the Wrangell Cooperative Association (WCA) during their regular monthly meeting. Following the presentation, the WCA formally voted to support the research. A similar meeting was held in Petersburg in August of 2013 by ADF&G Division of Subsistence Subsistence Resource Specialist Rosalie Grant. This meeting was held with the Petersburg Indian Association, which also voted to support the study. Both tribal governments offered recommendations on potential key respondents and local research assistants. During the scoping meeting trips, ADF&G staff also conducted literature reviews in local libraries.

## Key Respondent Selection

Key respondents were selected in this study based on recommendations of the general public in partner communities. Researchers solicited suggestions during the scoping meetings, at the local ADF&G offices, at the local U.S. Forest Service offices[1], and from other community members interested in the project. For each community, a list of possible candidates with "extensive salmon fishing knowledge" was created and maintained. When an individual was suggested that was already on the list, a tally mark was added next to the individual's name. Those with the most tally marks received contact priority. Researchers also categorized all suggested key respondents based on the type of fishing participation that they have been involved in (sport, subsistence, commercial), and whether or not they were Alaska Native. Effort was made to include key respondents in each of these categories.

Researchers provided the resultant list of key respondents to the respective local research assistants in partner communities. These local research assistants initiated contact with the key respondents and assisted in setting up interview dates, times, and locations. They also sat in on the interviews and provided additional context to key respondent dialogue when needed.

Using the aforementioned method, researchers identified a total of 23 key respondents that were willing to participate in this study (Table 1). This included 15 key respondents residing in Wrangell and eight key respondents residing in Petersburg. Most respondents were men (22) though one respondent was female. All respondents were at least 40 years of age with the largest cohort being 60–79 years old (10 respondents). Three respondents were equal to or older than 80 years old.

Seventeen respondents were born in and spent the majority of their lives in the Stikine River region. The average duration of residency among key respondents was 60 years. The largest cohort for regional residency was 61–80 years representing 10 key respondents (Table 1). All key respondents participated in a sport salmon fishery at some point in their lifetimes, and a majority of respondents (19) participated in a commercial salmon fishery. Seven respondents have participated in the federal Stikine River subsistence salmon fishery since its inception. Two respondents participated in salmon fisheries as charter fishing operators.

1. Because the Alaska portion of the Stikine River is within Tongass National Forest, the U.S. Forest Service provides management oversight for the subsistence fishery. USFS also provided lodging and office space for ADF&G staff in support of this project.

## Interview Protocol

Key respondent interviews were conducted using a semi-structured format. A list of questions pertaining to local Chinook salmon populations, habitats, fisheries, and changes over time was utilized (see appendices), but respondents were provided the opportunity to expand on related topics.

Interviews with Wrangell respondents were conducted in respondents' homes, the Wrangell Cooperative Association (WCA) office, and at the U.S. Forest Service bunkhouse. Interviews in Petersburg took place in respondents' homes at and at the local ADF&G office. Locations were chosen for each interview based on the preference of the respondent.

Most interviews in both communities were conducted in November 2013, and some additional interviews were conducted in April 2014. A total of 15 individuals were interviewed in Wrangell. One respondent was interviewed twice to follow-up on observations of Canadian fisheries on the Stikine. A total of 9 individuals were interviewed in Petersburg, but one individual later revoked permission to use the interview.

When permission was granted to do so, interviews were recorded using an iPad. Research staff also took notes during the interviews. For those respondents that declined to be recorded, extensive notes were taken. Audio files were then backed up on computers and transcribed. These transcriptions and typed notes were then coded using NVivo 10 software[2]. Coded interview data were then arranged thematically as a means of organizing the contributed LTK and to determine common themes across interviews.

2. Product names are given because they are established standards for the State of Alaska or for scientific completeness: they do not constitute product endorsement.

# 3. RESULTS

## Biological Observations

Key respondents in this study offered a wealth of knowledge and observations of Chinook salmon and their habitats in the Stikine River region. Common themes regarding these biological observations and perspectives have been organized within the following sections. These observations provide a broad spatial and temporal scale of knowledge that may be used by researchers and managers to better understand Chinook salmon in the region.

### Stock Changes Over Time

Many key respondents in this study reported lifetime observations of fluctuations in the Chinook salmon stocks near Wrangell and Petersburg. While some of these respondents acknowledged that there have always been fluctuations in the stocks with periods of both boom and bust, several suggested that recent downward trends are particularly alarming and beyond normal cyclic patterns.

One key respondent noted that his grandfather and other elders told stories about the high abundance of Chinook salmon in the 1920s. This species was so abundant in that decade that less desirable fish were discarded:

> In Greys Pass they used to load up one of the old barges. It has a big round pie shaped tank on it and they used to load it up with just king salmon. And then grandpa and those guys used to just row to Wrangell, across to Woronofski. They only kept the red kings; that's the only thing that got caught. They used to kill all of the white kings and throw them back, and they were only getting like 3 cents a pound for the reds. The whites were worthless back in those days.

According to respondents, abundance of Chinook salmon persisted through much of the 1950s. Several key respondents noted that they fished during the 1950s and that the local Chinook salmon were both abundant and large. Drift gillnetting was still allowed on the Stikine flats at that time, and even during a commercial opener, Chinook salmon could still be caught by others in the area. In 1959 however, respondents indicated that the local Chinook salmon stocks began to crash. Some respondents attributed this to federal mismanagement (e.g. not collecting sufficient empirical data and/or not allowing for necessary escapement), and others placed blame on the highly effective fish traps being used by local canneries:

> Yea, those traps would have killed off everything if left in there because they caught everything that went by. You know they were built right straight off shore, and all the fish would run by; they just went right into the traps. They were banned in the same year [1959]. That was a big issue and as soon as we became a state they outlawed them in 1959.

The decline in Chinook salmon abundance is said to have persisted through the 1960s. One key respondent indicated that:

> The early 1960s were a tough time for Chinook. There was no Canadian fishery at the time. In Wrangell if you caught one fish per night you considered yourself lucky.

Few key respondents offered observations of stocks between 1970 and 2005. Some mentioned that it took Chinook salmon many years to recover from the crash of the 1950s, but that improvements were made over time, especially due to state management of the fisheries. Some of the improvements cited by respondents include increased data collection methods, increased fishery oversight, and gear restrictions. One respondent noted that stocks were strong in the 1980s. He recalled fishing in the early 1980s and having caught a large quantity of very large fish. He said that 1984 was a particularly great season.

Several respondents indicated that fishery management was appropriate and successful until 2005. In that year there was an unusually large return of local Chinook salmon. One respondent described the abundance as follows:

> There was a phenomenal amount of king salmon here. They were here in strong numbers. The nonresident's bag limit was 3 fish a day with no annual limit at all. You could get that in a couple of hours. You could get them right in front of town; you could get them 15 minutes away. You could go back day after day and these fish were just really good strengths. They held up in lots of places and so it was phenomenal fishing.

Unfortunately, according to respondents, the state allowed too many of these returning fish to be harvested, especially by opening up a commercial gillnetting season on them that year. According to one respondent:

> In 2005, it seemed to me that it was desperate that we need to catch these fish. They've just got to disappear off the face of the earth and go into a god damn freezer some place... It was extremely important that we take them all.

The downward trend appears to have continued gradually since that year, with a slight increase in 2013 followed by continued decline, according to respondents. A charter operator described the trend as follows:

> I've been watching the trends and logging them myself since 2005. When we reached 2010, it was a steady decline and the numbers that I received were smaller. The fishing was more run hours. We got to the point that there were 18 rod hours[1] for one fish, which was about the highest I have ever experienced. Bay limits reflected that as well. We went from a three fish a day [with] no annual limit down to a two fish a day [and] five per year, to a two fish and six per year. Obviously this year [2014], I'm not sure if you're familiar with what we had, but it was one fish for resident and non-resident angler per day. That's the first that I have ever seen that, that a resident was the same as a nonresident angler. The index and return numbers came back way under what they were projected at. I thought by 2011 we should start to see an incline but instead we actually went down in size again in 2011. Last year we got a little bump of fish but not much. It's definitely not on a 5-year cycle where you would see those fish come back starting in 2010, 2011. It slowly went down then up with a little hump and now we're back down again.

### *Size*

Fisheries users in the Stikine Region have been observing declines in Chinook salmon size over time. Several key respondents indicated that the Wrangell Chinook salmon derby records provide some evidence[2] of this, a topic that is more thoroughly discussed later in this report. The records appear to correspond with fisher observations and are provided in this report as Appendix D.

Declines in the size of salmon caught may be caused by several factors. A fisheries biologist with ADF&G indicated that many larger fish caught during the Wrangell Chinook salmon derby over the years were likely stocks from British Columbia rivers that were rearing in Alaska's Inside Passage but not destined for spawning in the Stikine River[3]. The average size of fish in some of Canada's Chinook salmon stocks is known to be larger than those of the Stikine River. In fact, several key respondents noted that Stikine River Chinook salmon are not particularly large in comparison to other river systems, especially stocks from the Chickamin River, Unuk River, and those rivers emptying into the Bradfield Canal. One key respondent noted that when he fished near the Unuk River in the late 1950s and early 1960s, Chinook salmon were commonly 60–70 pounds. Referencing Stikine River Chinook salmon during the same time period, he said "you know if you caught one between 35 and 40, man, that's a big fish around here."

1. "Run hours" and "rod hours" are used here as synonymous measures of angler effort, or the time spent by anglers attempting to catch a limit of fish.
2. The derby generally occurs from mid-May to mid-June though exact dates may change. Other variables such as regulation changes may have contributed to the size of winning fish over time and thus data should be viewed with caution.
3. Troy Jaecks, ADF&G Fishery Biologist, personal communication, November 2014.

The Bradfield Canal was mentioned regularly by key respondents in this study as an important historical fishing location for residents of the region. While this topic is explored in depth in a subsequent section, it is worth noting observations of size here. As one key respondent noted:

> The largest kinds around here come from Bradfield, and those were the largest fish around the country… Those guys [relatives] didn't even fish down there certain times of the year because fish were too big. I mean take a fifty pound cannonball from fifty fathoms and take it right out of the water. So when it hit, it hit pretty hard, and it would break their poles on a commercial troller, so they wouldn't fish at certain times.

This sentiment regarding the size of Bradfield Canal Chinook salmon was common, especially in Wrangell. There are several reasons that residents gave for why fishers no longer frequent the area. First, respondents indicated that the fishery experienced severe declines following intensive logging on the early 1970s. In addition to declines in returns, fishers are also said to have avoided the area due to the cost and distance to travel there. With regulations that have instituted smaller daily and annual harvest limits, some fishers have decided that the costs outweigh the benefits of traveling to the Bradfield Canal. One key respondent explained that:

> It's a long way to go and it's a lot of gas at almost $5 per gallon. You're not going to get by that trip without 20-some gallons of gas. That's a lot of money to go fishing today.

Though the Bradfield Canal Chinook salmon were mentioned frequently, some respondents more generally referred to fishing at the "southern end" of Wrangell Island, which may still include Chinook salmon from the Bradfield Canal river systems. Anan Bay was commonly mentioned as an orienting landmark, as was Earnest Sound located to the southwest of the Bradfield Canal. One respondent also recalled witnessing a school of large Chinook salmon feeding near Magnetic Point in Union Bay outside of the community of Meyers Chuck. When he asked others if they ever caught Chinook salmon in that area, they all responded that they had never tried.

Another popular location for catching large Chinook salmon during the Wrangell derby was Snow Passage located in Clarence Strait between Zarembo Island and Shrubby and Bushy islands. A lot of derby winners' fish are said to have been caught in this area. Olly's Hole and Deichman Rocks were used by several respondents for orienting themselves there. According to one respondent:

> Snow Pass used to have a big run. When we were logging on the other side we used to run over there and fish in Snow Pass. There's times we used to run over there and catch 15, 20 kings that were all over 40, 45 pounds.

This respondent also noted observations of declines in that area:

> Like I say, out in Snow Pass it was nothing to catch 45 pounders…That was nothing in the old days. You don't see them quite as much, and I fish out there off and on.

All of these locations were more popular among Wrangell respondents as compared to Petersburg residents, likely due to their proximity to the former. Similarly, Petersburg respondents mentioned fishing locations such as in Farragut and Thomas bays, locations closer to their community. One Petersburg respondent described commercial fishing for Chinook salmon at those locations in years past:

> Well for years we fished that with hand crankers[4], and sport fishing. They were a run of their own as far as we know. I mean there were a bunch of us that fished it. Every weekend we'd go out and the fish were mind boggling. Big and beautiful they were, and then the same way we'd fish the shoreline and we'd go clean out to Pinta Point. And we'd fish all the way up to Fanshaw, to Port Houghton. These were just 17–18 foot and 20–22 foot skiffs. Some were 26 to 28 feet. Big, beautiful fish.

Some respondents noted that the size of harvested fish often depends on gear type. Trollers apparently tend to catch smaller Chinook salmon while gillnetters more readily catch larger fish. One respondent noted that

4. Hand-powered gurdy used in commercial trolling.

troll-caught fish tend to be "little short fellas" and gillnet-caught fish tend to be "long and fat." Another respondent noted that it is sometimes harder to catch larger Chinook salmon while trolling when there are lots of smaller fish around because it is hard to keep the hooks baited long enough to reach the depth of the large fish.

The smaller Chinook salmon, particularly those that are illegal to keep, are often referred to as "shakers" because they are thrown back in the water, often with an unceremonious shake of the hook by the fisher to release it. There is substantial concern about these fish among community residents, and this was expressed both during key respondent interviews and during Wrangell's community review meeting. An abundance of shakers not only makes it difficult to catch a larger fish, but residents also perceive the mortality rate to be high for fish that are thrown back. According to one respondent, there was an unusual abundance of small fish in 2014:

> This year in particular we caught a lot of small shakers. I mean man oh man. It was late in the run, too; this was July, late June, early July, and you were just shaking fish and shaking fish.

Between 1990 and 2000 Southern Southeast Regional Aquaculture Association (SSRAA) released between 200,000 and 500,000 hatchery Chinook salmon annually at the road-accessible Earl West Cove site on the Blake Channel side of Wrangell Island[5]. A key respondent suggested that these returning Chinook salmon were "20 to 30 pounds" and that "you very seldom caught one of those fish that were over 30 pounds." Despite the smaller size of the fish, this was apparently a popular release location because of its accessibility. Salmon smolt release locations and numbers reported by SSRAA are included in this report as Appendix E.

One respondent indicated that larger Chinook salmon tend to arrive in the Wrangell area in March. He remembers fishing for these "freight trains" near the airport as a child. Despite having larger fish earlier, he indicated that many residents refuse to fish until the start of the Wrangell Derby out of fear of "catching the big one" too early. He and another respondent noted that that the biggest derby fish are often caught later in the season, suggesting that larger fish come through in two separate waves.

Several perceived reasons for the local decline in Chinook salmon size over time were provided. One respondent suggested that these salmon are not staying at sea as long as they used to and that many of the fish returning in recent years originated in the hatcheries. Another respondent suggested that older fish are smaller, especially those that originate at hatcheries. He explained that according to a tag report from a fish caught in 2008 and weighing only 15 pounds, the fish was already five years old. This fish originated at Crystal Lake Hatchery and was released at Anita Bay.

Another perceived reason for the decline in fish size is harvest activity. Respondents believe that the derbies which encourage the retention of only the largest fish are a major contributing factor. One respondent noted that: "The biggest ones… they are gone. They have been nailed off. The gene pool I think it gone, I really do."

On average, returning Chinook salmon have been becoming smaller over the past 30 years and is represented in a decline in the predominant age at maturity and a decrease in age-specific length (Lewis et al. 2015). While there may be a variety of reasons that are causing declines in Chinook salmon size,, the general consensus appears to be that this trend is being witnessed by many local residents of the Stikine Region. It is also acknowledged, however, that Stikine River Chinook salmon stocks have never been considered particularly large when compared with several other stocks in Southeast Alaska and British Columbia.

## *Run Timing*

Chinook salmon spawn in the Stikine River in the spring, with most adults entering the mouth of the river between May and early June (Bernard et al. 2000) and those destined for Canada arriving in their spawning grounds between July and mid-September (Bernard et al. 2000). The majority of Stikine River Chinook salmon rear for little more than a year in freshwater after hatching and then travel to the Pacific Ocean, where they remain for 1–5 years before returning to fresh water to spawn (Bernard et al. 2000).

5. Southern Southeast Regional Aquaculture Association. Historic Smolt Release Table. Accessed June 2016. http://ssraa.org/historic-smolt-realease-table.html

Respondents in this study offered observations of run timing and staging characteristics. Two key respondents commented on the timing of Chinook salmon runs for the Stikine stock. One of these respondents also noted a change in the staging behavior of Chinook salmon before they enter the mouth of the river. She mentioned that the fish used to move upriver in large groups, but in the past three years they have been moving in smaller "spurts." She has observed that environmental triggers such as a large tide or rain event appear to be the impetus for fish to move from marine waters to the fresh waters of the river.

According to one key respondent, Chinook salmon runs in the Stikine seem to be delayed in recent years. She mentioned that they are not seeing fish as early in the season. Historically, fishing for Chinook salmon would pick up at the end of April, but recently this has not occurred until early May. Fish can still be caught sporadically in the early part of the season, but most sport fishing success has shifted to be later in the season than it has been in the past. She is unsure if this observation is an environmental anomaly, or if there is a trend in this seasonal spawning delay.

A second respondent concurred with the aforementioned delay in run timing for the bulk of Chinook salmon destined for the Stikine. He indicated that a fish can still be caught from time to time in late April and early May, but he has observed that the bulk of the Stikine River fish have returned toward the end of May in the last two years. He suggests that this migration peak has been occurring about two weeks later in the past three years. Similarly, he has noticed that the end of the run has been pushed back as well, indicating that he has been catching more Chinook salmon in July than he had in the past.

The same respondent offered insight as to why the returns may be coming in later based on reports that he has read regarding hatchery salmon. He says that many salmon are following water temperatures at sea, which has been changing in some areas. The fish end up in locations that are both different and sometimes farther from their spawning grounds, and the migration therefore takes more time. He also said that when rainfall is limited in the spring and river output remains low, he suspects the salmon hold-up offshore until streamflow increases.

Sauter, McMillan, and Dunham (2001) documented that salmonids sense and respond to their immediate thermal environment. Water temperature influences the behavior of fish more than any other nonliving variable and is a critical environmental factor during spawning migrations because the fish fast and must rely on stored energy reserves (Sauter et al. 2001). Higher water temperatures are likely to delay or be stressful to salmonids, especially during summer and fall migrations. Changes in annual thermal regimes can also cause long-term behavioral changes in the timing of migration as was documented in sockeye salmon from the Columbia River that now return approximately six days earlier as compared to historical records (Sauter et al. 2001).

## Habitat and Spatial Distribution

Key respondents in this study offered their observations of habitats and the spatial distribution of salmon in the region over time. The temporal and spatial scale of these observations differed among respondents based on their fishing experiences and length of residence in the region. The observations were primarily oriented in the U. S. portion of the Stikine River including its tributaries, delta, and nearby islands and marine waters. Some participants also offered their observations and knowledge of the Canadian portion of the Stikine River watershed, as well as of the Bradfield Canal and River area to the south of Wrangell Island.

### *Stikine River (United States)*

#### *Navigation and Flooding*

The Stikine River, particularly near its mouth, is known to change drastically over time due to the high amount of silt in its water[6]. The Stikine delta is seventeen miles wide, includes many braided channels

6. USDA Forest Service. "Special places: Stikine River flats. USDA Forest Service, Alaska Region. Accessed December 2014. http://www.fs.usda.gov/detail/r10/specialplaces/?cid=fsbdev2_038816

> **MY DAUGHTER WAS THE FIRST** ranger on the river, and they got all these rules and regulations; going to teach her how to run a boat and everything else. They got her up on the river; she'd been running the river for a long time. They finally just said, "Here, you run the boat." The guy that was supposed to be teaching her went up on the sandbar two or three times. I taught my kids how to read the water so you stay in the deep water, and we laughed about that for a long time, both of my daughters that worked for the Forest Service.
>
> Stikine River key respondent interview, 2012

and encompasses 27,200 acres. Three of the river's braids are considered navigable in the delta and these are known locally as the North Arm, the Middle Arm, and the Main Arm. The North Arm and the Middle Arm are often used by residents of Petersburg to access the Stikine River, while the Main Arm is primarily used by residents of Wrangell. Navigating watercraft through the Stikine River delta can be challenging and requires knowledge of water levels, tides, and channels.

Several key respondents noted observations of changes to flow patterns and navigation of the Stikine River delta over time, as well as seasonal fluctuations in water levels. Many of these respondents own or visit cabins located on the southern edge of Farm Island along the Middle Arm of the river. One of these respondents noted that there is very little water in this area in the winter and that you can often walk across the channel. He explained that this has occurred over recent years as changing patterns upstream of the Farm Island community have redirected water away from the area. Even in the summer months, he has noticed shallower water levels in the area, and he indicated concern about accessing his cabin in future years if current trends continue. He recalled that when gillnetters were allowed to fish on the flats, larger boats were able to navigate in this vicinity.

This respondent noted that water levels and flow patterns have also changed along Sergief (Nores's) Island, a common navigational route along the Main Arm. He stated that the channel used to flow right past what is locally referred to as "Hayes Cabin" before turning toward the centerline of the river but that it now turns away from the island earlier. This change occurred in the last six to seven years.

Another change is said to have occurred at Limb Island where a small channel (locally referred to as Ingdol Slough) historically cut the island in two. This key respondent noted that the channel was once very deep and an excellent route for getting up the river. Today, it is said to be bone dry. Another key respondent who owns a cabin on the north side of Limb Island indicated that another slough near his cabin has become a major waterway in recent years. In the last three years, he has had to move his cabin 35 feet to prevent it from falling into this slough.

A second key respondent indicated that a lot more water used to come through the Main Arm when he was a child and that much of this arm has since filled in. He said that you used to be able to point the nose of your bow from Point Highfield toward the waterfalls near Granite Ledge and run straight across. He said that you could hug the mainland shore all the way to Granite Ledge, but along that line today one would still be approximately 400 yards from the water. Today, the navigational channel most frequently used by boaters runs along the northern edge of the Main Arm. This respondent reiterated how hard it is to navigate the river delta and recalled a story whereby someone knowledgeable of the river got stuck two or three times.

In spring 2011 a major flooding event took place on the Stikine River, and this was mentioned by several respondents, though many were unsure as to what effect this may have had on Chinook salmon. One respondent remembers pulling his speedboat inside a Forest Service cabin that sits on a bluff above the river near Twin (Figure-Eight) Lakes. He postulated that the flood may have left fish in places that became landlocked as river levels dropped. He recalled seeing one landlocked pool about 100ft wide with over 100 fish, though it is unclear what species was observed. Another respondent indicated that she did not see a lot of changes in habitat after the flood, but she worries about Chinook salmon juveniles and eggs that might

have been in the creek when it occurred. A respondent from Petersburg shared this concern, adding that heavier snowfall and runoff can damage eggs in streambeds.

### *Chinook Salmon Observations*

Some key respondents provided observations of Chinook salmon in the U.S. portion of the Stikine and its drainages. Several of these observations were associated with the ADF&G tagging operation at Kakwon (discussed later in the Research and Management section) and with Andrew Creek—the best known and contemporarily most productive creek for spawning Chinook salmon on the Alaska portion of the Stikine River. Many respondents recognize the importance of Andrew Creek as a spawning stream and as a source of Chinook salmon eggs for the Crystal Lake Hatchery on Mitkof Island. In general, Chinook salmon in the Stikine River are speculated to have the same genetic origin as Chinook salmon in the Taku River, another transboundary system (Gharrett et al. 1987).

According to one respondent, Andrew Creek Chinook salmon are "phenomenal, beautiful fish." This contrasts slightly with the views of another respondent who was told that Andrew Creek Chinook salmon are "not as healthy of a strain of king salmon as some of the other stocks in Southeast." When asked to clarify this, the respondent related this to genetic potential and use as broodstock for hatcheries:

> Well they aren't as prolific. I don't know what it is, whether it is where they come from or what their genetic makeup it is, but it doesn't sound like they're as hardy for aquaculture, for rearing broodstocks of fish. They don't quite perform as well as some of the other broodstocks in an aquaculture setting. So that leads you to believe that isn't quite as strong of a genetic fish.

Despite ambiguities in perceptions of health and size of Andrew Creek Chinook salmon, several respondents noted observations of Chinook salmon declines in Andrew Creek over time. One of these respondents described the creek as being "black" with Chinook salmon when he was younger and indicated that you just cannot see it like that anymore. He said that this decline has been happening for years, beginning 15 to 20 years ago. The respondent noted that one reason for this is the removal of eggs for the Crystal Creek Hatchery over time, without replenishing any fish to the creek. A table of Chinook salmon collections from Andrew Creek for aquaculture operations is included as Appendix F of this report.

Another respondent agreed that Chinook salmon eggs and fry should be put back into Andrew Creek. This respondent recalled the following observation of an early Chinook salmon egg collection for the Crystal Lake Hatchery:

> One thing that the department [ADF&G] did was that they went up and took eggs out of Andrews… That was such a waste as far as I was concerned. I mean I could have seen them taking SOME eggs out. I can remember going up into the clear water of Andrews one time. They had put a weir in there to stop the king salmon, and they were scooping them out and taking the eggs; there were 22 buckets, 5-gallon buckets, of eggs sitting there on the (sand) bar, and the helicopter was supposed to come in and pick them up middle of July or first of July. The helicopter didn't show up, and they sat there in the sunshine all day and they sat there in the sunshine the next day and they opened them up and dumped them all in the river and went and

**CHINOOK SALMON**

juveniles divide into *ocean type* and *stream type*. Ocean type migrate to saltwater in their first year. Stream type spend one full year in fresh water before migrating to the ocean. In Alaska, most juvenile Chinook salmon remain in fresh water until the following spring when they migrate to the ocean as smolt in their second year of life.

ADF&G, 2017, Species profile: Chinook Salmon
http://www.adfg.alaska.gov/index.cfm?adfg=chinook.main

> filled them up with fresh eggs. Well, what happened to the king salmon on the river? Kind of a no-brainer. And that isn't the only king salmon on the Stikine River by any means.

Another respondent remembers very large runs of Chinook salmon in Andrew Creek that could also be observed in Andrew Slough located near the confluence of the creek and the Stikine River. He said that the slough used to be "full" of Chinook salmon and the last time that he visited the area he counted a total of only seven fish. He added "God, you used to go up there and it would be just back to back fins." This was said to begin in April, but there were always stragglers later in May.

A third respondent observed declines in Andrew Creek Chinook salmon over time, noting that it seems to get worse every year. This individual mentioned that there have been some structural changes in the creek, and she thinks that Chinook salmon are less adapted to deal with that change compared to some other species. She also wondered if the presence of sport fishermen is having an effect, and she thinks that some individuals are illegally targeting Chinook salmon there.

A fourth respondent offered observations of sport fishing in Andrew Creek, noting that there are many charter boats and sport fishers that frequent the creek, often to the point that it could be considered "combat fishing." This is a popular creek for fly fishing for trout. There is a USFS Public Use Cabin (Mount Rynda Cabin) located on the western bank of the creek, and the respondent suggested that this cabin receives fewer visitations than some of the others because there is less privacy because of the sport fishing pressure on this portion of the creek. He indicated that Andrew Creek is "one of the few places where the water is clear, and you can fish with sport gear."

Andrew Creek is not the only Stikine tributary on the U. S. side of the border where Chinook salmon have been observed by respondents. One respondent remembers as a child seeing very large spawned out Chinook salmon along Little Andrew Creek, located downstream from the mouth of Andrew Creek. He reiterated several times that these were very large fish, at one point stating, "I would bet my next three meals that they were well over 50 pounds" He noted that you do not see them in that location anymore. Another respondent indicated that he fairly regularly keeps track of Chinook salmon at Goat Creek, but he has not seen any the last few times he has been there.

North Arm Creek (known in Wrangell as Dog Salmon Creek), located along the North Arm of the Stikine River delta, was mentioned by three respondents as regularly having Chinook salmon, though they were unsure if they spawn in this glacial stream. One of these respondents noted that he was unable to find a single Chinook salmon in this creek in 2013, but that they used to be common in that area. The other respondent sometimes sees Chinook salmon near the mouth of North Arm Creek, but she has not seen them near the headwaters. She said that you can see Chinook salmon in many of the side sloughs and feeder streams, including Shakes' Slough.

A third respondent indicated that he was told that North Arm Creek is the only other Chinook salmon spawning stream on the United States side of the Stikine. He describes the stream as follows:

> Oh yeah; the only other king salmon stream on the American side; it's pretty much straight across from Andrews on the opposite side of the river. I've been up it—you know because when the river is high you can get back there, back into that slough, and it goes completely clear, which is really cool, because you can see everything under the water. But there are so many trees and stuff, I've never been where it actually turns into a stream; I've been pretty far back in there. But I've seen people set their [subsistence] setnets close to the mouth of that, and I've been told that's the only other king salmon stream… The rest are going up to Canada.

It does not appear to be widely known locally that Chinook salmon spawn outside of Andrew Creek, though, as mentioned previously, there is some speculation that they do. According to ADF&G's Division of Commercial Fisheries, Chinook salmon spawn in North Arm Creek, Shakes Slough, Little Andrew Creek, Goat Creek, and Government Creek, albeit in much smaller numbers than Andrew Creek. Foot, aerial, and boat survey counts for Chinook salmon in these tributaries are included in the appendices. Chinook salmon also spawn in Kukahe Creek and Clearwater Creek on the United States side of the border.

The observations of Chinook salmon and their declines in the vicinity of North Arm Creek are particularly interesting because the declines have been confirmed by ADF&G surveys for this species over time. In 1962, an aerial survey recorded 800 Chinook salmon in North Arm Creek. That same year, an aerial survey recorded only 300 Chinook salmon in Andrew Creek. In 2014, foot surveys recorded a total of six spawning Chinook salmon in North Arm Creek and 647 in Andrew Creek. While Andrew Creek may have historically experienced greater returns than other tributaries on the U.S. side of the border, the 800 spawning Chinook salmon identified in North Arm Creek in 1962 surpasses all of today's records.

### *Stikine River (Canada)*

Only two key respondents were able to offer extensive observations of Chinook salmon and their habitats on the Canadian side of the international border. One respondent provided upriver observations obtained while working with ADF&G in the region of Tahltan Lake during four summers in the late 1950s and early 1960s. Tahltan Lake drains into Jimmy Tashoots Creek[7], which flows approximately four miles until it reaches the Tahltan River. In 1980, this lake accounted for 80% of the entire Stikine sockeye escapement (Lough 1980).

The key respondent described Jimmy Tashoots Creek (though he did not refer to it by name) as a trickle of water that has consistently been dammed by beavers. It was among his job duties to remove the beaver dams, which he believes remain a major problem with Canadian streams that have Chinook salmon. His friends who have been in the area of the Little Tahltan River more recently reported to him that beaver dams remain a problem. The Little Tahltan River is the primary long-term index site for Chinook salmon escapement estimates in the Stikine River (Johannes 2011). He remembered that a dam and weir were put in place in Johnny Tashoots Creek in 1959 that held back only about three feet of water toward the end of the summer. While most of his work was with sockeye salmon at that time, he remembers observing Chinook salmon at the mouth of Jimmy Tashoots Creek and in the Little Tahltan River.

During one of his summers working at Tahltan Lake, the Little Tahltan River Canyon caved in, causing a very deep reservoir to build up before the pressure forced it open. The respondent observed that the blowout formed a series of six impassible waterfalls and that Chinook salmon were rerouting to any nearby stream that they could find, as they "had to get rid of their eggs." He said that they eventually were able to haul barrels of fish over the resultant waterfalls using helicopters. He remembers that none of the fish that were transported made it to their spawning grounds because they were too weak after being hauled up, causing that year's class of fish to disappear. Prior to the formation of the waterfalls, the respondent noted that there was always a natural, partial blockade upstream during periods of low water. Because of natural barriers such as these, spawning is limited to the lower mainstem and to downstream tributaries, especially the Tahltan River, Little Tahltan River, Chutine River, Katete River, Craig River, Barrington River, Tuya River, Beatty Creek, Christina Creek, Verrett Creek, Sixmile Creek, and Tashoots Creek (Pahlke and Etherton 1998)[8].

*Source* Tahltan Fisheries Program 2015

*Plate 3-2.–Landslide on the Tahltan River—May 21, 2014.*

7. Government of Canada, "Toporama - 104G13 - Tahltan Lake, British Columbia," Government of Canada Open Data, http://data.gc.ca/data/en/dataset/7eadf5ec-da0e-45a2-810a-82371b3f3c89

8. Fisheries Information Summary System (FISS), Department of Fisheries and Oceans Canada and Ministry of Environment,

In May 2014 there was a large landslide on the Tahltan River and most Chinook salmon were unable to negotiate the slide area (Appendix G; Plate 3-1). Some sockeye salmon passed the slide area and both species seemed to pass during low water periods in 2015. Between July 4 and July 26 a total of 1,091 Chinook salmon and 3,391 sockeye salmon were transported above the slide (Tahltan Fisheries Program 2015). This river has seen declining returns since 2007, and this slide may have contributed to extremely low escapement of Chinook salmon on the Little Tahltan River in 2014; (Tahltan Fisheries Program 2015). The lower end of the escapement goal for the Little Tahltan River is 2,700 Chinook salmon, and the optimum escapement is 3,300 as per the Transboundary Technical Committee Management Plan. In 2014, 169 large Chinook salmon and 39 jacks[9] were counted through the Little Tahltan weir (Tahltan Fisheries Program 2015).

While the slide substantially restricted fish passage, reduced water flows eventually enabled fish to pass the slide site freely (Tahltan Fisheries Program 2015). Still, an estimated 70% of the Chinook returning to the Tahltan River were lost, and 9% of the Tahltan Lake-bound sockeye salmon were lost due to the slide. The Tahltan Band Council has since received funds to pursue modifications at the slide site for removal of spawning barriers.

This respondent's only other observation of Chinook salmon reported during the interviews was at Christina Creek, which is located downstream of the confluence of the Scud and Stikine rivers. He said that Christina Creek flows into a slough, and that it would be difficult to find if it were not for the seal activity at that location. He mentioned that this is a "big" Chinook salmon stream but that it would be difficult to walk and that a plane would be needed for surveys.

A second key respondent has been travelling almost annually to the Canadian portion of the Stikine since 1966. His family bought a cabin near the mouth of the Chutine River in 1972, and this is where many of his observations have been made over time. He explained that for many years it was his goal to make the first trip to the cabin on the first of May, but that for the past several years there has not been enough water in the Stikine at that time to travel that far. When he would make it there on that date however, he would already see seals at the mouth of the Chutine, and he wondered what they were eating at that early date.

According to some of this key respondent's friends in Canada, the Chutine River is partially fed by geothermal vents and upwellings that allow it to stay relatively ice-free to about -25ºF. At -20ºF the river reopens. Locals say that steelhead trout utilize the Chutine River in the fall and that they wait to be the first ones to spawn in the spring. The respondent indicated that "those are the ones the gillnets are catching in the spring when they come back down the river." He has caught them in the river in front of his cabin, and he thinks that these fish are the only ones that seals can eat so early, except perhaps whitefish and other trout. He has never seen a seal upstream of the Chutine River, but he has heard from others that they have been seen in the Tahltan River.

This respondent said that he was once told by Canadian authorities that few if any Chinook salmon spawn in the Chutine River, but this conflicts with other reports (i.e. (Pahlke and Etherton 1998). He believed that Chinook salmon are indeed present because he has seen very large salmon there by the Fourth of July that appear too large and too early to be coho salmon. He has also seen many Chinook salmon in Shakes Creek in the past, approximately 3 or 4 miles below Glenora. The respondent indicated that they were abundant there in the 1960s–1980s, that it was one of the most prolific streams for Chinook salmon during that time, and that during the 1970s it was "THE" Chinook salmon stream. According to his friends living on Shakes Creek, who have lived on Shakes Creek for 10–15 years, they did not see a single Chinook salmon there in 2013 and told him that they saw fewer fish overall in 2013 than in any previous year at that location. The family also believed that fewer salmon resulted in fewer bears in the area.

Up until several years ago, this respondent's brother owned a sport fishing site and fish drying house approximately 3 miles below Telegraph Creek. There were a couple of drying houses in that area, and many of them served as both fish drying facilities and living quarters. He described them as being made of metal

British Columbia, Fisheries, Nanaimo, B.C. Canada, Accessed November 2014. http://www.env.gov.bc.ca/fish/fiss/index.html

9. Jack Chinook salmon are those that return to spawning grounds after fewer years than the majority of their counterparts. Though sexually mature, they are smaller due to their younger age.

frames with woody debris used for walls, and they had bunks on one side. The subsistence fish were hung high and they were smoked just enough to keep the bugs, particularly blowflies, off of the meat. Fish were dried there not only because of the warmer, drier climate, but also because the fish contained less oil/fat by the time they arrived so far upstream. He said that nowadays there is not much fish drying happening above the border.

The respondent mentioned that the most popular upriver fishing sites on the upper river were along the road from Telegraph Creek to Glenora where the road ends. He said that some people fish above Telegraph Creek too, but not many due to the precarious cliffs and waters of the Grand Canyon of the Stikine. He does not see many local Canadian people fishing up there anymore, and he thought that most fishers drive from points along the Iskut River and other locations along the road system and go down for a weekend or maybe a week to fill their freezers with fish. He also said that a lot of people still fish on the Tahltan River, and there are more and more cabins being built in that area.

This respondent has also heard many stories over time from Canadians regarding the Tuya River. He has heard that this river has great sockeye salmon spawning habitat, but a natural barrier prevents adult fish from accessing much of it. He has been told that the Canadians transport smolt downriver past the blockage. He has also been told that the United States has urged Canada to just remove the blockage, and that this solution has been rejected because it could result in the United States seeking a greater allocation of sockeye salmon.

He has also been told that a family living below Telegraph Creek was contracted by the Canadian government to set a gillnet for fish that are destined for the Tuya River at a point upriver of the Tahltan River. Since few of these fish can pass the natural barriers, they were presumably harvested as both broodstock and for distribution to the community of Telegraph Creek. The respondent believed that local people do not necessarily need to fish for sockeye salmon because of this distribution. The family apparently received a flat rate payment for the summer to catch all that they can. Those salmon that do not get caught were thought to travel back downstream after being unable to access the Tuya River, and he believed that these fish were being observed at Shakes Creek. His friends at Shakes Creek saw an otter pull a sockeye salmon out onto the snow on January 1, and they believed that this was a "Tuya fish that was thoroughly frustrated." They could not believe that this sockeye salmon was still alive in fresh water at that time of year.

The respondent does not travel to the Chutine as often as he used to due to increases in the cost of fuel for his boat. He said that it used to cost $100 roundtrip to go up there, but now it costs $500, and he cannot justify "going up just to mow the grass." He does not catch and eat a lot of fish while on the Stikine River because he prefers fish caught in the ocean. That said, he did explain that the skin of Chinook salmon is easier to consume when caught upstream in the Stikine River because "they have absorbed their scales; the skin is far thicker, and it is softer." He added that a Chinook salmon caught upstream is a "different fish."

### *Bradfield River and Canal*

While the Bradfield Canal and its associated Chinook salmon stocks were not initially included as research topics in this study, many respondents in Wrangell and Petersburg commented on these fisheries, often without prompting by project staff. To many in the region, this system is considered of equal value and importance to the Stikine River and its stocks. Some consider observations of severe Chinook salmon declines in the Bradfield Canal system to be an indicator, or at least a warning, for what could happen if the Stikine River and its stocks are managed similarly. A respondent highlighted this in the following quote:

> Those fish are just genetically beautiful fish. They're just huge. About 70 or 80 years ago the commercial fishermen would decorate their boats in a day with these 50 pound slabs [of fish]. Now you have to go down and hunt and peck for one. That was the cumulative effect of logging and seining and whatever other environmental or ocean issues exist. The lack of understanding and the lack of good management… We've all but virtually lost that run. There's this tenuous little scraggle of it that's left. That should be something to remind us that we need to keep track closely of these king salmon, because they can suddenly disappear. That run is probably one of the most important runs in the region.

The Bradfield Canal is located between the southwestern corner of Wrangell Island and the northern end of the Cleveland Peninsula on the mainland. The canal penetrates the mainland to the north and east of the Cleveland Peninsula for approximately 15 miles from the head of the canal to the mouth of the Bradfield River, which splits into its North Fork and East Fork nearly at its mouth. Several other river systems empty into the Bradfield Canal from the mainland including the White River, Harding River, Eagle River, Tom Creek, Hoyt Creek, and Anan Creek. Anan Creek flows from Anan Lake into Anan Bay and this is a popular tourist destination for viewing brown bears during the salmon spawning season. The U.S. Forest Service maintains public facilities at this site, and there is also a power production facility, the Tyee Power Intertie, at Tyee Lake. Bradfield Canal joins with Blake Channel to the north, Fools Inlet to the northwest, and Ernest Sound to the southwest.

Many of the key respondents in this study noted that the Bradfield Canal area Chinook salmon fishery was important for past generations, indicating that their parents and grandparents traditionally fished in this area. Today, fewer people were said to visit the area: "hardly anybody goes king fishing or even netting." Some folks remember utilizing the area for eulachon ("hooligan") fishing too. Those who remember fishing for Chinook salmon in the Bradfield Canal area in former years all mentioned the size of the fish and the strength of the run (see section Stock Changes Over Time for more information on size comparisons). When asked how long ago this salmon fishery was strong, a respondent indicated the following:

> The 1970s. I remember I caught 27 big king salmon, all over 30 pounds, in just an afternoon and early morning.

Similarly, another respondent noted his success with the Chinook salmon fishery in this area:

> I went down to Ham Island and trolled up until dark, then I tied up at Anan, that float over there, and I started fishing at about four in the morning. From there I just started heading up the canal from Marten Creek all the way up to the canal. I think I ended up with nine kings in just a couple of hours. I actually ran out of herring. That was really neat.

Use of the fishery is perceived to have declined for several reasons: namely a sharp decline in the stock and the cost of travel to reach the area. Stock declines are attributed to logging activities and commercial salmon seining in the vicinity. Logging under the direction of Dick Sykes began in 1966 and lasted through 1972[10]. Twenty-six miles of road were built from the company's camp along the Bradfield River to facilitate clear-cut logging activities[11]. During the initial period of inactivity following operations, a Hollywood film "Timber Tramps" was filmed at the Sykes Logging Company camp.

Four key respondents indicated that logging on the Bradfield River was a major cause of the decline of Chinook salmon in the area. According to one respondent, tremendous stumps could be seen right along the river banks in the early to mid-1980s. Another respondent noted that the U.S. Forest Service attempted restoration work on the river:

> The Forest Service people have tried to clean that stream up, but everything they do gets washed away. It's a wild bugger. They try to stop the flow a bit and make some puddles and stuff, but man I think they gave up on it.

The nature of the river mouth was described by one other respondent:

> In that valley there was a lot of silt that was stirred up. It's pretty interesting crabbing up along those flats. It's not as subtle as these flats [on the Stikine]. It looks like there are times when a lot of water rages out of that thing.

Respondents indicated that compounding the effects of the earlier logging and related Chinook salmon declines was what they view as mismanagement of the commercial pink salmon seine fishery in the area.

10. Pat Roppel, "Hollywood 'tramps' through Southeast," *Capital City Weekly*, June 19, 2014, Accessed June 2016. http://www.capitalcityweekly.com/stories/061914/out_1209944514.shtml

11. State of Alaska Senate Finance Committee, *Committee Minutes*, 23rd Legislature, February 27, 2003, Accessed June 2014. http://www.legis.state.ak.us/basis/get_single_minute.asp?session=23&beg_line=00243&end_line=00709&time=0903&-date=20030227&comm=FIN&house=S

Some respondents perceived seiners as having taken "a horrible toll" on the salmon in the area prior to the 1960s; one respondent attributed this to seiners fishing in the vicinity of Point Ward. Another respondent noted that seining operations took a greater toll on Chinook salmon when a decision was made to open pink salmon fishing earlier, before the end of the Chinook salmon run:

> All decisions were based on the nets. That's how our king salmon run at the Bradfield River was… [Kings] came in any time after the first of June, you could go down for kings, but somewhere around the 8th and 10th they hit big. They would stay in there 'til July. They never opened the seining season for the humpies [pink salmon] until about the 7th. Sometimes the Fourth of July. Someone got the mad idea that they had a fishery up north, and all our boats would go up there. They didn't like all those boats up there, so, "Why don't you open up Anan early?" They did. And of course those king salmon were caught, which are not seine fish; they never used them. They had no ice onboard. The crew would try to sell them to the cannery for beer. The cannery wouldn't buy them because they were all belly burned. I think, in those three or four years there, they really helped to bring that run down as did the logging on the river.

In addition to the timing of seining, one respondent indicated that changes in gear type also increased efficiency and led to overharvest:

> They went to a 3-strip seine and then that's what really knocked the doggone amount of fish that went up Bradfield. Just killed it. Totally killed it. And it still hasn't come back.

Another respondent noted the perceived attitude of fishery managers at the time, explaining that one of these said, "Oh, what's the king salmon compared to how many million cases of pink."

Full stock recovery for the Bradfield River is sometimes perceived by respondents as bleak without additional restoration and intensive management. Some respondents fear future development of the area will further impact Chinook salmon. Among development proposals is a road to connect the Bradfield River area to the Canadian highway system as well as powerlines to link to the Canadian power grid. In 2003, former Alaska State Senator Robin Taylor reported that 11 more miles of road would reach the Canadian border and 23 additional miles of road would link to an existing mine[12]. He also indicated that a road would be accompanied by a shuttle ferry linking to the Alaska Marine Highway System. In addition to environmental degradation, respondents feared that this would cause an influx of people and put further pressure on salmon stocks:

> Because quite frankly the only thing that has saved us so far is the lack of mass transit. The minute people can hop in their car or camper with a dog and three kids from Los Angeles… The minute people can drive here we're dead meat as far as our lifestyle goes.

## Predation and Prey

A large number of species typically play important roles within ecosystems and food chains. Concerning Chinook salmon, those that either depend on the species as a food source (humans included) or on which Chinook salmon prey, may critically influence the health and status of their populations. Key respondents in this study acknowledged the importance of these relationships, especially as they pertain to marine mammals and nonsalmon fish.

### *Marine Mammals*

Marine mammals were mentioned by a number of respondents as contributing stressors on Chinook salmon populations in the Stikine River region. These species frequently consume not only the Chinook salmon themselves, but also the prey on which the Chinook salmon depend. In addition, these species often damage

12. State of Alaska Senate Finance Committee. Committee Minutes. 23rd Legislature. February 27, 2003. Accessed June 2014. http://www.legis.state.ak.us/basis/get_single_minute.asp?session=23&beg_line=00243&end_line=00709&time=0903&-date=20030227&comm=FIN&house=S

fishing gear. Key respondents offered their opinions of these species but also biological observations. Many respondents noted the significance that the Marine Mammal Protection Act (MMPA), enacted in 1972 and amended in 1994, has had on allowing local marine mammal populations to skyrocket while providing little opportunity for harvest and population management.

The MMPA allows for minimal incidental catch of marine mammals in commercial fishing operations as well as deterrence of marine mammals that pose a threat to fishing gear, but in both instances there are penalties for harming or killing the mammal. Alaska Natives are permitted to take marine mammals, and section 101(b) of the MMPA stipulates that they may be taken for subsistence and handicraft purposes:

> (b) Exemptions for Alaskan natives
>
> Except as provided in section 1379 of this title, the provisions of this chapter shall not apply with respect to the taking of any marine mammal by any Indian, Aleut, or Eskimo who resides in Alaska and who dwells on the coast of the North Pacific Ocean or the Arctic Ocean if such taking—
>
> (1) is for subsistence purposes; or
>
> (2) is done for purposes of creating and selling authentic native articles of handicrafts and clothing: Provided, That only authentic native articles of handicrafts and clothing may be sold in interstate commerce: And provided further, That any edible portion of marine mammals may be sold in native villages and towns in Alaska or for native consumption. For the purposes of this subsection, the term "authentic native articles of handicrafts and clothing" means items composed wholly or in some significant respect of natural materials, and which are produced, decorated, or fashioned in the exercise of traditional native handicrafts without the use of pantographs, multiple carvers, or other mass copying devices. Traditional native handicrafts include, but are not limited to weaving, carving, stitching, sewing, lacing, beading, drawing and painting; and
>
> (3) in each case, is not accomplished in a wasteful manner.

This allowance does not permit the taking of marine mammals in defense of other subsistence efforts, nor does it allow for the wasteful killing of marine mammals. The recent increase in marine mammal populations in Alaska coastal communities has caused concern among respondents in this study. The dramatic increase in marine mammals noted in Southeast Alaska by respondents in this study is attributed both to natural cycles as well as to increased protection and the subsequent elimination of bounties and hunting opportunities. Most comments regarding marine mammals were in regard to whales and/or pinnipeds.

### *Whales*

Whales are considered by many to be having an increasingly negative effect on local Chinook salmon populations. In particular, humpback whales have been mentioned by many respondents as occurring locally in greater numbers than the recent past. It is important to note however that this species was hunted to the brink of extinction and that recent population estimates of between 30,000–40,000 animals globally is but 30–35% of their original population (Stevick et al. 2003). Humpback whales have also been observed staying in the Stikine River region for longer durations than in the past, with many apparently not migrating to warmer waters in the winter. A total of thirteen key respondents offered observations on local whale populations.

In 2013, large pods of humpback whales were frequently observed in Frederick Sound. One respondent from Petersburg indicated that these whales are consuming large quantities of herring and squid in the area. The respondent noted that many people, including biologists, deny that whales eat squid, but he strongly disagrees. He described the whale impact as follows:

> The whales feed on [squid] and when you get 300 whales feeding on the squid banks and the herring school…You know a 40 ton animal consumes a lot of product.

The same respondent noted that the whales in Frederick Sound have been increasing in number since the late 1990s when there was a failure of krill elsewhere. He noted that krill is the mainstay of the whales, as well as the herring and the "whole cycle." He went on to explain that the whales moved in following the krill failure and that they have not left since. They were sometimes so plentiful that it was difficult, if not dangerous, to fish. He said that a whale tore one side of his boat off and nearly threw him in the ocean.

A second key respondent from Petersburg also acknowledged the whale impact on herring. He mentioned that as soon as herring are fished out "everything goes to hell." When the herring started coming back, the whales were the first to arrive to eat them. He noted that is the reason that there are a couple hundred whales in Frederick Sound in the summer. A third respondent noted that whales, in his opinion, were eating most of the salmon feed (i.e., herring) that exists in the area.

Yet another key respondent indicated that he has never seen as many whales in Frederick Sound as he did in 2013:

> This year, in Frederick Sound, the entire sound, from right in front of town all the way to Pybus [Bay] was just full of whales…The entire Frederick Sound was full.

This respondent also thought that the whales were eating squid, or that there was at least a correlation between the increases in both species. He said that they have always had squid locally, but that people did not usually catch them so close to Petersburg.

Another respondent noted that large squid have been more abundant and frequent on the north end of Mitkof and Kupreanof islands and that these species were feeding on salmon, including Chinook salmon. He indicated that harvested Chinook salmon sometimes have scratch marks on their sides, indicative of entangling with a squid.

Humpback whales are known to "bubble feed", a process by which a number of whales will circle underwater and emit a continuous stream of air to trap fish in the center of a ring, then to be consumed. A key respondent from Wrangell observed humpback whales bubble feeding throughout Sunrise Bay in 2013:

> …there's lots of whales! Last year was the first time that I had them circle feed right in front of my boat. It was just amazing to see all of this feed [herring] pop out and then these two guys, they got their choreography just right. They come back to back and boom. Up and out. I was in Sunrise Bay over there, and they went the whole length of the bay. It was maybe a five-block distance, and if you wanted to troll that way, you'd be right there when they came out. They were just gorging on this feed.

This respondent also noted that more whales are staying around throughout the winter months than did in the past, and the increase in whale populations was not just restricted to the Stikine River region. As a commercial fisher, he observed more whales all the way from "Lisianski Inlet to Ketchikan."

A second key respondent from Wrangell has observed local whale populations increase for the past ten years. He also observed that they are not migrating to warmer waters in the winter time, and he believed they were eating more fish than any human group. In addition, this respondent noted that humpback whale populations need to be managed, adding that "we manage our fisheries and a lot of our resources and if you don't manage a top predator then it really doesn't do you a lot of good to manage everything underneath of it."

A third respondent from Wrangell also observed the over-wintering of humpback whales in the area, stressing that she did not remember ever seeing this before. She said that this has been happening for the past three of four years and that the resident pods were hanging out at the mouth of the Stikine. She too was concerned about the amount of feeder fish that these animals were consuming.

Another respondent speculated that the increase in whales was due to a gradually increasing herring population in the area. This Wrangell respondent had observed humpback whales in Anita Bay in the winter that he did not recall seeing there in the past. He noted that this used to be an area where Wrangell boats would catch herring for bait in the winter time. Observations of increased numbers of whales in Anita Bay

were also made by a second respondent, and he attributed this to a nearby fish hatchery. A third respondent indicated that these whales were not being seen regularly in the immediate vicinity of Wrangell, but there were large pods near Zarembo Island and Roosevelt Harbor.

Two key respondents noted that humpback whales were also having a major impact on the local fish hatcheries. They indicated that whales have learned the sound of the machinery used when fry are released into the water. They have not only learned the sound, but also the general timing and locations of these released fish. The whales were said to frequent these areas and to consume large quantities of hatchery released fry.

The winter presence of whales has also been noted near Lena Point in Juneau according to Phil Mundy, Director of NOAA's Auke Bay Laboratories:

> I have been watching humpbacks from the window of my office at Lena Point in Juneau since May of 2007, and I can tell you that my casual but lengthy observations are consistent with observations of those who think they are seeing humpbacks resident year around in SE Alaska.[13]

Mundy speculated that if non-breeding whales could find adequate prey availability, there may not be reason to migrate. He explained that reports of humpbacks targeting releases of hatchery salmon spoke to the adaptability of the species in targeting available prey. John Moran, a research fisheries biologist from NOAA's Auke Bay Laboratory, postulated that the increased reporting of winter whales is likely a function of the increased population of humpbacks in the North Pacific (5–7% annually), a shift in feeding areas, or both factors. Since the Gulf of Alaska has been warmer, the whales may be moving closer to shore to feed.[14]

The presence of winter whales in southeast Alaska is not new and has been documented since at least the late 1970s. Straley (1990) indicated that local residents of southeastern Alaska had observed the year -round presence of humpback whales. Her observations of whales between 1979 and 1986 revealed the presence of whales in all months of the year, but she indicated that whales present in the fall, winter, and early spring were likely irregular migrants with some being late to depart and others being early to arrive at the feeding grounds (Straley 1990). She also postulated that overwintering may take place but is probably rare, and her study did not document any individual whales from fall to spring in Alaska waters (Straley 1990). The timing of migration is complex and may be tied to prey availability, oceanographic conditions, and individual needs of the whales (Straley 1990).

Since Straley's 1990 report, biologists have documented a small percentage of whales that do appear to skip winter migration, but there does not appear to be a pattern to their demographic make-up[15]. In Southeast Alaska, whales have been observed feeding on euphausiids and herring—both energy rich foods[16]. Whales that stay on their wintering grounds longer may maximize their reproductive fitness "by spending more time provisioning themselves for two oceanic migrations and other activities because little or no feeding occurs on the breeding grounds[17]." Since migration to Hawaii takes about a month to complete, whales that remain in Alaska through early February may still make it to Hawaii for the peak of the breeding season in March[18]. In any case, shifts in prey availability may influence whale migration patterns, and an increase in the humpback whale populations will likely result in more observations by the region's residents.

Few respondents offered observations of killer whales, though the sentiment toward this species appeared to be more positive. There are marine mammal-eating and fish-eating populations of killer whales, and it was unclear which of these were most frequently observed by respondents. One respondent noted seeing killer whales from time to time, including in front of Wrangell proper and at the Nose (Elephant's Nose on Woronkofski Island). He thought that these whales often ate sea lions, and he suggested that this was

13. Dr. Phil Mundy, Director, NOAA Auke Bay Laboratory, personal communication, April 18, 2016.
14. John Moran, Fisheries Research Biologist, NOAA Auke Bay Laboratory, personal communication, April 18, 2016.
15. John Moran, Fisheries Research Biologist, NOAA Auke Bay Laboratory, personal communication, April 18, 2016.
16. Jan Straley, Professor of Biology, University of Alaska Southeast, personal communication, April 21, 2016.
17. Jan Straley, Professor of Biology, University of Alaska Southeast, personal communication, April 21, 2016.
18. Jan Straley, Professor of Biology, University of Alaska Southeast, personal communication, April 21, 2016.

positive for local salmon. A second respondent indicated that he saw a pod of 20 killer whales in March 2013 while trolling near Babbler Point and that seeing them swim under his boat was "pretty neat."

### *Pinnipeds*

Increases in seal and sea lion populations were mentioned by a majority of key respondents in this study as major sources of predation and stress on local Chinook salmon populations. Several respondents have observed growing populations of sea lions, particularly in the vicinity of a haulout at Liesnoi Island near the mouth of the Stikine. Seals were considered a problem for Chinook salmon as far upstream as Telegraph Creek, British Columbia by some respondents.

Between 1979 and 1997, the United States' population of Steller sea lions declined to approximately 75,000 animals, a decline of about 75% (Calkins et al. 1999). The National Marine Fisheries Service (NMFS) identified two stocks, east and west, with the division occurring near Cape Suckling, Alaska (Calkins et al. 1999). The eastern stock of sea lions breeds on rookeries located in Southeast Alaska, British Columbia, Oregon, and California (there are no rookeries in Washington) (Allen and Agliss 2015). The best available records indicate that the eastern stock increased at a rate of 4.18% per year from 1979–2010 (Allen and Agliss 2015). In December 2014 the eastern stock was removed as a threatened species under the Endangered Species Act (ESA). Currently the eastern stock is increasing throughout the northern portion of its range that includes Southeast Alaska and British Columbia, and is stable or increasing slowly in the central portion that includes Oregon through central California (Allen and Agliss 2015). At the southern end of the range (Channel Islands in southern California), they have been declining considerably since the late 1930s with several rookeries and haulouts being completely abandoned in that area (Allen and Agliss 2015).

In 2013, 25,842 Stellar sea lions were counted in Southeast Alaska, including 19,101 non-pups and 6,741 pups (Allen and Agliss 2015). Increases in this region have been robust. In 1998 a single Stellar sea lion pup was observed at Graves Rocks near Cross Sound; in 2013 the pup count at this location was 551 (Allen and Agliss 2015). For subsistence purposes, the mean annual take of sea lions in Alaska between 2004 and 2008 was one animal with approximately 10 additional animals struck and lost annually (Allen and Agliss 2015).

The growth of the sea lion haulout at Liesnoi Island was mentioned by six respondents from Wrangell and Petersburg. One respondent indicated that he "never saw that many sea lions there as a kid," while another believed that every year, there were at least 50 more animals at Liesnoi Island than during the year prior. Another respondent noted that the sea lions arrived in the spring when the eulachon began to run up the river, and they stayed to feed on all of the salmon. He said that they stayed at the mouth of the river through December, and even when they left, they did not go far, they just dispersed locally. He thought that there were 200–300 sea lions in spring 2013, "all on the flats as far as the ice on the Stikine River." An additional Wrangell respondent confirmed that sea lions arrived on the Stikine with the eulachon in the spring.

Another Wrangell respondent described his recent observation of sea lions at Liesnoi Island in November 2013, and his concern regarding the impact of these and other predators on Chinook salmon:

> There's a lot more. I just ran by them over here on Liesnoi, and there were probably 40 on that rock. More than I can ever remember. Right on the mouth of the river. And they are there this time of year! There's a lot there in the spring when the hooligan [eulachon] show up, and then they'll just stay. Not only are we feeding more people, we are feeding more predators, and there is less food for them because the predators… the whales are eating the herring and krill. There's no sense in managing the king salmon if we are not going to manage predators, in my mind.

An additional respondent concurred that the sea lions were sticking around Liesnoi Island well into the winter. He heard them there when there are "no hooligan and no other fish running."

Many key respondents that were concerned with increased seal and sea lion populations blamed the Marine Mammal Protection Act (MMPA) for allowing populations to increase without proper control or oversight. "Chinook salmon have definitely been impacted by an increase in seals and sea lions ever since they took the bounty off of them," explained one respondent. Several respondents noted that prior to the MMPA, sea

lion populations were kept in check with local harvest of the species. One respondent remembered that in the 1960s, many people harvested sea lions, including employees at a local fox farm, but it is unclear if the sea lion meat was fed to the foxes. She did indicate that much of the harvest was "arbitrary" and that it was a "normal accepted thing around the community."

A Wrangell respondent related that his father would often shoot sea lions when he was fishing, prior to the MMPA. Now, he explained, there is such a big fine and jail time that nobody is willing to take the risk. A second Wrangell respondent remembered when the government offered a bounty on seals and sea lions, including a couple of dollars for the feet of these species. A third respondent noted that when residents would be out trapping, "they'd shoot seal and bring the hides in and the nose…So they were held down a little bit." A Petersburg respondent indicated that he remembers "rarely seeing sea lions in the Petersburg harbor as a kid because in those days if they showed their face, they got blasted. That's just the way it was back then."

One respondent noted that sea lions were a "horrendous problem and you can't touch them…They're killing everything we are putting out there." This sentiment was shared by several others in reference to sea lions eating hatchery-released salmon. Another respondent suggested that sea lions began to make haulouts and rookeries in the vicinity of hatcheries as soon as they were put in place.

Beyond directly competing for salmon entering the river, sea lions were said to be negatively impacting fishermen by taking salmon directly from their gear. A respondent described this in detail, including the impact on his household:

> Sometimes you're trying to pull a king salmon in on your 4-fathom king leader, and the god dang sea lion gets onto your gear when you're trolling, and they know when you get one on. When your line just pulls way back and then it lets way down; then you look back and they are back there throwing that 35–40 pound king. They're just throwing it up in the air, playing with it, eating it. You're just thinking about the kid you have at home; you've got to feed them, and that dang sea lion is just ripping the gear up, taking your flashers, your spoons, your king salmon plugs. We can't fight back with them unless you want to get a big fine and go to jail.

While seals were often mentioned at the same time as sea lions, respondents generally provided very different responses regarding seal locations and predation on salmon. Many respondents indicated that seal populations have been increasing and that this was impacting Chinook salmon, particularly those salmon that were captured in fishing gear on the Stikine River.

The subsistence gillnet fishery for salmon on the Stikine was criticized by several respondents, not because they disapprove of the fishery, but because, at the time of the interviews, the regulations did not require fishermen to tend their nets. Many salmon that were caught in these nets were soon preyed upon by seals, as one respondent explained:

> They go up and put them out [nets] and come back the next day or a couple of days, and meanwhile they are hanging fish, and the seals are having a ball. And these guys get what fish were caught in the last three hours only. It's a real waste of fish.

One respondent observed this waste in 2013. He said that he watched a fisher pull his net and though there were no harvestable fish, there were five heads that were obviously left by the seals. He explicitly stated that he was not against the fishery; he just wanted to see the fish harvested that are caught.

A similar scenario was witnessed by a key respondent as it pertained to the ADF&G tagging operation at Kakwan Point. Though the nets were being tended by state employees, the seals preyed on the fish soon after they were returned to the river. He described the event as follows:

> We pulled up and we saw these two fishermen in a river skiff. He said those are Fish and Game guys. One from the United States and one from Canada. They are tagging these fish. He said "watch what happens"…We sat there a while and we saw a king hit the net. We looked over there, and it was fighting, and they were trying to handle it real careful, and they got it out of the net, and they put a tag on it… He put it back in the water, and a

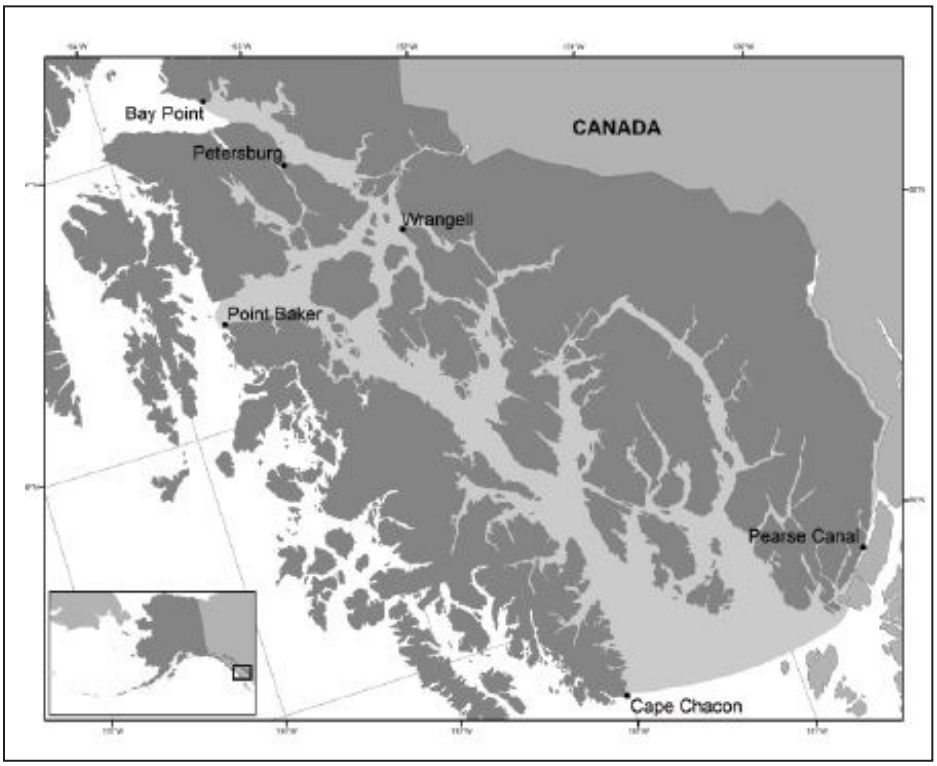
seal had it just like that. We watched two of them going up; then coming back down two days later, we saw the same thing. It is ridiculous.

According to respondents, the number of seals occurring above the river's delta has gradually increased over time. One respondent noted that seals used to be rarely seen past Point Rothsay on the Main Arm, just about where the commercial gillnetting line was historically. He observed approximately 200 seals on a sandbar in 2013, and he said that you would never see this back when people were hunting them, and there was a bounty on them. He has also seen them recently as far upstream as the Ketili River and Guerin Slough.

Seeing seals upstream of the Stikine River delta seems to be a common occurrence for residents visiting the river in recent years. One respondent has observed seals as far upstream as Telegraph Creek, B.C., as well as in Andrew Creek, Ketili River, Government Slough, and Red Slough. She did not recall seeing many seals in these side tributaries in the past. Nowadays, she explained, she saw more and more on the sand bars.

A Wrangell respondent that has spent time on the Canada side of the Stikine mentioned observations of groups of seals as far upstream as the mouth of Christina Creek. Another respondent offered observations of seals in Canada's Katete River, including a dead specimen that had obviously been shot. An author of this report observed a seal near Wizard Island in May of 2014.

Like sea lions, harbor seals are difficult to estimate because they can only be accurately counted when they are hauled out, and this number must then be corrected for the percentage of animals suspected to be in the water (Feldhamer et al. 2003). In the 1970s the total worldwide population of this species was estimated between 600,000 and 900,000 animals. Estimates from the early 1980s found around 400,000 animals with about 185,000 making up the total eastern Pacific population. In 2010, the National Marine Fisheries Service and their co-management partner the Alaska Native Harbor Seal Commission defined 12 separate Alaska stocks based largely on genetic structure (Allen and Agliss 2013). The population occurring in the Stikine River region is part of what was defined as the Clarence Strait harbor seal stock (Figure 3-1). In 2003 a survey reported an abundance estimate of 23,289 animals for this stock and 152,592 animals statewide. The Clarence Strait stock is considered stable or increasing. Trend analysis strongly indicates Southeast Alaska populations have been increasing since at least 1983. The average annual subsistence harvest estimate for 2004–2008 (most recent data) for this stock was 164 animals (Allen and Agliss 2013).




*Source* Allen and Agliss 2013

*Figure 3-1.–Approximate distribution of Clarence Strait harbor seal stock (shaded area).*

The increase in seals and their corresponding occurrence upstream of the Stikine delta was attributed by many to the limitations on hunting these marine mammals imposed by the MMPA. One respondent noted that when he was a child, he regularly hunted seals on High Island as a

means of predator control and to benefit from the bounty. He offered a descriptive account of how this would take place:

> The way we would hunt them is that you get above the water level, so you can shoot downward. When the tide goes out, the seals come off the flats, and if you wanted to shoot 100 seals you could do that, assuming you had enough ammo. This could be done in a day, or even a couple of hours.

One respondent recalled that ADF&G used to hire a man to shoot seals near the mouth of Andrew Creek to protect the spawning Chinook salmon population while keeping tabs on the fish. He remembered one instance when this individual reported to him that he shot twenty seals there in a single day. The respondent believed that this was very beneficial and suggested that a lot of people would agree with that sentiment.

A Wrangell respondent that felt strongly about maintaining traditional Tlingit values described an alternative approach to dealing with seal predation when the animals cannot be harvested. This respondent talked to the seals, calling them cousin, and asked them to help him in his fishing efforts rather than hinder him:

> Finally, one day I looked at him. "Hey cousin seal, bring me fish. You can have some. Just bring me sockeye—bring the good fish." He would take off and come shooting back. A few seconds later my net would fill up. I talked to him. I asked him. I asked him for 3 or 4 years. They would always bring me fish. One day there were all the nets, and one guy goes "there is a seal by your net; they're going to take all of your fish."
>
> I go "No, no, no." He saw my net, and I told it to bring me fish. A little while later my net was filled. I caught up with everybody. He took off, as did I.

## *Nonsalmon Fish*

### *Herring*

Many key respondents referenced observations of nonsalmon fish over time, especially fish that prey on salmon or those that serve as prey for salmon species. Smaller fish are a substantial component of adult Chinook salmon diet. Herring were mentioned by key respondents more than any other nonsalmon fish. Some respondents indicated that declines in Chinook salmon were directly correlated to declines in herring populations over time. As one respondent noted, "when your feed [herring] is gone, there's nothing for the salmon to survive on."

Many key respondents noted that herring populations in the region have experienced devastating declines over the past century, primarily due to overharvest. While some respondents have observed gradual recovery of herring stocks, the extent of recovery was often based on the relative age and tenure of the respondent. For instance, respondents present in the region in the 1950s and 1960s remembered tremendous schools of herring that appeared to be so thick, "you could walk on the water." One respondent told a story about his experience with a massive school of these fish:

> One morning I had the experience I don't think anyone else has ever had. I was standing there when here comes the whales. To my astonishment they were not whales, they were herring. His [the whale's] mouth was open and they were rolling off the sides of his mouth. It just swamped me, and it just filled the whole side of the deck all around, flopping herring in the boat…
>
> We had one day, Sunday, to come in and get groceries and fuel. We were coming in Saturday evening. No, we had to run all the way from the south end so it was a Saturday morning. We were in solid herring from the lower end of the Narrows all the way right into town. It was just solid herring the whole way, boiling on top of the water. That is the difference from now; you have to wait for just a few to show up at the floats.

Another respondent's observations corroborate this type of historical observation in the area:

> From Totem Bay over into Snow Pass, on a flat calm day, you could see feed [herring] flipping on that whole way across there. You don't see that. I can remember, and he'll tell more stories than I can, of going out in the ocean out there and coming around from Ommaney [Bay], headed across over to Coronation [Island], solid feed, solid feed, black out your doggone fathom meter. You don't see that anymore. You don't see any of that.

A third respondent noted similar observations of herring between Kake and Wrangell:

> That would have had to been in the late '50s. As a matter of fact, if you come in from the Kake area, we would run through schools of herring. It would just be a solid block. You could see it in the water. The water would turn a different color. And the herring were—we would get some that were 10 or 11 inches long, hand-sized bodies. They figured they were 9, 10, or 11 year-old herring.

In Wrangell, herring were often harvested right from the harbor, especially to use as salmon bait. A respondent noted that they did not spawn in the harbor, they just "pooled up." They were also caught there in the winter to use for trolling for winter Chinook salmon. At this location, you could almost always "get more than you could handle." One respondent remembered using a herring rake to harvest these fish in the Wrangell area:

> I used to rake them. His dad used to have a rake. We used to rake them underneath the canneries. You don't even see that anymore. We used to rake them and we'd have baskets set up so we could catch live herring and the deal there.

The herring schools that visited Wrangell Harbor are said to have declined drastically in the late 1960s or early 1970s following the first commercial herring opener in Wrangell Harbor. According to one respondent, the result of opening a commercial fishery here was instantly devastating:

> Then these herring would suffocate in the seine, they'd let them go and the whole harbor would be full of dead herring. The herring never came back again. Very few herring.

There seemed to be little support among respondents for any type of commercial herring fishery:

> I don't think they need to have any herring seine openings in this area because, the whales and sea lions and birds, everything preys on the herring. Everything in the ocean exists by feeding on the herring. That's what we use for bait to catch the king salmon too. In the future, I hope they don't open it to herring seining like Ernest Sound, anywhere close to Wrangell.

According to several respondents, the major decline of herring region-wide started in the early to mid-1960s. Some respondents noted that herring reduction plants had a major role in this decline and remember them being present in the 1960s, particularly in Chatham Strait. These plants processed herring into fish meal, fish oil, and concentrated protein called solubles[19]. One respondent noted abhorrence for the reduction facility located in Murder Cove/Surprise Harbor on Admiralty Island:

> We were still fighting in the 1960s because all the local fishermen were trying to get them to close that herring reduction plant. There were some other ones too. Somewhere near the 1970s they were gone.

The Murder Cove/Surprise Harbor facility was constructed as the first whaling station in Alaska in 1907 by the Tyee Whaling Company and operated through 1913[20]. The facility was then converted to a herring reduction plant. It is estimated that 90% of herring catches in Southeast Alaska between 1926 and 1966 went to reduction facilities such as this. Herring reduction plants began to decline in the 1950s due to competing Peruvian anchovy production (Alaska Department of Fish and Game and Alaska Inter-Tribal Council 2000:1–24), and by 1966 the last of these plants shut down due to market conditions and depleted

19. In Their Words: The Story of BC Packers, "Farm Animals Ate Fish," Accessed June 2016. http://www.intheirwords.ca/english/canning_herring.html

20. Alaska Humanities Forum, Alaska History and Cultural Studies, "Chapter 4–16: Fishing And Sea Hunting," Accessed June 2016. http://www.akhistorycourse.org/articles/article.php?artID=181

herring stocks (Reid 1971:1). A timeline of Southeast Alaska's herring fisheries can be found as Appendix H (Thornton et al. 2010).

Respondents also noted abhorrence toward herring waste. As one respondent indicated, the herring fishery changed once the market demands focused on sac roe rather than the entire fish:

> We fished the herring for bait. They used it for halibut bait, which we fished for around Wrangell and in Petersburg a little bit. When we first started fishing for herring, they didn't have the roe business then. That started later, I don't remember when. But several years later they started to save the roe. Now that's all they fish for is the roe. I don't know what they do with the herring bait. They can't throw it away they have to grind it up, I think. The roe is all they want. The larger the chunk of roe you get in it, the more money you get for it.

Some of the younger respondents indicated that herring are starting to come around more in recent years than they used to. One of these mentioned that while you can find herring around throughout the winter, they are scarce in April and May when the salmon start to return. While these respondents seemed somewhat optimistic that herring would gradually rebound, several older respondents seemed less optimistic. Still, the general feeling about herring was that they are key to salmon recovery, as was embodied in this respondent's statement:

> Herring is the basis for all of our fisheries.

#### *Eulachon (Hooligan)*

Eulachon (hooligan) were also mentioned by several respondents in this study. Hooligan remains a popular fish to harvest in the region and is said to be traditionally and culturally important to many local residents. Respondents indicated that hooligan run in both the Stikine and Bradfield rivers. In the Stikine River, hooligan are known to travel as far upstream as Telegraph Creek. A Wrangell respondent indicated that people would go to the river with "little tiny seines" and that they would give away most of what they caught.

Though some respondents referred to hooligan as "feed" for the Chinook salmon, most references to these fish were in relation to the timing of their returns (immediately prior to salmon in the spring) and the associated return of marine mammals that prey on the salmon.

### Regional Use and Harvest

Participants in this study offered a wide range of observations, perspectives and understandings of the local use and harvest of Chinook salmon stocks over time. While attempts were made to include a variety of stakeholders within this study, we recognized that our sample was small and may not be representative of the opinions of the communities at large or specific user groups. Still, these observations offered important insights on the changes in local Chinook salmon harvest patterns over time and how these have influenced stocks and access to them. For reference, the 2014 catch estimates of Stikine River Chinook, sockeye, and coho salmon in various fisheries are included below in Table 3-1.

## Commercial Fishing (Freshwater)

Directed Canadian commercial gillnet salmon fisheries occur on the lower and upper Stikine River when preseason and inseason forecasts predict a terminal run size that equals or exceeds bilaterally agreed-upon escapement goals as per Annex IV of the Pacific Salmon Treaty. There is also an Aboriginal Communal Fishery on the Canadian portion of the Stikine River. In 2014, two groups, the Tahltan Band Council and the Iskut First Nation, were licensed by Fisheries and Oceans Canada to harvest up to 2,000 Chinook salmon each for "food, social, and ceremonial purposes" using fish wheels, gaffs, gillnets, dipnets, rod and reel, traps, and temporary weirs[21]. These permits are included in this report as Appendix I. The key respondents

21. DFO, 2014, Aboriginal Communal Fishing License

interviewed in this study generally offered a negative view of the inriver commercial fisheries, describing detrimental effects on spawning salmon and an imbalanced allocation of resources over time.

Many complaints regarding the Canadian inriver commercial and aboriginal fisheries were in relation to the stipulations of the Pacific Salmon Commission, and these will be discussed in depth within the "Fishery Regulations" chapter of this report. It should be noted again that an attempt was made to garner Canadian perspectives on these issues, but the Tahltan First Nation declined to participate in this study.

*Table 3-1.–Estimated commercial and food fish harvests, Stikine River, 2014.*

| Fishery/species | Chinook (Large) | Sockeye | Coho |
|---|---|---|---|
| TFN[a] food fishery | 1,020 | 9,950 | 0 |
| CAN test fishery | 1,342 | 1,822 | - |
| CAN Tuya pilot fishery | 19 | 833 | 0 |
| CAN lower commercial | 896 | 30,502 | 5,409 |
| CAN upper commercial | 0 | 548 | 0 |
| CAN sport fishery | 50 | - | - |
| **CAN totals** | **3,327** | **43,655** | **5,409** |
| US subsistence fishery | 56 | 1,527 | 143 |
| US sport fishery | 697 | - | - |
| US troll fishery | 736 | - | - |
| US gillnet fisheries | 204 | 22,340 | 30,184 |
| **US totals** | **1,693** | **23,867** | **30,327** |

*Source* Tahltan Fisheries Program 2015

a. Tahltan First Nation

Among the greatest concerns of respondents toward the Canadian gillnet fishery were what respondents considered to be relaxed regulations that are perceived as rarely enforced. Two frequently cited concerns were the locations and expanse of water where inriver gillnets can be placed. One respondent observed gillnets tied off across the mouth of streams, indicating that "nothing can get through there." Another respondent concurred with this assessment, noting that these nets are "choking off the spawning channels." A third respondent suggested that nets are sometimes staggered all the way across the river so that nothing can get by. One respondent thought that the Canadians could fish with three nets, two of which could be set and not tended by the fisher. He believed that all nets should be tended, just as they should in the U.S. subsistence gillnet fishery.

According to the "Conditions of the 2014 Lower Stikine River Commercial Salmon License" (Appendix B), only one gillnet per licensee may be used, and it can be deployed as a drift gillnet or as a set gillnet. The nets must also meet the following specifications:

- the minimum number of filaments in each twine of the gillnet web is 6, with each filament in the web having a diameter of no less than 0.20 mm;
- the minimum gillnet mesh size is 100 mm;
- the maximum gillnet mesh size is 204 mm;
- the maximum gillnet length shall not exceed 135 m;
- the maximum gillnet set time is 12 consecutive hours without the net being completely withdrawn from the water and removing any fish caught therein; and
- the minimum distance between set gillnets fishing on the same side of the river is 150 m, measured between any points along the gillnets.

The efficacy of gillnetting, particularly in riverine areas, is considered by some respondents to be too great of a pressure on salmon populations. One respondent compared this gillnetting to gillnetting that takes place

in marine waters. He explained that when marine gillnetting is open, no one should attempt to sport fish because success drops rapidly due to the number of fish that the commercial fleet is capable of harvesting. He believed that when this efficient gear type is used in a river system to target spawning populations and spans the width of the river, escapement would be negligible.

Some respondents noted concerns that Canadian law enforcement is not providing adequate oversight of the gillnet fishery. Two respondents reported observations of commercial nets being placed on the United States side of the international border. One respondent reportedly observed gillnet fishing prior to the official opening, while another reportedly observed postseason fishing as late as September. It was suggested that rules are rarely followed or enforced on the Canada side of the border.

A specific point of contention mentioned by several respondents concerns the delivery of salmon (Chinook, sockeye, and coho) that were commercially harvested in Canada to U.S. canneries in Wrangell and Petersburg. One respondent noted that when camped on the river in the summertime, one can see tenders running back and forth to the United States all day long: "big boats full of totes." This was considered particularly painful for local residents to witness, especially during periods of commercial closures in the United States. A respondent noted that he was infuriated to see, from his living room window, a Canadian boat full of Stikine salmon pull up to the cannery, and to simultaneously not be allowed to harvest with his own boat in the United States.

## Commercial Fishing (Marine)

Alaska assumed responsibility for managing salmon fisheries within its waters in 1960, a year after statehood. In 1972 an amendment was added to the state constitution to provide for a limited entry program for the Alaska commercial salmon fishery (Clark et al. 2006). The following year, the state legislature passed a bill to implement a limited entry program to stabilize the number of fishermen and the amount of gear that could be used in these fisheries (Clark et al. 2006). Advocates of limited entry contended that it improved management effectiveness and the ability of managers to regulate harvest while meeting escapement objectives, and maintained a high proportion of Alaska resident participation.

Commercial salmon fishing has been an important economic activity for the residents of Southeast Alaska for many decades (Clark et al. 2006; Moser 1899; Skannes and Hagerman 2014). It also provides the opportunity for participants to remove a portion of their catch for personal use: what is sometimes referred to as "home pack." The four main gear types that have been used for commercial salmon fishing in Southeast Alaska since statehood are seine nets, drift gillnets, set gillnets, and troll gear. It is important to note that many fishers in Southeast Alaska also refer to "trolling" as harvesting Chinook salmon in the winter months under sport regulations. While this is a colloquial term, the difference is that sport trollers are using smaller rod and reels to drag lures through the water instead of the larger poles and lines used commercially. Trawling is a fifth commercial gear type that is typically used for groundfish fisheries but for which there is often salmon bycatch, including Chinook salmon.

Commercial troll gear has accounted for the greatest percentage of Chinook salmon commercial harvest in recent decades, accounting for an average of 83% of the catch between 1962 and 2013 (Appendix J, Table J-1; Conrad and Gray 2014). During this period, an average of 299,158 Chinook salmon were caught annually in Southeast Alaska commercial fisheries. Seine nets accounted for the second greatest percentage of commercial Chinook salmon harvest (6%) followed by drift gillnets (5%) and set gillnets (1%).

In 2014, 428,329 Chinook salmon (including jack salmon less than or equal to 28 in) were harvested from southeast Alaska in commercial fisheries (Appendix J, Table J-2; Conrad and Gray 2014). Jack salmon are those that return to fresh water a year or two earlier than the majority of their cohort and are thus generally smaller. The total harvest includes both traditional and terminal hatchery fisheries. The southern southeast purse seine total harvest was 26,014 Chinook salmon, and 8,023 Chinook salmon were harvested from the Stikine drift gillnet fishery. The total Chinook salmon harvested from southern Southeast Alaska commercial fisheries was 136,578 fish.

Respondent observations and perceptions of the commercial salmon fisheries were generally in reference to specific gear types and are included in the following sections. This was followed by observations and perceptions of Alaska's canneries over time, which have played an important role within the commercial fishing industry in the state.

### *Trawling*

Commercial trawling was mentioned by several respondents as a major contributor to declining Chinook stocks. The general perception among those interviewed was that high-sea trawling vessels take far more bycatch than they admit. They also seemed to concur that the allowable bycatch far surpasses sustainability.

Trawling gear is generally used on the high-seas for harvesting groundfish and shellfish. These fisheries are managed by the National Oceanic and Atmospheric Administration (NOAA). The Magnuson-Stevens Fishery Conservation and Management Act (MSA) was passed in 1976 and requires that bycatch be minimized to the extent practicable. The passage of this act immediately reduced the high seas harvest of western Alaska salmon by international fleets (Clark et al. 2006). Control of the "exclusive economic zone (EEZ)" in Alaska (3 to 200 miles offshore) was vested in the North Pacific Fishery Management Council (NPFMC).

For the Alaska Region, the NPFMC and NOAA Fisheries have adopted policies to limit incidental catch in groundfish fisheries[22]. They have defined "prohibited species" that are the target of other domestic fisheries, and these include Pacific halibut, Pacific herring, Pacific salmon, steelhead trout, king crab, and Tanner crab. Two sub regions are managed in the Alaska Region—the Gulf of Alaska (GOA) and the Bering Sea and Aleutian Islands (BSAI).

Several amendments to the MSA have been made since its passage to further protect Chinook salmon. Amendment 91 (implemented in 2011) addressed Chinook salmon bycatch in the BSAI pollock fishery by combining a limit on the amount of Chinook salmon that may be caught incidentally with incentive plan agreements and performance standards. According to NOAA:

> The program was designed to minimize bycatch to the extent practicable in all years, and prevent bycatch from reaching the limit in most years, while providing the pollock fleet with the flexibility to harvest the total allowable catch.

Amendment 91 set a hard cap of the bycatch on the Bering Sea trawl fleet of 60,000 Chinook salmon; once the cap is reached, the fishery is closed. There is also a lower limit of about 47,000 fish. If the lower limit is exceeded in more than two of seven years, the upper cap is removed and only the lower cap applies.

Amendment 93 was passed in 2012 to address the amount of Chinook salmon caught in the GOA pollock fishery[23]. This amendment established separate Prohibited Species Catch (PSC) limits for the Central and Western GOA. This requires the National Marine Fisheries Service (NMFS) to close the directed pollock fishery in the Central or Western regulatory areas when the applicable limit is reached. In addition, it requires retention of salmon until the catch is delivered to a processing facility and an observer is provided the opportunity to count the salmon and collect biological data.

Amendment 97 was adopted in 2015, and this established Chinook salmon PSC limits for non-pollock, groundfish trawl fisheries in the Western and Central GOA[24]. The non-pollock trawl catcher/processor sector is allowed 3,600 Chinook salmon, the Rockfish Program catcher vessel sector is allowed 1,200 Chinook salmon, and the non-Rockfish Program catcher vessel sector is allowed 2,700 Chinook salmon. In addition, it established incentives for reducing Chinook salmon bycatch for the trawl catcher processor and non-Rockfish Program sectors and established seasonal limits on the trawl catcher processor sector.

---

22. NOAA Fisheries Alaska Regional Office, Bycatch and Prohibited Species Catch (PSC) in Groundfish and Shellfish Fisheries, Accessed June 2016. https://alaskafisheries.noaa.gov/fisheries/bycatch-reduction
23. NOAA Fisheries Alaska Regional Office, Chinook Salmon Bycatch Management, Accessed June 2016, https://alaskafisheries.noaa.gov/fisheries/chinook-salmon-bycatch-management
24. NOAA Fisheries Alaska Regional Office, Chinook Salmon Bycatch Management, Accessed June 2016, https://alaskafisheries.noaa.gov/fisheries/chinook-salmon-bycatch-management

Several respondents pointed to the trawlers as historically detrimental to the Chinook stock before regulations became more stringent. Two respondents noted that trawlers are often accused of taking a toll on the Chinook, though the numbers are hard to verify. One Petersburg respondent noted that trawlers take more of all species of salmon than they report, and another said that he has read stories in *National Fisherman Magazine* about 100,000 lb of Chinook has been called "incidental catch." According to a 2015 genetics report that analyzed a total of 1,385 Chinook salmon caught in the 2014 BSAI pollock trawl fishery, approximately 1.4% of these fish were stocks from coastal Southeast Alaska (Guthrie et al. 2016a). According to another 2015 genetics report that analyzed a total of 1,163 Chinook salmon caught in the 2014 GOA pollock trawl fishery, approximately 16% of these fish were stocks from coastal Southeast Alaska (Guthrie et al. 2016b).

While there is no way of accurately knowing the levels of unreported bycatch, NOAA has kept records of reported bycatch for several decades. The reported Chinook salmon mortality in the Gulf of Alaska groundfish fisheries since 1991 is included as Appendix J, Table J-3[25]. The annual totals have fluctuated greatly during this period, with a high of 54,631 Chinook salmon in 2010 and a low of 84,475 Chinook salmon in 2009. Until 2016 the GOA onboard observer coverage was dependent on the length of the vessel. Since 2013 the observer program has been refining its selection "strata" to get the best coverage with the available resources. Currently the coverage rates are based on gear type: trawl vessels carry an observer on 28% of trips, and hook and line and pot vessels carry an observer on 15% of trips. Trawl catcher/processors and any vessel fishing under the Central GOA Rockfish Program carry an observer 100% of the time[26]. All GOA vessels would have 100% coverage under a newly proposed bycatch management program. Vessel coverage in the BSAI Pollock fleet is also 100%[27].

Also included in Appendix J_4 is the reported Chinook salmon mortality for BSAI groundfish fisheries since 1991. This is reported slightly differently, with seasonal designations and the inclusion of Community Development Quotas (CDQs). These annual incidental catches of Chinook salmon have also fluctuated in this region, with a high of 130,000 fish in 2007 and a low of 8,222 fish in 2000. By law all salmon bycatch must be counted by an observer and may not be retained or sold. Some salmon are donated to food banks, but to date there has been no accounting of the percentage of bycatch that is donated versus that which is wasted. However, recent efforts have been made to ensure that more of the donated fish is distributed within Alaska.[28]

Some respondents believe that a few trawl vessels in the GOA intentionally target Chinook salmon. One respondent in this study mentioned that offshore, foreign vessels have been close enough in recent years to be able to hear their radios, and she speculated that they are coming closer to land in an attempt to intercept salmon specifically:

> Every year for the past 10 years, you hear these offshore foreign vessels talking back and forth. I don't know what they're saying, but you can hear them because they're within radio range. I know they're just within the three miles, maybe six miles somewhere. Because we got all these fancy radios and we can scan hundreds of channels. You can't hear them when they're far, far away but when they're within radio range and they're clear, you know they're just targeting the salmon. And they do the king salmon and the cohos, I think they do all species, they just target them. And then they get away with it and call it incidental catch. That's not right in my eyes. I mean everyone is trying to make a living but those guys out there are scooping all the gravy before it gets inside the gulf to our shores.

One respondent described the evolution of trawling in the area. In his grandfather's time, "it was nothing to have a six mile set, seven mile set." The Stikine River flats has changed drastically over time with

25. NOAA Fisheries Alaska Regional Office, "Chinook salmon mortality in GOA groundfish fisheries." Accessed June 2016. https://alaskafisheries.noaa.gov/sites/default/files/reports/goasalmonmort2016.pdf

26. Sam Cunningham, Economist, North Pacific Fishery Management Council, personal communication, March 2016.

27. Diana Stram, Fishery Analyst, North Pacific Fishery Management Council, personal communication, March 2016.

28. NOAA Fisheries Alaska Regional Office, "Prohibited species donation permits," Accessed February 2017. https://alaskafisheries.noaa.gov/fisheries/prohibited-species-donation-permits

fluctuations in sedimentation and channel flow. In the early to mid-20th century, trawling was said to be possible right in front of Wrangell Island at Point Rothsay. There was also a trawling camp for king salmon in Roosevelt Bay and Deep Bay off of Zarembo Island, accommodating 50–75 men:

> You go in the bay part way in and there's a little bluff in there and then you turn around and look on the side…part of that was still there when we were kids, the boardwalks were still there.

This respondent hand-trawled in the early 2000s and noted catching a lot of 9–10 lb Chinook salmon at that time, but added that more recently these smaller fish seem to have disappeared. Two respondents mentioned trawling activities on the Stikine River flats near Wrangell in the 1980s that were apparently targeting flounders. One indicated that the three operating vessels harvested 20,000 Chinook salmon but that the removal of flounders spurred an increase in the availability of local shrimp.

According to historical fish ticket records, trawl landings from groundfish statistical areas that include the Stikine Flats occurred in several years between 1985 and 1994; the fishery was targeting starry flounders. For most years in this span there were fewer than three vessels registered, and thus the harvest data are confidential. In 1985 and 1987 there were three vessels trawling in the area. In 1985 there were two vessels with a beam trawl permit and one vessel with a non-pelagic/bottom trawl permit. In 1987 there were four vessels registered, including three with non-pelagic/bottom trawl permits and one with a beam trawl permit[29].

Landing harvest records for starry flounders in 1985 and 1987 for the area were 54,000 lb and 131,000 lb respectively. No bycatch was reported in 1985, and in 1987, pollock, Pacific cod, and lingcod were reported. No Chinook salmon were recorded as bycatch in either year. Landings occurred in January–March and October–December[30]. The accuracy of this bycatch reporting is unclear, but managers suggest that Chinook salmon would be unlikely to be caught in substantial numbers via these methods near the Stikine River delta during the trawl openings[31].

An experimental groundfish beam trawl permit for the Stikine River area was issued by the Commissioner of Fish and Game in 2014. A single vessel reported making eight tows and landed fewer than 800 lb of starry flounders and rock sole. The bycatch reported on the logbook was eight Dungeness crabs[32], and no other formal records show Chinook salmon bycatch in the Stikine River delta trawl fisheries over time.

### *Trolling*

Commercial trolling for Chinook salmon in Southeast Alaska occurs during the winter, spring, and summer (Skannes et al. 2016). The winter season begins on October 11 and continues through April 30, or until 45,000 Chinook salmon managed under the Pacific Salmon Treaty are harvested. All outer coastal areas, including the EEZ, are closed during the winter fishery; it is open in areas lying east of the "surf line" south of Cape Spencer and in Yakutat Bay (5 AAC 29.020 (b)). The spring fishery opens immediately after the winter fishery (May 1) but may open earlier if the winter fishery closes early. The spring fishery closes on June 30. The summer fishery opens July 1, and it is this fishery that takes the majority of the annual quota. Most Southeast Alaska waters are open to commercial trolling in the summer fishing season.

While the winter troll fishery may not exceed the guideline harvest level of 45,000 treaty Chinook salmon, spring troll fisheries target both Alaska hatchery-produced Chinook salmon and wild stocks (Skannes et al. 2016). There is no harvest ceiling for the spring fisheries, but the harvest of treaty Chinook salmon is limited according to the percentage of the harvested hatchery stock. Treaty fish count toward annual quotas, but most of the hatchery fish do not. The summer season targets the remainder of the troll treaty quota during one or more openings.

29. Mike Vaughn, ADF&G Fishery Biologist, personal communication, March 23, 2016.
30. Mike Vaughn, ADF&G Fishery Biologist, personal communication, March 23, 2016.
31. Troy Thines, ADF&G Fishery Biologist and Kevin Clark, ADF&G Fishery Biologist, personal communication, March 23, 2016.
32. Mike Vaughn, ADF&G Fishery Biologist, personal communication, March 23, 2016.

As mentioned previously, troll gear accounts for the majority of commercially caught Chinook salmon in Southeast Alaska. Between 1975 and 2013 an average of 1,705 hand troll permits and 967 power troll permits have been issued annually (Appendix J, Table J-5; Conrad and Gray 2014 ). In 2014, the total number of Chinook salmon harvested with troll gear in Southeast Alaska (excluding Annette Island Reservation[33]) was 355,426 fish (Appendix J, Table J-4). Approximately 95% of this harvest was with power troll gear. Trolling represented about 83% of the Chinook salmon harvest in 2014 (Appendix J, Table J-3) but only about 6% of total salmon harvest in that year (Appendix J, Table J-6).

Several permit holders were interviewed for this study. One respondent described commercial Chinook salmon trolling as compared to the use of other commercial gear types:

> But you know king salmon fishing as a troll fishery is an art form. It really is. To be good at it, it's an art. It takes a lot of time to figure it out and a lot of work to be good at it. Now seiners, gillnetters if they are there they will take them [salmon]; if they're not there they don't take them. Trollers go looking for them. That's the difference.

This respondent also noted that the troll fleet in Southeast Alaska did not have summer closures when he started fishing in the early 1970s:

> Well in those days when I started we didn't have closures because we had no treaty. It was being negotiated at the time and had been for 20 years. Nobody could agree on the time of day. There were no closures, we kept king salmon either as incidental or directed catch all summer long. We just didn't have any closure in the troll fleet.

Respondents sometimes mentioned that there are conflicts between the different commercial groups due to the timing and location of commercial salmon openers. One troller explained his frustration with gillnetters and the difficulty of concurrent openers:

> They have our troll openings and the gill openings at the same time. I've had problems with the gillnetters, they come right in where the trollers are. They can see us, they've got their glasses. They can see us bonking fish and pulling them on board. Some of the gillnetters just come and set right in the middle of the drag. Then you have to go a half mile out and around their half mile long gillnet. So I think if we need to share those fish, they should have a troll opening where they get their two or three days, and then we get our two or three days. They shouldn't be the same days. It's not working that way. It's working for them, but it's not working for the fellow trollers. All of the guys fishing, I know almost everybody, and they're my friends. We just more or less pull our gear and go home because after one or two days of them fishing, we are not getting any fish. It takes a couple of days for them to settle down because they're all broken up, and then we have one or two good days.

Another troller concurred with this sentiment and explained the difficulty of fishing alongside of gillnets:

> When they've got it open in here and those guys fish three days a week, don't even bother to put your line in the water or you won't catch anything. Or if you do, maybe you'll spend the whole day to catch one, if that. The next day and the next day. If they get done at noon on Wednesday, maybe by Friday or Saturday you can catch a fish. Of course on Sunday at noon they are back out. We used to be able to fish a little bit better with them when there were more fish. They're pretty effective with them. They have very effective gear, more so than we had in the 1960s. Better hung, better color match, better stuff. Much more effective fishery.

### *Gillnetting*

The average number of annual drift gillnet and set gillnet permits for Southeast Alaska between 1975 and 2013 was 482 and 168 respectively (Appendix J, Table J-5). In 2014, the total number of Chinook salmon

33. Annette Island Reservation harvest records are reported separately but may be found in Appendix J, Table J-4.

harvested by drift gillnet in Southeast Alaska (excluding Annette Island Reservation) was 27,877, with 8,023 of those from the Stikine River region (Appendix J_4). For set gillnet the total Chinook harvest was 1,403 fish. Gillnetting represented only about 7% of the Chinook salmon harvest in 2014 (Appendix J, Table J-3) and only about 11% of total salmon harvest in that year (Appendix J, Table J-6).

Among some respondents in this study, the sentiment toward gillnetting seemed negative in relation to impacts on Chinook salmon, largely due to concerns about the efficiency of the gear. One respondent indicated that a recent opening that targeted Stikine River Chinook salmon was particularly harmful to the stock:

> This year they opened the directed gillnet fishery which targeted Stikine River king salmon in June. Residents and nonresidents [sport fishers] were still held to a restricted bag limit. I felt personally that was a wrong move to make when you have a run size that doesn't meet an index to where you can liberalize the resident and nonresident bag limit. I think residents should come first. You have those numbers so you can't liberalize, but then you have a resident that's smoking fish, putting those fish up for winter… But then you open a gillnet fishery eight miles off the mouth of the Stikine River….

Another respondent alluded to the modern efficiency of gillnet gear:

> They are much more efficient now than they were in the '50s and '60s and '70s. They have better nets and better boats; a lot more radar and sonar and stuff down there to see what's going on. Good communication too; if something is popping someplace, everybody finds out about it ultimately and runs over there.

A third respondent offered his concerns about this fishery:

> Gillnetters are a major cause of the Chinook overfishing. They open it up for 3–4 days with 24 hours per day. They wipe out a ton of fish. A two hour set often has over 100 fish.

A fourth respondent also attributes recent Chinook salmon declines to gillnet openings:

> I remember here, I think a year before they had that gillnet opening, my son and I had run over to Woronkofski, and I had to be at work at 8. We left the harbor at 7, and we landed seven kings in that hour; all well over 20 pounds. In that one hour, we were just constantly fighting fish. That was great. Then they had that gillnet opening, and it seemed like I couldn't get as many fish. But my son is a gillnetter now, and my brother is too; my dad used to be.

While these respondents noted their concern about gillnet fisheries, most were sympathetic to the fisheries' participants. Respondents mentioned that everyone knows or is related to a gillnetter and that they understand that everyone needs to make a living. In addition, some respondents mentioned that there are some do not currently participate in gillnet fisheries, but have in the past.

Many respondents also offered knowledge and observations of historical gillnetting on the Stikine River flats. One respondent shared his experience of this fishery and the difference in older gear types:

> Well from what I remember, back in those days of course they were pulling the net in the skiff by hand, and you would set the net out and sometimes it would drift anywhere from 4–18 hours. You would just run the net in the skiff; run the cork line and pick fish out of it. That was my job, or part of my job. The line was clear up at Point Rothsay right at the mouth of the river and we fished right out on the sand flats. You'd go up at low water and try and get up the slough at low water and set the net and catch the fish if they were coming in from the tide. Then you would drift out and drift off the flats as the tide was ebbing. We caught all species; we caught some big king salmon.

Another respondent participated for one year in 1946, sleeping on Goat Island and using a small outboard boat. He remembered that after World War II, young men were coming through the area, and there were

stories of gillnetting on the flats across the Eastern Passage from Wrangell and the North Arm Stikine flats in the Petersburg area. Another respondent remembered observing gillnetters before the runs were depleted:

> I remember watching the gillnetters come back from night fishing on the Stikine flats and they would be loaded with kings, just a tremendous amount of kings. And I don't know how often that was; if it was only like that in spring time or only certain years…But if I remember right they fished all the way up to the Shakes…because in the old days you could run a boat up there. The river has changed a tremendous amount. The kings were just awesome throughout that area; although you had your slow years.

Regarding gillnet gear, one respondent explained the historically labor-intensive maintenance of nets before they transitioned to synthetic materials:

> When we were gillnetting and I was young, it was cotton web and the corks were made out of cedar and they tarred them every year. We had to take the nets completely apart, and you had to take rope, melt the lead to put it on the rope to make the lead line. You put the nets together, whether it was a seine or a gillnet, you had to put it together every year and every so often. And they had to bring it in and put in bluestone [blue vitriol; copper sulphate]. If you left bluestone around the water now they'd have a heart attack with it. Everything used to go in the bluestone because the web rotted if you didn't.

### *Seining*

The average number of annual purse seine permits for Southeast Alaska between 1975 and 2013 was 410 with 322 of those being used (Appendix J, Table J-5). The number of permits has been declining over time with a high of 477 in 1975 to a low of 315 in 2012, 2013 and 2014. In 2014, the total number of Chinook salmon harvested by purse seine in Southeast Alaska (excluding Annette Island Reservation) was 28,290 representing approximately 7% of the total harvest (Appendix J, Table J-4). Most Chinook salmon (26,014 fish) harvested with this gear type were harvested from southern Southeast Alaska. While seining represented only about 7% of the Chinook salmon harvest in 2014 (Appendix J, Table J-3), it represented 75% of total salmon harvest in that year (Appendix J, Table J-6).

The attitude among respondents toward contemporary seining and its effects on Chinook salmon was slightly more positive as compared to gillnetting. One participant in this fishery offered the following:

> Nobody targets king salmon for seining. When we do catch king salmon it's at the Hidden Falls Hatchery. Other than that, it's a really low number. I can say from my experience commercial fishing that I don't think the seine fishery in Southeast Alaska is affecting the king salmon run. I would be suspicious as to what happens on the open ocean. There's times even when the humpies don't come back when they should have.

Several respondents indicated that both seining and gillnetting are indiscriminate gear types that rarely allow a Chinook salmon to be released alive. One respondent noted that the seiners sometimes have a little more success "rolling" Chinook salmon out of the net alive but that those caught in the gills have no chance at survival. There is no incentive for these incidentally caught Chinook salmon to be released since they can be retained for sale or home use. While mortality is presumed to be high when salmon are released, this is dependent on a myriad of variables, including time in the net, handling time, release location, and scale damage, among others. Importantly, mesh size limits in gillnets help to mitigate the catch of non-targeted species that may be more likely to be caught in a seine net.

While there was little mention of seining near the Stikine, this gear type was blamed by one respondent for the decline in Chinook salmon at the Bradfield River:

> It was a huge run of fish [Chinook salmon] in the Bradfield. It seems to me, if I remember correctly, by the '60s that had pretty much petered out. The seiners had taken a horrible toll on them, the Point Ward seiners. All the seiners in that area.

This perception of the Bradfield fishery was shared by another respondent:

> We used to go down there for the seine openings…That's where the seiners were—they went to three strip seine and then that's what really knocked the doggone amount of fish that went up Bradfield. Just killed it. Totally killed it.

Some respondents also mentioned improvements in the efficacy of seine gear over time. According to one respondent:

> Your gear, though, is so sophisticated. Through the '30, '40s, and '50s, your purse seines went down six or seven fathoms. Now they are down to 25 or 30 fathoms. They can get those seines in and out, and they can make sets all day. It's all mechanical now where we used to pull by hand. All of these things add up.

An older respondent recalled seining before the availability of motors:

> The first boat I was on was just a little tiny seiner. In fact there was no power in the skiff, you used oars. In a year or so they did have engines and power skiffs. Now they have power skiffs, but they are thousands of dollars, thousands! Just to have a power skiff. That's more than a seiner was worth back then.

### *Canneries*

Beginning in 1878 and up until statehood in 1959, federally regulated canneries were a major feature of the Southeast Alaskan fisheries. Many respondents had heard stories, remembered, or worked in pre-statehood canneries and recalled the great numbers of fish that were exported through the canneries. As one respondent said:

> The canneries determined when you fished and how you fished…I remember [one old timer] said if you fish here or here or here I won't buy your fish because this guy and this guy and this guy are already there…this was long before limited entry. The canneries were limiting the fishing.

Another respondent spoke specifically of the king salmon leaving Petersburg:

> [They left] in huge tierces [wooden barrels], great big things. They were solid, and they were shipped all the way to Israel. They went to New York.

According to a United States Fish Commission report from 1899 entitled "Salmon and Salmon Fisheries of Alaska," only the Point Highfield and the Pyramid Harbor canneries were packing Chinook salmon in Southeast in that year (Moser 1899). The Point Highfield Cannery (see photograph in Appendix K) was originally built eight miles above the mouth of the Stikine River in 1887 by the Aberdeen Packing Company. It was moved to Point Highfield on Wrangell Island in 1889 and then assumed the name Glacier Packing Company. It was closed in 1892 when it joined the Alaska Packing Association (APA) but was reopened in 1893 when it joined the Alaska "Packers" Association. It was expanded in 1896 to handle 1,500 cases per day.

In 1896, the Point Highfield cannery employed 20 white fishermen to operate 14 large gillnets (each 250 fathoms long, 24 meshes deep, with 8.5 in mesh), "received the catch of 70 natives," and was primarily staffed by Chinese (Moser 1899). Interestingly, Moser (1899) described the salary of those fishing for this cannery:

> The company pays each man $125 for his services in taking the transport vessel to the cannery and back to San Francisco, and for discharging and loading at the cannery. There are two men to a gill-net outfit. When fishing commences the cannery supplies the gear and pays 5 cents for king salmon and 2.5 cents each for redfish and cohoes. The fishermen also receive their board and lodging. The Chinese contract price for packing is 40 cents per case.

A total of 3,958 Chinook salmon were harvested in 1896 with 1,239 fish harvested between May 15 and May 31, and 2,719 fish harvested between June 1 and June 22 (Moser 1899). In 1897 the cannery brought

in 4,946 Chinook (as well as 70,870 sockeye, 76,153 coho, and 662,563 pink salmon). The Chinook salmon were caught between May 15 and June 25. The Chinook salmon harvested in 1896 averaged between 16 and 22 lb. In both years, the Chinook salmon were all harvested in gillnets at the mouth of the Stikine River. According to the report, the gillnets were usually anchored, but sometimes they were drifted.

In 1900 the Point Highfield Cannery processed 1,837 Chinook salmon between May 15 and July 1 (Moser 1902). The previous year the Thlinket Packing Company was organized at Portland, Oregon and the company erected a cannery at Point Gerard on the mainland opposite of Point Highfield. Only a small pack was made in its first year and numbers are unknown. In 1900 the cannery reported 2,049 cases of Chinook salmon that were caught between May 14 and June 28 (Moser 1902). Among these, 1,375 cases were composed of fish with red flesh and 674 cases were composed of fish with white flesh. According to Moser (1902), many of the Chinook salmon were consumed at the factory or not used because of white flesh, corresponding with what respondents noted as a historical distaste for white flesh (compared with recent trends), and a home pack preference among fishermen for white kings (see Practices and Preferences section). One respondent recalled talking to older folks about the Point Gerard Cannery:

> It's over on the mainland shore. I've talked to some of the old timers who are gone now about that cannery over there. They'd gillnet the flood tide on the flats, and then go over and sell their fish to the cannery. I don't know if it's still there. There used to be an old boiler still on the beach there that was left over. That was all that was there that I can remember.

Several respondents mentioned the ruins of the Point Highfield Cannery. According to the Alaska Historical Society, the Point Highfield Cannery closed in 1903 and its owners moved their operations north to Funter Bay[34]. One respondent said he was not sure when it closed but remembered that as a child he would see the Chinese workers, who were brought to Wrangell to work for the summer at the canneries, walking around town. He said that seine boats would bring them in, then take them and the packed fish back to San Francisco:

> One big story is that the last of the season they took the Chinese and salmon and the boat wrecked out there…They were under way with a sail. It went on a rock. It lost lives and lost all the canned fish.

Another respondent spoke of the Point Highfield Cannery as well as the Diamond K cannery by the ferry terminal in Wrangell, and of another cannery on the mainland shore (presumably Point Gerard). The Diamond K Packing Company was started in 1932 and became Far West Fishermen Inc. in 1939[35]. In 1940 the company was reorganized as Far West Alaska Company. Another cannery was opened in 1929 called Wrangell Packing Company, and this was taken over by Burnett Inlet Salmon Company in 1941, but the plant was not operated after 1942. Also in 1929, the Far West Alaska Company consolidated with A.R. Breuger. The Breuger facility opened in 1935 and operated until 1942 when it reorganized as Far West Wrangell. In addition, the Alaska Sanitary Packing Company operated in Wrangell from 1912 until it burned in 1924.

One respondent said that his mother worked at the Point Highfield (APA) cannery, building wooden boxes, and that his grandfather picked up fish from some of the old canneries. He knew that his grandfather had pictures of the cannery below Rothsay, and possibly another across the water, but that the one below Rothsay was gone before the Highfield cannery was built. This respondent detailed some of the operations of the Wrangell and Far West canneries in the mid-20th century, recalling that the fish came to the cannery in tierces on a barge and were loaded into stacked boxes with handles added on. He also recalled that there were Chinook salmon saltries in Ideal Cove, Salmon Bay, and Angoon.

---

34. Alaska Historical Society Blog, "The Funter Bay Cannery," Accessed June 2016, http://alaskahistoricalsociety.org/the-funter-bay-cannery

35. Alaska Historical Society Blog, "Lewis MacDonald's Alaska Salmon Cannery Chronology, 1878–1950," Accessed June 2016. http://alaskahistoricalsociety.org/lewis-macdonalds-alaska-salmon-cannery-chronology-1878-1950/

Another respondent mentioned towns built around canneries, specifically in the Lynn Canal area in upper Icy Strait, and the effect of World War II on canneries in Southeast:

> At the start of the war they jammed a whole bunch of people into [the area]—took them out of the Aleutian Islands and everywhere else out there, and dumped them in the canneries down here.

Another respondent in Wrangell operated the Chatham Cannery in Petersburg for years, and also said that there had been a cannery called Breuger's in Wrangell. Another respondent mentioned working on the pitching crew at Breuger's Cannery in Wrangell when he was growing up pre-statehood:

> They'd come in here just loaded right to the gills. Yeah, they caught a lot of fish, a lot of fish.

Though most respondents discussed the historical importance of the influence of canneries on the push for statehood (for locals to take control of the fisheries), canneries remain a point of contention as salmon are brought from the Canadian Stikine fisheries and shipped or sold from Wrangell and Petersburg. When the PSC determines that the Chinook allowable catch does not permit a U.S. directed fishery, this is especially contentious for Southeast Alaska fishers who see Canadian vessels packed with Chinook salmon.

The fish traps commonly used by canneries were abolished when Alaska attained statehood in 1959. These traps were controversial because of their efficacy and because they competed with fishermen. In 1900 the Thlinket Packing Company operation at Point Gerard built four traps. An account of this construction was provided by Moser (1902):

> Four traps were built this year at an expense of $5500 located as follows: one in Dry Strait; one in the lower part of the southeast stream of the Stikine; one about 300 yards west from the cannery, and one in Zimovia Strait, about 10 miles below Wrangell. The first three were complete failures, although rebuilt several times; the fourth was fairly successful and about paid the expenses connected with all. The following are its dimensions: Lead, 150 fathoms, heart double, 15 fathoms across, and pot 36 feet square, in 70 feet water at high water. A short channel lead, or wing, extended from the corner of the heart. Webbing all tarred; 4-inch mesh for the leads, 3-inch mesh for the rest.

A sketch of the aforementioned trap located in Zimovia Strait is included in Appendix K. In addition to these traps, the company also used 13 Chinook salmon gillnets, each 200 fathoms by 22 meshes, 94 inch mesh (Moser 1902). The Point Gerard Cannery only operated for three years and packed a total of 63,300 cases[36]. The company's president James T. Barron sold the cannery to the Pacific Packing and Navigation Company in 1902; the new company never put the cannery into operation[37].

Many of this study's respondents noted that the fish traps caught both enormous numbers of fish and the largest fish, and discussed how the traps, which enabled the canneries to take large amounts of salmon and income out of the region, became the rallying point for the movement for statehood. Two respondents spoke of fishers taking fish from the traps to sell back to the canneries that owned them. According to one of these:

> In those days they had fish traps. Fish traps were putting the commercial fishermen out of business. In those days we would skirt around and rob traps. We would come into Breuger's cannery, and he would say, "I know damn well those are my fish I'm buying back."

One of these respondents said that this was happening in his father's day. He said that the largest fish could be seen at the cannery traps. Another respondent mentioned that the biggest king salmon ever caught was from a trap near Point Colpoys, and that a replica of the fish is now located in the lobby of the Alaska

36. Pat Roppel, "Southeast History: Early cannery at Gerard Point." Capital City Weekly, September 19, 2012, Accessed June 2016. http://www.capitalcityweekly.com/stories/091912/out_1045125897.shtml
37. Pat Roppel, "Southeast History: Early cannery at Gerard Point." Capital City Weekly, September 19, 2012, Accessed June 2016. http://www.capitalcityweekly.com/stories/091912/out_1045125897.shtml

Department of Fish and Game office in Anchorage, AK. This respondent emphasized the positive impact the removal of traps has had on commercial fishing in the region:

> I remember it was very, very poor fishing for quite a while. In fact I think the big issue was fish traps. They were catching just hundreds of thousands of fish. The seiners, it was very slow for them…Alaska took over the management. The federal government was just screwing it up. It has gotten to where it is really a nice income now.

Another respondent indicated that fish traps were antithetical to the ethos of Alaskan coastal life:

> The reservation of Metlakatla could legally have kept their traps, but even though the money stayed in town, they just stopped. Their own fishermen didn't like it because the traps were fishing and they weren't.

Once the traps were outlawed, they disappeared quickly. One respondent said that they arrived in 1960, and the traps were all gone. Respondents noted that the rebuilding of the run took some time. One respondent estimated that the Stikine Chinook salmon run did not recover until the 1970s:

> Those traps would have killed off everything if they were left in there because they caught everything that went by. You know they were built right straight off shore.

One respondent said that the old trap spots are becoming harder to see. The respondent mentioned one across from Round Point near the waterfall, below King George Bay.

## Sport and Subsistence Fishing

As mentioned elsewhere in this report, key respondents in this study tended to make little distinction between salmon harvested under sport and subsistence regulations. In their minds, subsistence salmon is those that are brought home to feed their families, regardless of the regulatory regime under which they were harvested. That said, the regulations are distinct and may have varying impacts on Chinook salmon stocks. In addition, sport fishing effort includes not only harvest by local residents but also effort by nonlocal Alaska residents and visitors from outside of the state or country. Several common themes emerged in the discussions with key respondents especially pertaining to local fishing derbies, charter fishing operations, "sport" fishing, and subsistence gillnetting.

### *Petersburg and Wrangell Derbies*

The Chinook salmon spring sport fishing derbies in both Petersburg and Wrangell are considered important annual events within these communities. The Petersburg derby has occurred annually for 33 years, while the Wrangell derby has occurred annually for 62 years. Respondents in this study acknowledge the long-term importance of these events but also offered concerns and observations pertaining to their impact on Stikine Chinook salmon.

Both derbies are organized and overseen by the Chamber of Commerce in their respective communities, but there are important distinctions in duration, participation, and spatial extent. In Petersburg, the Chinook salmon derby lasts for four days annually over the Memorial Day holiday weekend. In contrast, the Wrangell derby lasts for nearly a month. In 2014, the Wrangell derby began on May 10 and ended on June 8. Both derbies boasted more than $30,000 in prizes in 2014.

A key respondent in Petersburg described that the community's derby was "massively important." He noted that people get really excited about the derby, and that some participants plan for it all year long. Within two weeks of the derby, "everybody is getting their boat ready, and that's the main focus of everything." He explained however that the Petersburg derby is primarily focused on local participants, whereas in Wrangell the derby is advertised and there is a greater effort to promote nonlocal participation.

The economic importance of the derby to Wrangell was confirmed by several respondents. One respondent indicated that many different industries benefit, including retail sales, lodges, restaurants, and guides. He noted that with over 100 boats participating in the derby, the oil and gas docks experience higher sales

during this time also. Two respondents involved with charter fishing suggested that this is an important event for them too, and that many of their clients opt to participate and to buy derby tickets.

While the derby is considered important in Wrangell, one respondent mentioned that it seems to be declining slightly in participation. She attributed this to several factors including a declining human population, a poor economy, higher fuel prices, and lower bag limits. "Ultimately, we have fewer people with less discretionary income, fuel is really expensive, and you can only go and catch one fish," she explained. Another respondent agreed that residents seem less excited about the derby in recent years, also attributing this to costs outweighing the benefits. He explained that with fewer fish around, it takes more rod hours to catch a single fish, and the heightened cost of gas diminished the benefit to some participants.

In 2013, derby participants were limited by sport fishing regulations to one Chinook salmon per fisher per day, whereby in many recent years the bag limit was two. Many respondents indicated that this regulation was detrimental to both the derby and to the fish themselves. Because it is the goal of derby participants to harvest large Chinook salmon, smaller fish are frequently released. Some respondents believe that the mortality rate is high on these released salmon, and two explained that by the time you get the fish in the boat, remove the hook, and weigh it on your scale, the fish has been extremely stressed and is unlikely to survive the encounter.

Catch and release mortality for Chinook salmon is also likely affected by a number of variables, and this has led to a variety of mortality estimates in published literature. The Chinook Technical Committee (CTC) of the Pacific Salmon Commission addressed needs identified in the Pacific Salmon Treaty to account for various forms of incidental mortality including catch and release mortality. For recreational fisheries, the CTC identified large differences in hooking mortality between fishing techniques. Nevertheless, the CTC uses a rate of 12.3% for fish greater than or equal to 33cm and a rate of 32.3% for fish less than 33cm, based on several studies from the early 1990s (Pacific Salmon Commission 1997).

Given the number of variables that need to be controlled in studying catch and release mortality, investigating this topic is challenging, and the results of existing studies are unlikely to correlate with conditions elsewhere. Some authors have found that hook location, hook structure and size, fishing location (marine or freshwater), fish size, and the duration of fight contribute to variations in catch and release mortality rates. While it may be useful to acknowledge the variables that can contribute to variations in mortality rates, the effects of each are not necessarily applicable to Stikine area fisheries.

Photograph by Seth Perry

*Plate 3-3.–Subsistence-caught salmon from the Stikine River.*

In one study of Chinook salmon in the Kenai River, Bendock and Alexandersdottir (1991) found that freshwater catch-and-release Chinook salmon in the Kenai River exhibited 8.8%

mortality for early-run and 5.9% for late-run fish with hooking location significantly affecting mortality; gill injury significantly increased mortality though the frequency of gilled fish was small. Gills are delicate yet vital respiratory organs responsible for gas exchange with the blood (Starr et al. 2008). A subsequent report by these authors (Bendock and Alexandersdottir 1993) suggested that a Chinook salmon hooked in a vital location (gills, eye, or tongue) has a significantly reduced chance of surviving compared to one that had been snagged or hooked in the jaw. In addition, fish that were bleeding also suffered increased mortality.

Gjernes et al (1993) examined hook structure and size effects on catch and release mortality. For Chinook salmon caught via "sport trolling gear" and released in marine waters in British Columbia during their first year of ocean life, Gjernes et al (1993) found a mortality rate of approximately 30%. They also found that hook type plays a more dominant role in determining injury location, more so than barb type. Small fish are unlikely to engulf a large treble hook far enough for it to become hooked in the gills, and the width of the hook is too small to allow easy penetration of the brain or eye. They also found that barbless hooks were less likely to result in a lethal injury location than barbed treble hooks. In addition, hook size is an important variable, with proportionately larger hooks leading to a greater frequency of more severe injuries since longer points penetrate more deeply before the bend of the hook is reached and a greater gap allows a larger hook to penetrate central parts of the head (Gjernes et al. 1993).

A third variable affecting mortality rate is fatigue. The longer and harder a salmon fights while being caught, the more lactic acid builds up in their tissues. Parker and Black (1959) argued that the average degree of muscular work done by Chinook salmon while on troll gear is much more than normally occurs while the fish is free in its environment and noted that there is no biological adaptation for work of this intensity. They estimated a mortality rate of 71% among all sizes of Chinook salmon while Wertheimer (1988) estimates rates of 25% for small Chinook salmon (<66 cm fork length) and 21% for large Chinook salmon (>66 cm fork length) caught in marine troll fisheries.

**THE SCIENTIFIC NAME** for Chinook Salmon is ***Oncorhyncus tshawytscha.*** The species name *"tchawytscha"* comes from the common name used among natives in Alaska and Siberia. Other names include Chinook, chins, king, quinnat, tyee, tule, blackmouth, and spring salmon.

ADF&G, 2017, Species profile: Chinook Salmon
http://www.adfg.alaska.gov/index.cfm?adfg=chinook.main

In short, many variables can effect catch and release mortality and the impact of these variables relative to the extent of Chinook salmon mortality in Stikine River region recreational fisheries is largely unstudied. Still, the potential for catch and release mortality was a concern to some respondents in this study that noted that the one fish limit was problematic in situations where participants continue to fish after harvesting a single fish. Two respondents indicated that they know of people who threw a dead fish overboard after catching a larger fish. Another respondent would like to see greater enforcement during the derby to help curtail illegal release and harvest.

Many key respondents noted that the size of local Chinook salmon has been declining for a number of years, and most of these indicated that this is particularly evident in the size of winning derby fish over time. A table provided by the Wrangell Chamber of Commerce that displays annual winning fish sizes is included in this report as Appendix D. Importantly, during a 40-year period between 1960 and 2000, the winning fish was greater than 50 lb in all but five years, and the average weight during that period was 54.2 lb. During the thirteen year period between 2000 and 2013, the winning fish exceeded 50 lb in only two years, and the average weight during that period was only 46.5 lb. Only five winning fish have exceeded 60 lb since the beginning of the derby in 1953, and no fish exceeding this weight has been recorded in the derby since 1986.

A Wrangell respondent noted that he had participated in the derby with his son years ago. He said that his son caught a 42 lb fish, and he was listed as number 100 on the derby list. Nowadays, he explained, you can win the derby with a 42 lb fish, or at very least be in the top ten.

The decline in the size of winning derby fish is not necessarily indicative of a decline in the size of Stikine River area Chinook salmon. According to fisheries biologists at ADF&G, many large Chinook salmon caught during the derbies in the past were likely from British Columbia stocks further south that are known to be genetically larger. These fish often rear within the inside passage as opposed to the open ocean. Declines in these stocks were then consequently observed by Wrangell and Petersburg residents, and fewer large fish may, at least in part, reflect this decline.

Several respondents noted that derby-winning fish in past decades were usually harvested in areas where they were likely to be from stocks that spawn in systems other than the Stikine. A Petersburg respondent indicated that when the derby first started in that community, all of the winning fish came from Farragut Bay to the northeast of Mitkof Island. In his view, human exploitation driven by greed has nearly wiped out the Chinook salmon population in that area.

In Wrangell, many respondents noted that winning derby fish were frequently captured near the Bradfield Canal in the past, where very large fish were once known to be common. The Bradfield River Chinook salmon stock was considered by many Wrangell respondents to have once been among the most productive stocks in Southeast Alaska, and many believe that these fish were larger and stronger than any other in the region. Respondents' observations of this stock and its decline are discussed in detail within the "Habitat and Spatial Distribution" chapter of this report.

Snow Pass was also mentioned as a location where many past derby winning Chinook salmon were harvested; this area is located between Zarembo and Prince of Wales Island to the west of Wrangell. A respondent remembered that "Snow Pass used to have a big run." He noted that "we used to run over there and catch 15 to 20 kings that were all over 40 or 45 pounds." An additionally popular location to derby fish in the past was between Greys Island and Rynda Island, north of Wrangell Island. One respondent explained that the area closer to Greys Island used to have a rougher bottom, and many boats would anchor up to fish in that area. He said that area is no longer open during the derby and that no one anchors to fish like they used to. Another respondent indicated that he has caught tagged hatchery fish during the derby in the past and that at least one of these was from Neitz Bay. He explained that these fish are from the Chickamin River stock and are known to be genetically larger than those originating in the Stikine.

Wrangell respondents had mixed feelings about the duration of the derby in that community. Some mentioned that it is shorter now than it was in the past, while others said that the duration places unnecessary stress on the stock. A respondent that felt the duration was too long explained that Haines once had a longer derby that had to be shortened when the stock declined. He said that it would be better for all fisheries to be proactive and self-limiting when stocks are less than optimal. Another respondent suspected that a month-long derby has had some degree of impact on the size of local fish, with large individuals being targeted for so many years by so many people.

Two respondents mentioned that the duration of the Wrangell derby allows for too many fish to be harvested by households that otherwise would not be fishing as intensively for Chinook salmon. One of these mentioned that he throws a lot of fish back unless he knows that someone wants one. He also tries to take one or two fish to the long-term care center. He does not, however, put a lot of fish in the freezer because his family prefers to eat fresh salmon.

### *Charter Operations*

Few respondents offered observations and perceptions of charter fishing in the Stikine River region. Of those that did, most pertained to the quantity of boats on Andrew Creek or operations that ignore regulations in an attempt to increase the harvest for out-of-state residents. Generally, the perception of Stikine area charter operations seemed neutral among respondents. Most charter operations in the study communities are run by local residents.

One respondent indicated that Andrew Creek gets "choked out" with charter and sport fishing boats in the spring that are targeting nonsalmon fish. He said that 6–8 boats sometimes anchor right at the mouth of the creek, nearly making it impassable. He prefers to fish for trout in the clear water farther up the creek.

Two respondents mentioned that they would prefer all fishing operations, including charter operations, to be shut down within and near the Stikine River when there are concerns about declining stocks. One of these explained that fisheries should not be opened in "an area that is clearly going to target those Stikine area fish we are worried about."

One respondent described illegal practices by licensed charter operations in the Stikine River region. She mentioned that licensed charter operations are failing to record harvested fish, and in some cases they are returning fish to the docks and taking their clients back out to catch a second limit in the same day. She apparently observes this happening frequently, and she is concerned that this is hindering the state's ability to accurately record harvests. She also mentioned that the clients are partially to blame, and that many try to fund their fishing vacations by selling part of their catch upon returning home. She went on to explain that some clients make no effort to hide these activities, but that the more ethical charter operations dissuade them from doing this or refuse the client's business altogether.

Another respondent offered the view that in some areas of Southeast Alaska, charter operations are taking too many fish. He said that "they call themselves sport boats, but that they are just as commercial as everyone else." He explained that in Craig and Klawock you often see 30 or 40 sport boats in any given day "taking people out from Texas and Washington and all over the place." The respondent noted that the same thing happens in Wrangell and Petersburg, and he went on to suggest that "something needs to be done to tone it down a bit before we have nothing."

### *Sport Fishing*

Sport fishing for Chinook salmon is a popular activity in both Wrangell and Petersburg. This is often done as part of the community derbies, but not always. It is important to mention that sport fishing is accomplished using rod and reel gear, but that bait is often dragged behind a boat in what local residents refer to as "trolling." Regulations stipulate that trolling is a method used within commercial fisheries, but this is merely a semantic distinction. As one respondent indicated, "you could call it subsistence fishing because we do eat it, not sport, so I have a tough time with a lot of the terminology." In this discussion, we use trolling to refer to the means by which most sport fishers in Wrangell and Petersburg harvest Chinook salmon.

Another important consideration worth mentioning here is that very few fishers in Wrangell and Petersburg made a distinction between sport and subsistence fishing. While the regulations vary between these two categories, the term "subsistence" was frequently considered to be the acquisition of wild foods to feed local families, regardless of the regulatory regime under which those foods are harvested. As one respondent noted, "we don't call it a sport fishery when you go out to get one to eat." Similarly, many commercial fishermen kept part of their catch in what is known as "home pack." Instead of selling these fish, they were retained for home consumption. Home pack was therefore also considered subsistence. A respondent explained how this home pack is important to his household:

> We eat a lot of king salmon in the house; pretty much all of the smoked salmon we eat is king salmon, but I keep it from the seine trips you know. Put it on the fish deck and just bring it home. If they're going to pay us 15 cents a pound for it, we might as well utilize it for ourselves…Everyone that fishes that has a family in town brings their fish home off of the commercial boats. It's all about efficiency. I mean there's a lot of people in town that sport fish and get their fish that way. But I don't have the time or the money to do that, but we need to have that fish in our diet. Yea, I think it is very important.

Another key respondent noted that he likes the idea of commercial fishermen having access to Chinook salmon home pack, but that there are quite a few individuals that abuse the system, particularly those fishing on seine boats. He said that many of these fish do not survive and that some folks are bringing them home as home pack, freezing them, then selling them under the table. He explained that there is no accounting on those fish and that every time a seiner unloads, "there is anywhere from 3 to 4 to 20 king salmon sitting on

the side of the deck." He believes that to be a "real destructive force" and that there are "a few fishermen making a lot of money on those fish."

Sport fishing for Chinook salmon was mentioned by some respondents to be among the most important activities for acquiring subsistence fish to feed their families, sometimes more so than other salmon species. One respondent indicated that he likes to sport fish for Chinook salmon, and that is how his family acquires most of their food. He added that, "We eat a lot of fish. We usually can about 10 to 12 cases of king salmon per year. I use to go after sockeye and humpies [pink salmon], but I just go after kings now."

This respondent also noted that "everyone is taking more fish, so there is less for sport fishermen." He noted that his preferred fishing locations traditionally included the area surrounding the Elephant Nose of Woronkofski Island, and the area near Vank Island, but that Chinook salmon have declined in these locations since the opening of commercial gillnetting in the region. Two respondents recalled sport fishing near Snake Creek in Olive Cove (Etolin Island) when they were younger, stating that they would "go catch fish in the creeks, and take them back to the boat and can them right on the boat; that was a traditional thing that we did every year."

One long-time fisher explained that sharing and preserving Chinook salmon was, and continues to be, very important to the community of Wrangell. He explained that when he was young, "everyone gave away Chinook salmon, put it up, smoked it, or put it in the freezer." He also explained that, in the past, Chinook salmon could not be kept frozen for long because they would become freezer burned, but that modern vacuum packing has helped to extend the duration that fish can be left in the freezer.

Another respondent described what he referred to as the "casual fishermen" who were around prior to the institution of limits and quotas. Prior to limited entry, he explained, sport fishermen would also sell part of their catch commercially because it was easier and cheaper to obtain a license. He described local participation in this hybridized sport and commercial fishery:

> You could buy a commercial license and you could sell your catch as long as you heeded to the rules for commercial fishing which were three days a week. The commercial thing was three days a week during part of the year out there over the summer. As long as you did that you could fish two poles and you could sell your catch. Everybody did that. Out of a hundred king salmon caught on the weekend, probably ten of them were sport fish and the rest were all going to be sold. Frankly, what would one do with all of that fish? I did that and made some pretty good money at it. I fished pretty hard until limited entry which was 1973 or 1974.

A second respondent participated as a casual fisher in the early 1960s. He explained that he would fish from Petersburg south toward Blake Channel to the east of Wrangell using a hand troller, but that "this was just a weekend thing that I did."

One respondent indicated that in the earlier part of the 20th century it was fairly easy to catch a king salmon while sport fishing from a power skiff close to town, but that this is rarely the case in modern times. An additional respondent described how improving boat and engine technology has changed over time, influencing distances travelled for Chinook salmon sport fishing:

> In the beginning, 40 horses was about as big of an engine that you could get. But as the engines started getting bigger you could get a 75. You could put in a decent sized boat. You could also put it on a deep bottom boat that can take the rough water. As when you only have 40, you better stay to a pretty flat boat. That's when people really started heading to all these places, because gas was cheap and now they've got an engine that will take them down there [Bradfield Canal]. I can remember going down there on 40 horses, but not very good ones either. As they got bigger and bigger people could fan out. But then the price of fuel got bad and it is different now.

As the cost of travelling further to sport fish increased over time, many respondents noted that they began to consider the costs and benefits associated with participation. Some respondents tried to adapt by improving

their ability to harvest closer to their community. As one respondent explained, logging weather conditions, location descriptions, and harvest success has been helpful over time:

> That's why I usually keep a log. I have a little paper log. I write all my stuff down, including how deep I am fishing, where the fish were at, what stage the tide was in, what the weather was doing…Usually after a storm the fishing is really good. I just write little things like the color of the water, the water temperature. I have a little thermometer to see what the water temperature is. If the bait is there. If there are whales or sea lions. Yeah I write all of that stuff down. And I go back to it and refer back to it. It is pretty close to the same…Then I listen to other people, the gossip, so I'll have some idea. So I won't have to go so far too.

Though many respondents in this study fished for Chinook salmon under multiple regulatory regimes (commercial, sport, subsistence) in any given year, one commercial fisher indicated that gear efficiency has limited his participation in the sport fishery. He explained that he has spent a lot of time on commercial boats catching thousands of fish, and that spending so much time, energy, and money to catch a single fish under sport regulations was not appealing to him. He did acknowledge however that sport fishing often has an element of "fun" and "competition," particularly during the local salmon derbies.

### *Subsistence Gillnetting*

A federal subsistence fishery for sockeye salmon was established in 2004 on the United States portion of the Stikine River as part of an agreement between the Federal Subsistence Board, ADF&G, and the Pacific Salmon Commission[38]. Targeted Chinook salmon and coho salmon subsistence fisheries were then established on the Stikine River in 2005. These fisheries are open to residents of drainages flowing into districts 7 and 8, residents of drainages flowing into district 6 north of the latitude of Point Alexander (Mitkof Island), and residents of Meyer's Chuck. Participant households are primarily from the communities of Wrangell and Petersburg.

The subsistence fisheries allow for each permitted household to use dip nets, spears, gaffs, rod and reel, beach seines, and gillnets to acquire up to 5 Chinook salmon, 40 sockeye salmon, and 20 coho salmon. The total annual guideline harvest level is 125 Chinook salmon, 600 sockeye salmon, and 400 coho salmon. Nets may not exceed 15 fathoms and mesh size can be no larger than 5.5 inches stretched, except during Chinook salmon season when it can be up to 8 inches stretched. Chinook salmon may be harvested from May 15–June 20, sockeye from June 21–July 31, and coho from August 1–October 1. Salmon species taken incidentally under the terms of the permit may be retained, but these fish must be reported on the permit. Chinook salmon less than 30" must be reported but are not counted as part of the harvest limit (Stikine Permit Application 2014) because only Chinook salmon designated at "large" are considered in forecasts and escapement goals.

From the inception of the Stikine River subsistence salmon fisheries in 2004 until 2013, a total of 387 Chinook salmon (greater than 30") have been harvested in this fishery, including those that were taken during the designated Chinook salmon season and those that were harvested incidentally during other seasons (Appendix E, Table E-1)[39]. In 2013, a total of 51 Chinook salmon (greater than 30") were harvested in these fisheries (Appendix E, Table E-1; Larson 2013), but only 2 Chinook salmon were harvested during the Chinook salmon season (Appendix E, Table E-2; Larson 2013) while all others were harvested incidentally during the sockeye salmon season (Appendix E, Table E-3; Larson 2013). More Chinook salmon were harvested incidentally during the sockeye salmon season than in the Chinook salmon season in every year since 2008.

It is important to note that in 2013, the Chinook salmon fishery remained closed until June 15 due to pre-season abundance estimates that were lower than those required by the Pacific Salmon Treaty (Larson

38. Subsistence Management Regulations for Public Lands in Alaska, Subpart D; Seasonal Adjustments–Copper and Stikine Rivers. Federal Register 70 (June 22, 2005) 36033–36036.

39. Robert Larson, USFS. Stikine River subsistence salmon fishery: 2013 season summary. United States Department of Agriculture Forest Service, unpublished report, 2013. Hereinafter referred to as (Larson 2013).

2013). Once the inseason abundance estimate reached 24,635 Chinook salmon, the fishery was opened for the remaining six days of the season. Some respondents in this study felt strongly that closures of this nature were unfair and should be applied equally to subsistence fisheries on the Canadian portion of the river. One respondent noted that participants in the 2013 subsistence fisheries intentionally self-regulated themselves to help protect the Chinook salmon stock. She described her satisfaction with participants' willingness to limit Chinook salmon harvests:

> One thing that was kind of neat that I noticed up the river subsistence fishing this year was that, even though we surprisingly got a directed fishery for subsistence for the kings, people knew that there was less abundance and there weren't a lot of people that fished it. Those that did weren't really targeting kings. They were fishing them but they were trying to catch the sockeyes that were early. I know that we and a number of other people, if we had a fish that was in good shape, a king, we let it go. Even though technically we were fishing kings, people weren't keeping the kings unless they were dead or something like that. That was kind of neat to see just a voluntary responsible use.

The number of households permitted in the subsistence salmon fisheries on the Stikine River has gradually increased over time from 40 households in 2004 to 130 households in 2012, followed by a slight decrease to 124 households in 2013. Of the 124 permits issued in 2013, 44% were issued to residents of Petersburg and 56% were issued to residents of Wrangell. The 2013 season summary excludes harvest reports from seven households that had not provided harvest data by November 22. The subsequent year's permits are not issued until these reports are provided, and the updated harvest totals are reflected in the next year's season summary report to the Pacific Salmon Commission[40].

Several respondents in this study have participated in the Stikine River subsistence salmon fishery since its inception. The general attitude of most respondents toward the fishery was positive, but many offered commentary and suggestions for improvement. Among the most frequently provided recommendations was for a provision to require the in-person tending of nets to prevent predation of captured fish by seals. This predation is thought to occur regularly in this fishery. In addition, net-tending is considered "responsible fishing" by many local residents. The Southeast Regional Advisory Council (RAC) for the U.S. Office of Subsistence Management (OSM) also commented on this issue. The recommendation to require net-tending was made by the RAC in 2014 and was considered by the Federal Subsistence Board in January 2015[41]. The board adopted the regulation requiring fishers to check a set gillnet at least twice daily beginning in 2015 (Appendix G). More about this concern, particularly as it applies to predation, can be found in the section "Predation and Prey."

One respondent indicated that the Stikine River subsistence fishery was critically important to his household during a period when his health prevented him from commercial fishing and acquiring salmon as home pack:

> I hung a gillnet, and I went up and subsistence fished on the river with my net. I made three trips and it was great fun. I loved it. That was so much fun. We processed the fish on the beach and brought them home and smoked them ourselves…If I was not going to salmon fish anymore (commercially), I would participate in that subsistence fishery on the river every year.

This fishery participant went on to further describe the experience and efficiency of the fishery:

> We just had this net in the bow of the skiff and we went up there and set up camp and setnetted it out. I think we only had to put the net out about three times. It stayed in the water for about 40 minutes each time. We had a lot of fish and we just dressed them all out and iced them with glacier ice. We stayed the night and then headed home in the

40. Robert Larson, Subsistence Regional Council Coordinator, U.S Forest Service, Tongass National Forest, personal communication, November 7, 2014.

41. Robert Larson, Subsistence Regional Council Coordinator, U.S Forest Service, Tongass National Forest, personal communication, November. 7, 2014

> morning. Really efficient, you know it would take us a month to catch that many fish with a pole.

While the subsistence fishery is open in most of the federally controlled areas of the Stikine River, one respondent indicated that there are only a few places that set gillnets can be effectively utilized. One of these is at the mouth of Government Creek near Rock Island (also known as Willow Island or Fisheries Island), another is near the mouth of Shakes Slough, and the third is near Wizard Island (Plate 3-3). Another respondent also noted having seen nets placed near North Arm Creek (Dog Salmon Creek). This respondent has utilized the Wizard Island area while participating in the subsistence fishery. He described this area and his harvest of chum salmon as follows:

> There's a shallow area on the inside of the river and when the river is high, it's moving slower back there, and you can set that up there. The river is really racing nearby so they [the salmon] tend to go through there. By the time the fish get up there, the dogs [chum salmon] and the sockeyes, you can hardly tell them apart, because the river kind of blows all their scales out so they start looking the same. A lot of people don't keep the dog salmon but you can keep as many as you want to, so it doesn't count toward your limit of sockeyes or cohos. I brought 60 home. Some of the best smoked fish we've ever had.

Photograph by Seth Perry

*Plate 3-4.–Wizard Island subsistence setnet site. The net can be seen in the water to the right of the beach.*

Two respondents did offer negative views of the subsistence fishery. One of these indicated that he thinks there is not enough enforcement of the fishery and that some subsistence-caught fish are making it to the commercial market. He explained that his commercial fish are required to go throughout the proper channels of sanitation and preservation, adding that if bad fish were to make it to the market, "It would give all the salmon a bad name, and it would be detrimental to my industry." This respondent also noted that he takes issue with the definition of subsistence, and he does not believe that someone with "a $40,000 truck" launching a "$40,000 boat" should be able to "claim" subsistence. Importantly, both state and federal law define subsistence as customary and traditional use; neither links participant eligibility with income or poverty.

Another respondent said that he does not see a need for a subsistence fishery because, "We can get enough fish out here trolling with a little effort." He believed that once Chinook salmon reaches fresh water, they should be free to spawn without human interference.

A third respondent who supports the subsistence fishery also took issue with the definition of customary and traditional, including its limited use to define other subsistence areas in the Stikine River region. He suggested that salmon harvests with subsistence gear should be permitted in Mill Creek, Thoms Creek, and other areas. This respondent indicated that "customary and traditional" should be specifically applied to those with local Alaska Native heritage. He noted that the Anan area was traditionally important to the Stikine Tlingit, and that the U.S. Forest Service has been too restrictive in allowing access to that area.

### Practices and Preferences

The practices and preferences regarding the harvest and use of Chinook salmon have changed over time due to social fluctuations and technological advancements. Documenting and understanding these changes may be helpful in interpreting contemporary circumstances and predominant harvest methods. While these topics did emerge within this study, there is room for each to be developed in greater detail in subsequent investigations. In the Stikine River region, Paige et al. (2009) provides an excellent overview of traditional salmon harvest activities, especially as they relate to sockeye salmon. Our study adds to this body of knowledge with notes on traditional trade, harvest, and use of Chinook salmon as well as a discussion of preferences regarding seasonal harvest, flesh color, and other desired characteristics of this species.

## Traditional Trade, Harvest, and Use

The trade, harvest, and use of Chinook salmon has deep cultural roots in the Stikine River region, like throughout much of Alaska. Several key respondents explained the importance of Chinook salmon to the Tlingit people of the region, both traditionally and contemporarily. While specific harvest methods and trade patterns have changed over time, cultural connections to these practices are often maintained. This cultural importance is exemplified in the following key respondent statement:

> Culturally I was taught to harvest king salmon. It's just a way of life for most of the Natives. That's not just in Southeast, it goes way up into Alaska, the Bering Sea and everywhere…Culturally I learned how to catch and harvest the fish and to share with the elders. It's what I do deer hunting too. I share with my mom, she's an elder too, and my auntie, my uncle, and some of the elders that aren't even relatives, I give a little bit to them. Some of my deer meat, my king salmon, I give them some king salmon eggs when I catch one with big eggs in it.

Traditionally, many resources were shared with elders and others before they were retained for one's own household use. This sharing is often practiced today. One respondent mentioned that he never gets enough Chinook salmon because, by the time he is done sharing with elders, there is only a little left. In his mind, the ability to share this resource is more important than his ability to personally consume it. Another respondent noted, "I don't have to have it to eat, king salmon, but I sure do appreciate it."

Respondents generally agreed that Chinook salmon are shared regularly among many people in the local communities. Sometimes this species is chosen for sharing because of its size compared to other salmon species:

> There are four or five different guys that go out and catch big kings and say, "It's too big for me, do you want part of it?" I get slices of king salmon from people periodically.

Chinook salmon are also frequently eaten fresh or smoked in the Stikine River region; respondents attributed this to the year-round availability of the resource compared to the seasonality of other salmon fisheries. Some respondents also believed that salmon are not preserved well in the freezer:

> I take them up to the long-term care. We will eat a couple, but I don't put a lot of fish in the freezer. It just doesn't keep well in my mind.

Another respondent echoed these sentiments:

> If I go out and catch two fish, that takes care of me for a couple of weeks. By the time I smoke them and give them away and then by the first of the year you freeze a few but I'm not real keen on frozen fish. For very long anyway. It just doesn't keep long. So I limit it and give a few away.

A preferred method of preservation of Chinook salmon is smoking. One respondent indicated that "everybody" liked their king salmon smoked or grilled, but some will pickle a little bit of it. Traditional smokehouses would have the salmon hung on racks above a fire that had to be maintained perfectly to avoid burning the salmon and to get the desirable texture on the surface of the meat. Some families smoked a lot of Chinook salmon to give it away at other times of year:

> Dad was a gillnetter. He and Mom would smoke maybe 50 kings in a summer, which is quite a bit. I mean how many cases does that come out to? I bet a lot. We used that for giving presents to friends and relatives for like Christmas time or whatever.

A second respondent recalled smoking salmon with his grandmother "the old way":

> She does it the old way. She brines it for 8 or 10 minutes and dries it for 12 minutes. Then she smokes it for a day. Same way it was done in Old Town. The fish should be dripping all of the time. We had to sleep outside. If it was raining we had to camp. We stayed in the cabin all of the time. When we would come into town with my grandparents they would put the fish out and say how much fish went to whom. She divided it up for the elders that didn't go out and get theirs. She had it all smoked and dried out in front of the cabin that we were staying in. I wish I had learned what she did.

When discussing the cultural importance of Chinook salmon, several respondents noted their abhorrence toward regulations that in their view encourage waste. This included commercial fishing that requires throwing back injured or dead bycatch and sport fishing regulations that promote throwing back smaller fish, especially during salmon derbies. A respondent explained his feelings about this:

> Even over at Mill Creek too it is a catch and release [fishery]. If we're fishing sockeye, and we get a certain fish that we are not supposed to, we are supposed to throw it back. Then we throw it back after it's been gilled and all that, and it's laying there on the bottom; it is a waste of fish. But they say, "No, you can't do it. Throw it back." All the fish that we catch that we are not supposed to, we have to throw it back. That is waste right there.

Many respondents understood the "throw-back" requirement's intent to prevent targeting certain species, but they passionately supported any alternative to waste, especially those that allow distribution of meat to elders and others in need.

There were few respondents who remembered more permanent fish camps along the Stikine River or trade with interior peoples, though most were aware of the historical presence of these sites and patterns. Salmon spawning streams along the Stikine were traditionally controlled by individual clans that would establish their fish camps at these locations. One older respondent did recall Tahltan families visiting Wrangell in the early to mid-20th century to work seasonally in the sawmills. He explained that they often dried their fish in the interior where conditions permitted this, and they would then sell these, as well as fish skins used for crafts, when they came to Wrangell:

> The Natives here would get dried fish, salmon that has been opened and prepared, hung up in the sun. You don't get any of that here because you don't get enough sunshine to dry them. But up there they put up a lot of them, and they used to bring some down here and you could buy them. I think at one time you could buy a skin for $5. They did a real

> nice job. Most of the time I think it was sockeye. I'm not sure how much king salmon they used. I don't think they dried the king salmon.

## Preferences

Seasonality and flesh color in Chinook salmon were important preference considerations for the residents of Wrangell and Petersburg. These preferences have led to related stock observations over time, and they have been important market variables in local commercial fisheries. Most key respondents in this study provided observations and insights related to local preferences and economic value as they pertained to seasonality and phenotypic characteristics.

Eight key respondents described their preference for Chinook salmon caught in the winter months (locally called feeders) as compared to those caught during the spring spawning season (locally called spawners). Several of these respondents also indicated that the preference is standard in both Wrangell and Petersburg. According to one of these respondents, "Most local people would rather eat a winter king than a spring king or a summer king…It's the amount of oil in them." He continued this description by noting, "There is a lot more oil in the winter kings and they are more flavorful. A lot of us don't even like to eat those other fish. We all love salmon but we prefer the winter kings."

One respondent indicated that the oil and fat content of winter Chinook salmon is predominantly in the "belly meat" of the fish. He mentioned that the winter Chinook salmon are often fat, and that these high-quality individuals can also be found through March and sometimes April. He also noted that they are thicker in the winter, and if he catches one with a small belly, they are usually darker and he will not keep them. Another respondent reiterated that spawners are not as high in quality as the feeders, but can be good smoked. He noted that he will eat a baked or fried spawner, but that these do not compare to the quality of a winter Chinook salmon, about which he added "there isn't anything better in the whole world." Two additional respondents concurred with this sentiment, one noting that it is "the best food around."

**ONE HALF POUND FILLET** of Chinook Salmon has 406 Calories,45.2 grams of protein, 23.6 total grams of fat, 7.0 grams of saturated fat, and 107 milligrams of sodium.

USDA, 2016, National Nutrient Database for Standard Reference Release 28, Food search list, https://ndb.nal.usda.gov/ndb/search/list

The availability of winter Chinook salmon was mentioned by several respondents as the reason they are harder to obtain than those that are available locally during the spawning season. One respondent explained that the feeders are "pretty hard to come by" while another explained that they are particularly important in the winter because the other salmon species are seasonal and absent locally in the winter months. The winter of 2012–2013 was said by one respondent to have been particularly good for harvesting winter kings in the Wrangell area:

> There seemed to be a fairly good amount for winter fish hanging around. I was kind of surprised. It seemed to me that it was weird because the summer runs weren't that great but then the winter…I know a couple of guys that did really well. We had some nice weather, and they fished just about every day there was a nice weather day. They always brought home a fish or two. That was interesting to see for that time of year.

The flesh color of Chinook salmon is variable with the greatest proportion of fish containing red flesh and a smaller percentage with white and pink flesh. Preference for these flesh colors has changed drastically over time, but this preference does not appear to be as important as seasonality. Today, white flesh is said by many to be preferable: a respondent from Wrangell stated, "Everybody here now prefers to eat the white."

The preference for white Chinook salmon has developed in the past several decades, and the historical preference for red Chinook salmon can be seen in the variable market rates for each flesh color. As one respondent remembers, he would get "$.90/lb for reds and only $.60/lb for whites." This respondent also explained that many buyers would label pale, pink-fleshed salmon as whites, but some established a price for this third color morph. Another respondent recalled having been told by his grandfather that some fishermen would historically kill all of the white kings and throw them back and added that the whites were "worthless during those times."

A Wrangell respondent noted that because the market preferred red Chinook salmon, commercial fishermen generally brought home the white-fleshed variety as home-pack. He said that "they were better eating anyway; they got more oil in them." This observation that white Chinook salmon generally contains more oil was also mentioned by a second respondent who added that local people "definitely" believe there is a difference in taste between the flesh colors.

The frequency with which the white-fleshed variety of Chinook salmon occurs in the Stikine River region is thought by biologists to be higher than in other parts of Alaska. Andrew Creek Chinook salmon are thought by some respondents to have higher frequencies of white flesh than other stocks in the area, and this may be the reason that they are caught more frequently by local fishermen in some areas. Still, the Stikine system as a whole is known to have a low percentage of white-fleshed Chinook salmon (approximately 3%) compared to other rivers in southeast Alaska (Hard et al. 1989). British Columbia systems have higher percentages of white-fleshed Chinook salmon (Hard et al. 1989) and it is possible that many of those caught in the Stikine River region, particularly in the winter, are from British Columbia stocks. A respondent noted that white Chinook salmon are caught "quite frequently in this part of the country, but if you move away from this area you have predominantly red."

Three respondents indicated that white-fleshed Chinook salmon are caught approximately 40–50% of the time, depending on the specific area that is being fished. Mill Creek was mentioned by one respondent as a harvest location for white Chinook salmon. Another respondent indicated that he has only caught red Chinook salmon near Anan, adding that in one fishing trip to that area he caught 23 Chinook salmon, "all were over 30 lb and all were red [Chinook salmon]." Two additional Wrangell respondents noted that the high frequency of white Chinook salmon is only observed nearby, and that once you get out towards Kingsmill Point, "you never get a red."

The frequency of flesh color may also be ascertained, at least in part, through historical cannery reports. According to a bulletin of the Unites States Fisheries Commission (Moser 1902), the Thlinket Packing Company (located on the mainland near the mouth of the Stikine River's main arm) harvested 2,046 Chinook salmon between May 14 and June 28, 1900. Of these salmon, 671 had white flesh, which equals a frequency of 33% for that flesh color in the harvest.

### Research and Management

Some respondents mentioned circumstances, activities, and policies that, while they may have been out of their immediate scope of experience or expertise, were thought to have had major impacts on Chinook salmon stocks in the region. Some of these, such as hatchery operations and resource development activities, were of concern to respondents, and many mentioned a desire to have additional information on these at their disposal. This section includes several additional sources of information (i.e. literature and personal communication with experts) to help better define and explain concerns arising from key respondent interviews.

## Hatchery Operations

Alaska hatcheries producing Chinook salmon were constructed throughout Southeast Alaska, with the Crystal Lake Hatchery on Mitkof Island being among the most important for the Stikine River region. The hatchery was originally operated by ADF&G's Fisheries Rehabilitation, Enhancement, and Development

(FRED) program, but is now operated by the Southern Southeast Regional Aquaculture Association (SSRAA) under contract from ADF&G. It was originally constructed in 1972, and in that year the hatchery received 1.5 million Chinook salmon eyed eggs from the Columbia River's Carson National Fish Hatchery for its initial operations. A total of 134,391 Columbia River stock smolt were released into Crystal Creek[42]. Some of the Columbia River stock smolt were transported and released in Sitka and Juneau as part of other fisheries enhancement programs. This was the only lot of Columbia River Chinook salmon eggs ever received and released, and all adult returns from these were destroyed[43].

Concerns about disease and genetics led the Crystal Lake Hatchery and other regional hatcheries to begin using stock from nearby Andrew Creek. To facilitate the establishment of hatchery broodstocks, adults and eggs were harvested live from Andrew Creek annually from 1976–1983 (Appendix F; ADF&G 1998). Eggs and adults were harvested specifically to supply both the Crystal Lake Hatchery and the Snettisham Hatchery in seven years including 1976, 1977, 1978, 1979, 1982, and 1983[44]. Appendix F shows the number of adults and eggs harvested for these hatcheries in each year. Eggs were also harvested in 1980 and 1981 (Pahlke and Etherton 1998), but there are no records of these being used at Crystal Lake Hatchery, and they were likely distributed between Hidden Falls, Snettisham, and Macaulay hatcheries or transported altogether to one of the three locations[45].

ADF&G also operated a weir on Andrew Creek from 1977–1998 to count spawning Chinook salmon (Appendix N) and to assist with the collection of these fish and eggs for the hatcheries (Pahlke and Etherton 1998). A "sliding egg take scale" was used for Andrew Creek egg takes, and the number of female Chinook salmon held for hatchery broodstock was dependent on the abundance of females counted on the weir. Broodstock was only collected when the escapement of fish reached a minimally acceptable level determined by ADF&G[46]. The weir was located on the "South Fork of Andrew Creek approximately 4 miles upstream from the confluence of Andrew Creek and a side channel of the Stikine River"[47]. In the mid-1980s, the Alaska Chinook salmon rebuilding program was incorporated into a coastwide program associated with the Pacific Salmon Treaty to increase escapement of wild Chinook salmon stocks returning to Oregon, Washington, British Columbia, and Southeast Alaska (Pahlke and Etherton 1998).

According to the Crystal Lake Hatchery's 2014 Annual Management Plan, the facility had four main Chinook salmon projects. The first of these was the Crystal Creek Chinook salmon program to provide "adult king salmon returns to local sport and commercial fisheries in the Petersburg area, as well as Andrew Creek broodstock for the Crystal Creek and Anita Bay king salmon program"[48]. The production goal for this program was the release of 600,000 smolt into Crystal Creek (SSRAA 2014). The second program was for Anita Bay Chinook salmon that provides adult returns for sport and commercial fisheries in the Wrangell area, and the 2014 goal was the release of 500,000 smolt in Anita Bay (SSRAA 2014). The third program was for City Creek Chinook salmon to provide additional opportunities for sport and commercial fisheries in the Petersburg area with a goal of releasing 200,000 Andrew Creek smolt (SSRAA 2014). The fourth and final program was for Neets Bay Chinook salmon to provide local and commercial opportunities in the Ketchikan area "as well as a cost recovery opportunity for SSRAA in the Neets Bay terminal harvest area,"

42. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
43. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
44. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
45. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
46. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
47. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
48. SSRAA, 2014, 2014 Annual Management Plan Crystal Lake Hatchery, Southern Southeast Regional Aquaculture Association, Ketchikan. Hereinafter referred to as (SSRAA 2014).

whereby 25% of returns are harvested by SSRAA. The goal of this program was to release 500,000 smolt into Neets Bay, but unlike the other programs, these fish were from Chickamin River stock (SSRAA 2014).

In 2013 the Crystal Lake Hatchery also received a one-time permit to receive and release 70,000 broodyear 2012 Unuk River stock king salmon smolt from the Deer Mountain Tribal Hatchery (DMTH) due to the closure of the latter facility (SSRAA 2014). The goal of this release was to prevent the destruction and waste of DMTH holdings[49]. These smolt were transported to Anita Bay for short-term rearing and release in April 2014 (SSRAA 2014). The release was thoroughly vetted by ADF&G biologists and determined to be biologically appropriate given that all returning fish would be harvested and none would be kept as broodstock[50].

Key respondents in this study offered several observations of hatchery operations and hatchery produced Chinook salmon over time. Several key respondents had a positive perception of the ability of hatcheries to support local commercial and sport fisheries for Chinook salmon. One respondent described his support of the program:

> I think it is a good program. I think it has done a lot for taking pressure off of wild stock fish. I'm a big proponent of hatchery fish. It provided $26 million to the commercial fishery last year. So that proves that the system is working, in my opinion.

Some respondents also acknowledged concerns and recommendations regarding these programs. One respondent mentioned regulatory concerns that give preferential treatment to commercial fisheries over sport fisheries, for fish originating from sport hatcheries. He emphasized that all hatchery fish need to be caught and that his kids should be able to go out and snag hatchery fish near Petersburg with a more liberal bag limit.

A frequently mentioned concern regarding the Crystal Lake Hatchery was the removal of eggs from Andrew Creek without returning any fish to that system. A respondent noted that a reason fish were taken from Andrew Creek was not just its proximity to the hatchery, but also because the stock consisted of "phenomenal beautiful fish." One respondent indicated that the decline in Andrew Creek Chinook salmon can be at least partially attributed to egg removal, and added, "They took eggs out of there for years, and they never replenished the stream." This sentiment was repeated by a second respondent who described in detail his own observation of egg removal from Andrew Creek. This quotation was included in a previous section but is also applicable here:

> They went up and took eggs out of Andrews Creek… That was such a waste as far as I was concerned. I mean I could have seen them taking some eggs out. I can remember going up into the clear water of Andrews one time. They had put a weir in there to stop the king salmon, and they were scooping them out and taking the eggs; there were 22 buckets, 5-gallon buckets, of eggs sitting there on the bar, and the helicopter was supposed to come in and pick them up. This was in early to mid-July. The helicopter didn't show up, and they sat there in the sunshine all day. They sat there in the sunshine the next day too, and they opened them up and dumped them all in the river and went and filled them up with fresh eggs. Well, what happened to the king salmon on the river? Kind of a no-brainer. Of course that isn't the only king salmon on the Stikine River by any means.

One respondent reiterated that both eggs and fry should be put back into Andrew Creek to replenish those that were taken. Wet incubation was recommended by one respondent as a means of returning fish to the Andrew system without changing the genetics of the stock: just "enhancing" it. He explained that the natural mortality rate can be lowered by removing eggs, incubating them in captivity, and returning them to

49. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
50. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.

the stream. The respondent believed that this should have been occurring for years on Andrew Creek, and he did not completely understand the controversy that prevents this from taking place.

The same respondent who promoted wet incubation of Andrew's stocks also encouraged commercial fisheries to take a leading role in stream rehabilitation. He said that for many years it was the logging industry that supported stream enhancement projects and that this is still often the case. He suggested that SSRAA should move beyond hatchery operations to support native stocks through stream restoration and enhancement.

Wrangell respondents frequently reported catching Anita Bay Chinook salmon, and this is presumably because of the community's relative proximity to the bay, compared to Petersburg. One of these respondents indicated that Anita Bay-released fish have high survivorship for hatchery fish, and that these releases have been a great asset for the commercial fleet and sport fishermen. Two other respondents indicated, however, that before the hatchery began releasing fish at Anita Bay, they released fish at Earl West Cove, an area accessible by road on the eastern side of Wrangell Island. These residents felt that the original location was better for local residents, and they urged that the hatchery consider releasing at this site again in the future. One of these individuals described a feeling of loss when release at Earl West Cove ceased:

> When they quit releasing fish back there, it was just a few years after that, to where there was no fish coming back there anymore. And the fishing just went down out here; I mean in the number of fish being caught….But people would go out there with sport rods and catch whatever you wanted to eat or put in the freezer.

The second respondent expressed concern that many Anita Bay fish were following Stikine River Chinook salmon into the river and that escapement counts of native fish were skewed because of this. He also indicated that fish returning to the Earl West Cove location seemed to be bigger than those that returned to the Anita Bay release site. He attributed the change in release sites to commercial pressure and stressed that it has not benefited sport fishermen in the community. He also noted that Anita Bay fish occurred less frequently near the community than those at Earl West Cove. The Crystal Lake Hatchery website acknowledges that few Anita Bay fish are harvested by recreational anglers[51].

According to a SSRAA representative, there were several reasons that Anita Bay was eventually chosen over Earl West Cove[52]. Earl West Cove was just one site available to SSRAA when they assumed management of the Burnett Inlet Hatchery, but Anita Bay was determined to be better for net pens. Perhaps more importantly, Earl West Cove did not have the standard characteristics of classic release sites and terminal harvest areas, especially natural boundaries that help to define the special harvest areas. The decision was also made in part based on fishers' concerns pertaining to the special harvest area boundaries and on SSRAA staff concerns with salmon rearing. Furthermore, the survival of chum salmon released at Anita Bay has been better over time than for those that were released at Earl West Cove.

One respondent also noted that the size of Anita Bay Chinook salmon seemed to be smaller in recent years than in the past. He said that a 4–5 year old fish now weighs 10–15 lb, but before, about 4 or 5 years ago, a fish this age would be 20–25 lb. In 2008 he turned in a tag report for a 5-year old fish weighing less than 15 lb, and it was indeed from a release at Anita Bay by the Crystal Lake Hatchery.

The size and migratory routes of returning hatchery fish were mentioned by several respondents as being related to food availability and water temperatures in the open ocean. One respondent mentioned that the timing of runs is often based on the availability of fresh water —limited rainfall can result in later runs— and added, "It takes a certain amount of fresh water to get salmon moving." Another respondent stated that too little is known about where Chinook salmon are going at sea and what conditions they encounter. He recommended increased research to ascertain these important aspects of life history. A third respondent was concerned that hatchery fish are competing for the same food resources as the native fish, and he wanted to know more about the effect that this competition has on spawners destined for the Stikine River.

51. SSRAA, 2014, "Crystal Lake," Accessed December 9, 2014. www.ssraa.org/crystal_lake.htm
52. John Burke, General Manager, SSRAA, personal communication, November 5, 2014.

Marine mammals were considered by some respondents to be problematic when it comes to hatchery activities. One respondent described that sea lions were establishing rookeries and haulouts in proximity to the hatchery so that they can have easy access to returning salmon. Another respondent indicated that whales were problematic during release events, were cued into the sounds of the equipment, and congregated to feed on the fry. He mentioned that this occurred regularly during the release at Hidden Falls near Mitkof Island. More information about marine mammal observations recorded in this study is included in the "Predation and Prey" section of this report.

Several recent events have affected hatchery operations at Crystal Lake. Approximately 1,100 hatchery king salmon died in Blind River Rapids in July 2013 due to warm water temperatures, low oxygen levels, and low tides. The expected return was 1,800 adults, and the low survival caused the hatchery not to meet its broodstock requirements. Broodstock needs were not met in the prior four years either, and the situation forced the hatchery to rely on broodstock from other operations in Southeast[53]. Die-offs of this nature occurred in six years over the past three decades, including 1,400 fish in 1989. In all years that broodstock needs were not met by Blind Slough returns, additional Andrew Creek broodstock was obtained from the Macaulay Salmon hatchery and Hidden Falls Hatchery. As mentioned, these other hatcheries also developed their original stock from Andrew Creek Chinook salmon. Each of these three facilities are permitted as alternate hatchery egg sources when broodstock needs are not met[54].

On March 4, 2014, the Crystal Lake Hatchery experienced a fire that destroyed 40% of the hatchery's Chinook salmon eggs and the loss of approximately $700,000 in potential catch[55]. The building was deemed a total loss, but luckily, a portion of the Chinook salmon were outside at the time of the fire. Of the fish that were lost, most were Chickamin River stocks destined for release at Neets Bay in 2015. There were not expected to be long-term effects on Chinook salmon production, but in the short term, fish were not released at the new experimental release site at City Creek site in 2015. According to a SSRAA representative, there will also be a small 2015 shortage on Andrew Creek stock destined for the Anita Bay release[56]. The egg collection goal was met, however, in 2014 at Crystal Lake, and those eggs were temporarily housed at the Whitman Lake Hatchery. The fry were returned to Crystal Lake in the spring, and all scheduled release goals for 2016 were expected to be met in their entirety.

Other hatcheries in Southeast were also mentioned frequently by respondents in this study. Two respondents noted that hatchery Chinook salmon returning to the Neck Lake area of eastern Prince of Wales Island are "pretty important" for Wrangell fishermen, but that subsistence users have yet to substantially utilize that run. When asked about hatchery tag reports on harvested salmon, some residents indicated that they regularly caught fish originating at Burnett Inlet or Neck Lake. One respondent noted that he has received tag reports indicating that some of his harvested fish originated in Canada, south of the Alaska border.

## Mining Development (Canada)

Mining development on the Canadian side of the Stikine River was a major concern mentioned by several respondents in this study, especially as it pertained to two larger open-pit mines that have been proposed. Much of the concern pertained to mine tailings that can submerge salmon spawning habitat and eggs in silt and introduce toxic chemicals into the freshwater systems[57].

Commercial mining activities are not new to the Stikine River, but according to one respondent, it is the size and extent of modern mines, including their tailings, that raised public concern. Following the Klondike

53. Joe Viechnicki. 2013. "Warm weather kills hatchery Chinook near Petersburg." Alaska Public Media. Accessed December 9, 2014. www.alaskapubic.org/2013/07/24/warm-weather-kills-hatchery-chinook-near-petersburg/
54. Lorraine Vercessi, ADF&G Fishery Biologist and Assistant Coordinator of the Private Nonprofit (PNP) Hatchery Program, personal communication, November 17, 2014.
55. Matthew F. Smith, 2014, "Petersburg Hatchery Fire Destroys more than 700k Chinook Eggs," KTUU, Accessed December 9, 2014. www.ktuu.com/news/news/petersburg-hatchery-fire-destroys-more-than-a-million-coho-eggs/24801616
56. John Burke, General Manager, SSRAA, personal communication, November 5, 2014.
57. Pat Forgey, 2014, "Mine waste spill in Canada puts Southeast Alaska fishermen on edge," Alaska Dispatch News, Accessed December 9, 2014. http://www.adn.com/article/20140808/mine-waste-spill-canada-puts-southeast-alaska-fishermen-edge

Gold Rush, thousands of mines were developed along the Stikine River and nearby drainages (Scannell 2012). Most of these were subsequently abandoned, and many sites have never been documented (Scannell 2012). Two larger mines in the Iskut River drainage, the Snip Mine and Johnny Mountain mine, were closed and have been reclaimed since the 1980s (Scannell 2012).

There are currently four major proposed mine projects in the Stikine-Iskut drainages (Galore Creek, Schaft Creek, Red Chris, and Arctic Anthracite) as well as three major exploration projects—Trek, Rock and Roll, and Bronson Slope (Scannell 2012). The proposed Galore Creek Project would be located between the Stikine River, Iskut River, and British Columbia's Highway 37 (Scannell 2012). This project estimates production of 5.9 billion pounds of copper, 3.7 million ounces of gold, and 40 million ounces of silver from an open-pit mine over its 20-year lifespan (Scannell 2012). Galore Creek flows into the Scud River, which flows into the Stikine River (Scannell 2012).

**ESTUARIES**

filter sediment and pollutants from freshwater before it enters the ocean. They also function as transitional waters for anadromous fish [such as Chinook salmon] adapting to either saltwater or freshwater during their migration.

(Baker et al 2011rev.)

The Schaft Creek Project would be located 60km south of Telegraph Creek. Schaft Creek itself drains into Mess Creek and then into the Stikine River (Scannell 2012). This is described as an open-pit mine that would encompass 4.9km$^2$ and extend 330m below the current elevation of the site (Scannell 2012). It is proposed as a polymetallic mine (copper, gold, silver, molybdenum) that will produce 812 tons of tailings over its 23 year lifespan (Scannell 2012).

The Red Chris Mine was permitted for construction on May 7, 2012 and will be an open-pit mine that is expected to produce 30,000 tons of ore per day over its 28 year lifespan[58]. This would be a copper and gold mine located 80km south of Dease Lake and near a tributary of the Iskut River. This project has been among the most controversial in the region, particularly after the Mount Polley Mine holding ponds in southcentral British Columbia were breached on August 4, 2014, releasing 17 million cubic meters of water and 8 million cubic meters of tailings and other materials into Polley Lake and Quesnal Lake[59]. Imperial Metals owns both Red Chris and Mount Polley mines.

The breach at Mount Polley prompted a group of Tahltan elders known as the Klabona Keepers to establish a blockade at the Red Chris mine site in August 2014[60]. The blockade was lifted after an agreement was signed between the Tahltan Central Council and Imperial Metals to have an independent engineering firm review the plans for the Red Chris tailings facility[61]. The review was conducted by Klohn Crippen Berger, and the report offered 22 recommended changes to the plan, adding that "any failure to the Red Chris Impoundment will likely have a much more significant environmental impact than the Mount Polley failure"[62]. While the

58. Northern Development Initiative Trust, 2014, "Red Chris Gold/Copper Mine," Invest in Northwest British Columbia, Canada, Accessed December 9, 2014. http://investnorthwestbc.ca/major-projects-and-investment-opportunities/map-view/red-chris-mine/red-chris-mine-development

59. British Columbia Government, 2014, "Mount Polley Mine Tailings Pond Breach, Likely, August 4, 2014," Accessed December 2012. http://www.env.gov.bc.ca/eemp/incidents/2014/mount-polley/

60. The Canadian Press, 2014, "Imperial Metals granted temporary injunction to remove Red Chris mine blockade," The Vancouver Sun, Accessed December 2012. http://www.vancouversun.com/business/Imperial+Metals+granted+temporary+injunction+remove+Chris+mine/10276569/story.html

61. The Canadian Press, 2014, "Imperial Metals granted temporary injunction to remove Red Chris mine blockade," The Vancouver Sun, Accessed December 9, 2012. http://www.vancouversun.com/business/Imperial+Metals+granted+temporary+injunction+remove+Chris+mine/10276569/story.html

62. Gordon Hoekstra, 2014, "Third-party review of Red Chris mine tailings dam design finds concern," The Vancouver Sun, Accessed December 10, 2014. http://www.vancouversun.com/technology/Third+party+review+Chris+mine+tailings+design+finds+concerns/10392164/story.html

Mount Polley tailings were considered relatively benign, Red Chris tailings are considered acidic with the ability to leach potentially toxic metals into the environment[63]. Another agreement was signed between the Tahltan Central Council and Imperial Metals on August 21, 2014 to ensure that all recommendations from the review will be implemented.

A fourth proposed mine, the Arctos Anthracite Project (previously named Mount Klappan Coal), would be an open-pit project located on the edge of the Spatsizi Provincial Park and has been described as "one of the world's largest undeveloped resources of anthracite coal" (Scannell 2012). The coal mine is a joint venture between Fortune Minerals Limited and South Korean steelmaker POSCO and is expected to produce 3 million tons of anthracite coal annually over its 25 year lifespan[64]. This is also among the most controversial mines in the region because it is located in an area known to the Tahltan First Nation as the "Sacred Headwaters." On June 26, 2014 the Tahltan Central Council announced its intention to pursue an Aboriginal title and rights claim against the Province of British Columbia and Fortune Minerals Limited in opposition to the mining project[65].

Four respondents in this study offered their perceptions and concerns with mining activities in the Stikine-Iskut drainages of Canada; all were negative. In addition, representatives of the Wrangell Cooperative Association stated during the project's scoping meeting that the tribe is also extremely concerned about Canada's mining activities and that they have been coordinating efforts with the Tahltan Central Council to address these issues.

One key respondent explained that he considers Canada's mining operations to be among the greatest concerns facing Chinook salmon at this time. He indicated that if the open-pit mines are allowed to proceed, all research on other stressors to the Stikine River Chinook salmon stock are warrantless. He also explained that, in his view, government oversight of the operations is less stringent in Canada. Following the breach of the Mount Polley Mine, the issue of oversight and increased scrutiny of Canada's mines in transboundary systems became a prominent political issue throughout Alaska[66].

A second respondent noted that Canada's mining activity has been a prominent topic of discussion at the federal Southeast Regional Advisory Council meetings. He was personally concerned with the pollution from tailings and the construction of roads, adding that "It will all flow right into the Stikine, and then it's going to end up right out here in front of town. I'm concerned about it." Another respondent reiterated her concern for the salmon fisheries but also explained that she feels that local residents on the United States side of the border have very little influence on upriver activities:

> It's really scary for me because it seems as though we value the Stikine for its wilderness qualities and its tremendous habitat for fish. I feel like that's what it is for us as a resource, this incubator for salmon primarily, but also a host of other species. And then its wilderness quality. Unfortunately, Canada's agenda is almost opposite of ours, even though we share this resource. We are pulling at this river from completely different directions. It seems to me, and maybe I'm just short-sighted and I don't understand it all, but it seems to me that Canada runs the show and does whatever it wants with the Stikine and its fishery resources. We just kind of go, "Okay, we don't really like that." We seem kind of powerless.

63. Gordon Hoekstra, 2014, "Third-party review of Red Chris mine tailings dam design finds concern," The Vancouver Sun, Accessed December 10, 2014. http://www.vancouversun.com/technology/Third+party+review+Chris+mine+tailings+design+finds+concerns/10392164/story.html

64. Tahltan Central Council, 2013, Tahltan Nation opposes fast tracking of coal mine in Sacred Headwaters, Tahltan Central Council News, Accessed December 10, 2014. http://www.tahltan.org/news/tahltan-nation-opposes-fast-tracking-coal-mine-sacred-headwaters

65. Tahltan Central Council, 2014, Tahltan Nation prepare Aboriginal title case against Arctos Anthracite Coal Mine, Tahltan Central Council News, Accessed December 10, 2014.http://www.tahltan.org/press-coverage/tahltan-nation-prepare-aboriginal-title-case-against-arctos-anthracite-coal-mine

66. Pat Forgey, 2014, "Following B,C, disaster, Alaskans seek tougher review of Canadian mines," Alaska Dispatch News, Accessed December 10, 2014. http://www.adn.com/article/20140813/following-bc-disaster-alaskans-seek-tougher-review-canadian-mines

## Fishery Regulations

### *Alaska Regulations*

The attitudes of respondents in this study toward ADF&G and its management of salmon fisheries over time were generally positive, though some respondents did offer concerns and recommendations for improvement. As one respondent indicated, many local residents recognize that ADF&G is charged with implementing and enforcing the decisions of the Board of Fisheries, and that limited funding often prevents adequate research and enforcement. He noted that given these constraints, ADF&G has done the best that it could to manage local salmon populations. Another respondent concurred with this assessment by stating, "I think the state has been a pretty good steward of the salmon."

A frequently mentioned concern with the management of local fisheries was that local knowledge and fisheries experience is too frequently ignored and often trumped by institutional knowledge of fishery management. Some respondents noted that science and book-learning is important, but that local knowledge and experience needs to be included more often in management decision-making. As one respondent described the situation:

> Academics have a place, but the biggest problem is that academics don't listen. We call it academic ignorance. "I'm a college grad and I know what I'm doing; it says in the book." Well those of us that have been roaming around in this country for god knows how long know that it is not in the book…Up and coming biologists need to pay attention and listen to those who are actually doing it [fishing].

Another respondent indicated that fishermen are infrequently approached by ADF&G employees for information. He noted that he has never had a biologist talk to him at the dock, and he has been fishing locally for 35 years. The only time that someone has approached his boat for information has been during the local derby.

A point emphasized by respondents on this topic was that fisheries observations and management in other areas and for other species were not necessarily congruent with the state of salmon fisheries in the Stikine River region. It seemed that respondents preferred a hybridized management style that would integrate academic fisheries knowledge with local knowledge and provide coequal credibility to both. One respondent noted that fisheries managers were often too young and nonlocal. He recommended that fisheries managers experience at least 4 years on a fishing vessel before they become employed by ADF&G.

Some respondents mentioned concerns that formulas used by ADF&G to estimate harvest are frequently skewed due to illegal harvest and under-reporting. Illegal harvest was thought by some to occur regularly as a result of limited funds for enforcement and research. The lack of funding was thought by one respondent to be among "the biggest downfalls of Alaska's fishery management." This respondent also acknowledged that it is easy to be an "armchair quarterback" but that the reality of managing fisheries is a complicated and often convoluted task.

Many respondents in this study mentioned concern for the amount of bycatch that trawlers are allowed to have at sea, and they think that Alaska should be more involved in limiting incidental harvest of Chinook salmon by the trawling fleet. One respondent believed that trawlers frequently target Chinook salmon even though they report them as incidental catch. This respondent added, "Everyone is trying to make a living, but those guys out there are scooping all of the gravy before it gets inside the gulf to our shores." A second respondent indicated that he would like to see more frequent and in-depth reporting of annual trawling bycatch in publications made available to local people. He also would like to see additional efforts to conduct scale analysis of the high-sea fisheries to determine the origins of harvested fish. This analysis was recommended by other respondents as well.

The issue of targeting species and reporting the harvest of these as "incidental catch" was mentioned by one respondent as a problem that also occurs in local waters. He explained that in 2013, ADF&G opened an area near Wrangell to sockeye salmon fishing during a period when most local folks knew there were

limited sockeye salmon in the area. He went on to explain that fishermen took advantage of the opening but knowing that sockeye salmon were unlikely to be substantially harvested, they targeted Chinook salmon but reported them as incidental catch.

While many respondents noted concern about the quantity of fish harvested at sea and the limited scientific data pertaining to salmon in the Pacific Ocean, many respondents also acknowledged concern for fish returning to their spawning streams. One respondent explained that it takes a great deal of effort and luck for a salmon to survive in the ocean, and that the few that return to their spawning systems are then faced with escaping commercial, sport, and subsistence fisheries at the end of their journey. This individual suggested that when there is concern for the conservation of a species that has experienced substantial declines, all fishing activities should cease regardless of the user group. This sentiment was not entirely shared by some respondents who emphasized the critical role that salmon fisheries play in meeting the economic and subsistence needs of human communities.

Another frequently mentioned management concern is the requirement to throw back fish that are caught incidentally or in excess of harvest limits under sport regulations. The concern was usually related to waste as it applies to fish that were injured or killed during harvest activities. Respondents seemed to realize that removing those restrictions would allow for intentional over-harvest, but many of their concerns pertained to a limit of one Chinook salmon during the salmon derbies. More information on this issue can be found in the "Wrangell and Petersburg Derbies" section of this report.

The timing and location of salmon openings for the commercial gillnet and troll fisheries was a topic of concern mentioned by two respondents in this study. One of these respondents noted that trolling and gillnetting should not be opened at the same time in the same area. He said that he, like many local trollers, are frequently choked out by the gillnetters. The respondent explained that many gillnetters will set their nets in the middle of a drag, and that some will even watch for troller success before deciding where to use their nets. He said that many fishermen end up having to head home because of this. The respondent noted that he does not bear animosity toward those who gillnet, but he would like for ADF&G to provide for separate times, areas, or both for the two gear types.

### *Federal Regulations and Treaties*

The balance between national interest in and protection of the fisheries in Southeast Alaska and the interests and needs of local fishers has long been a delicate one. Before statehood, the federal government acknowledged the interests of private fishing, whaling interests, and canneries[67]. Multiple federal laws and treaties of the 20th century have sought to protect the resources and wildlife of Alaska, in ways that may ensure the sustainability of its fisheries. The Marine Mammal Protection Act of 1972 (MMPA), the Endangered Species Act of 1973 (ESA), the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), and the Pacific Salmon Treaty of 1985 (PST) have all impacted Chinook salmon and those that harvest them.

The Pacific Salmon Treaty was inspired by concerns regarding allocations in the face of declining salmon abundance. The difficulty of accurately tracking salmon required the establishment of formulas to determine allocations of limited salmon stocks, necessitating a long and contentious deliberation between communities, regions, and two nations faced with different restrictions. After a century of debate over interceptions of native salmon stocks by fishermen of the neighboring country, the Pacific Salmon Treaty was ratified in 1985.

The Treaty's Annex IV is adapted regularly by the Pacific Salmon Commission, while the DFO and ADF&G work to manage their respective fisheries under the yearly preseason estimates and inseason escapement numbers according to formulas and allocations laid out by the Annex. Respondents, however, continue to have concerns over adequate and fair management of the stocks in question. One respondent, involved with the treaty commission until 1995, spoke of the process:

67. Alaska Humanities Forum, 2017, "Alaska History and Cultural Studies: 1873–1900 Developing Southeast Alaska," Accessed February 2017. http://www.akhistorycourse.org/articles/article.php?artID=71

> The annexes are subject to negotiations based on guideline harvest levels. These are based on escapement…we don't have a directed gillnet fishery in the terminal area every year, because the escapement goals don't meet the requirement… [A directed gillnet fishery] has happened about three times in the last ten years.

As laid out in the regulations introduction section of this report, the U.S. subsistence fishery may harvest 125 Chinook per year on the Stikine River, while the Canadian First Nations subsistence fishery may harvest 2,000 on the river. One respondent expressed concern over restrictions on subsistence use:

> If our elders were fishing there why should we have to wait for paperwork? This is Alaska. This is a Native place. They have been fishing all over without rules and regulations. They didn't overfish the stocks or run them out—like they had on the radio about fish traps and all that. That was because the companies wanted to fish, and they are the ones that destroyed the runs around here. They wiped out the stocks. It wasn't the Native subsistence. It was the folks from down south that came up and wanted our fish. They wiped out everything…I'd like to see it all open like it was before.

Another respondent met with tribal elders during the formation of the salmon commission:

> Petersburg was a tough sell for the treaty guys. You come into town with change and you're a dead man. The old timers were still alive then. Especially the troll fleet because the troll fleet took a tremendous hit from the treaty. But so did the gillnet and the seiners too, because they have always caught king salmon more as incidental catch.

The respondent spoke of the interceptions that were occurring, and of working with multiple tribes:

> The confederated tribes in Oregon and Washington and the Tahltans on the Stikine and the Taku as well as the Lumni in B.C. wanted to shut down completely, so we took a hit to preserve the Columbia all the way down to the north Oregon coast to Coos Bay. Once in a great while we would pick up a California tagged fish in our southern borders but not very often. But we did get a lot of Columbia River fish. The biggest problem was WCVI [West Coast Vancouver Island], they call them the Prairies out there. It goes nearly a hundred miles out and forty fathoms and has a real gentle slope. Those guys were out there whipping up that water to a froth. We'd send them south, and the Canadians were getting them on the Prairie, and what they didn't get the Indians were getting on the river.

This respondent served as a mediator to the commission for ADF&G and the confederated tribes during treaty negotiations and recalled several issues that held up decisions:

> Of course Petersburg didn't buy it because they had to take cuts in the king salmon fishery. They had to have closures. We had hatcheries all through Southeast that were producing king salmon, and they had negotiated how we were allowed to fish the fish that we produced and paid for. So they came up with a formula for that…We wanted an inseason mechanism to account for changes, and you know it could work both ways. They came up with all these fancy projections. And they would say this is how many fish you are going to get coming down the coast and you are allowed this many, and on several of those years we had four day seasons because there were so many king salmon coming down…We caught the number we were allowed in four days. The rest of the year we had to shake off this big beautiful salmon.

The respondent also said that the troll fleet could at least target other species, but that it was impossible to avoid catching some Chinook, which in a year of abundance would be better to keep than to throw back and have a low chance of survival. Additionally, the respondent spoke of the convoluted nature of the management process post-treaty, given Alaska hatchery fish, obstacles blocking the upper Stikine River, and the multiple management systems in which each river has a manager who determines projections for each species, which then determines the openings for that year.

Many of the respondents expressed concern that the PST made too many compromises for their communities to continue a viable fishery. One mentioned the complicated compromises involved in the treaty:

> It has nothing to do with this river. We're trading stuff on the Stikine here for stuff that happens down at Tree Point, and that is being done because of something back on the east coast.

Another respondent summed up his feelings about the treaty in this way:

> The worst thing they could have ever done was sign that damn treaty. Boy, that kills us bad. That hurt.

Several respondents expressed concerns that despite the Pacific Salmon Commission's ostensible collective interest in salmon conservation and sustainable fishing, that Canadian and Alaskan interests are at odds. One respondent noted that the Treaty allows an inriver fishery for the Canadians, but argues that this way of dividing the salmon is unsustainable:

> I don't feel that an instream fishery, whatever country it is, is the right way to go. Once those fish have reached their home river, they should be free to do their thing.

While the treaty has made allocations between user groups more official and endeavors to manage multiple fisheries sustainably, respondents' comments indicate that management with greater adaptability to a fluctuating resource, greater transparency and communication of more reliable data, and evidence of more consistent enforcement across the whole habitat would be better for the species and thus better for the long-term interest of the fisheries. It seemed apparent throughout this study that efforts should be made to better inform local residents of the status of stocks, trends, and treaty negotiations on both sides of the border. Unfortunately the Tahltan First Nation declined to participate in this study due to the sensitivity of treaty negotiations, and thus the Canada perspective on the treaty is not represented here.

In addition to the PST, other federal laws have impacted Chinook salmon fishing in the Stikine region. The Endangered Species Act of 1973 (ESA) "provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend." Currently the species in Southeast Alaska that are listed include the Steller sea lion (endangered), sea otter (threatened), and killer and humpback whales (endangered); currently Chinook salmon are only listed for California and Washington waters[68]. In addition to the ESA, the Marine Mammal Protection Act of 1972 (MMPA) protects all marine mammals from hunting or harassment with several exceptions. As documented under Biological Observations in the Predation and Prey section earlier in this report, several respondents expressed concerns about the rise of seal, sea lion, otter, and humpback whale populations and their negative impact on fishing gear, salmon harvest, and salmon populations.

Though Alaska Natives in the region are permitted to hunt marine mammals, some respondents believe there has been a decline in their traditional use and harvest. Thus there is less and less pressure on a growing predator population.

As one respondent noted:

> There has been an increase in marine mammals living right out in front of the river… Twenty years ago we had guys that ate seal blubber a lot more and did something with the seal hides. There aren't very many people nowadays that are doing something like that.

As some respondents noted, understanding fully the intricate details of state, federal, and international laws and treaties is difficult. Not only are these difficult to understand in their multi-scale complexity, but it is often also difficult for local stakeholders to feel that they have a meaningful voice in the processes that determine their access to local resources. Despite the difficulty, many local residents have tried to influence government policy through participation on subsistence boards, local advisory councils, nonprofit organizations, tribes, and even through the courts. In one example, members of the Southeast Alaska

68. US Fish and Wildlife Service, "Environmental Conservation Online System," Accessed March 2016 http://ecos.fws.gov/tess_public/pub/SpeciesReport.do?groups=A&listingType=L&mapstatus=1

Regional Advisory Council for the federal Office of Subsistence Management have formally documented their concerns and forwarded their recommendations to those negotiating the Annex IV of the Pacific Salmon Treaty that will be finalized in 2018.

# 4. CONCLUSION

This study was successful in documenting observations of many sport, commercial, and subsistence fishers utilizing salmon fisheries in the Stikine River region of Alaska, especially as they pertain to Chinook salmon originating on the Stikine River and its tributaries. These observations ranged from topics pertaining to the life history and habitats of Chinook salmon to concerns with and perceptions of human use and management of this species over time. These data may be used alongside biological data to better understand factors that have influenced trends in the productivity and abundance of local Chinook salmon populations, as well as to document the concerns and perceptions of local stakeholder groups. The project has also elucidated additional questions and hypotheses for future research, including an expansion of local knowledge for all Pacific salmon species, increased data on the Bradfield River/Bradfield Canal fisheries over time, increased data on Chinook salmon life histories during the marine phase of this species, and increased data on local marine mammal populations and behavior.

The information reported here has substantially increased the availability of local and traditional knowledge (LTK) that can be used to enhance stock assessment programs for the Stikine River region. This knowledge was derived from local users of the resource, who have interacted with salmon in the region for decades, often depending on Chinook salmon as a critically important economic and subsistence species. The extent of time spent engaging in consumptive harvest and recreational activities in the Stikine River region provides these users with broad spatial and temporal information that may otherwise be unavailable to researchers and managers in the area. By documenting this knowledge, managers will not only be able to consider local observations, but also enable them to address the needs and concerns of area residents.

Among the ecological knowledge and perceptions offered by respondents in this study were several important themes as summarized here:

- Chinook salmon have been and are important components of the mixed cash and subsistence economies of Stikine River region communities.
- The overall trend in local Chinook salmon stocks has been downward over time but has fluctuated from decade to decade over the past century.
- Chinook salmon have been becoming smaller in size, and this seemingly aligns with fish size documented in the local Chinook salmon derbies.
- Chinook salmon migration patterns seem to have been changing, perhaps in relation to warming water temperatures.
- Marine mammals have had an increasingly negative impact on Chinook salmon as the size of local marine mammal populations increased.
- Breeding populations of Chinook salmon were once substantial in several tributaries of the U.S. portion of the Stikine River (particularly Andrew Creek) but are no longer seen in substantial numbers at these locations.
- The Stikine River delta is dynamic and sedimentation and erosion have caused significant changes to the area over the past century. Existing cabins are under constant threat of being washed away, historical fishing areas are no longer easily accessible, and navigation can be difficult and sometimes dangerous. Most respondents perceived these changes as natural. Recent major flooding events and earlier spring thaw events are, however, considered by some to be highly unusual.
- Several important concerns for Chinook salmon stocks and associated reasons for decline were also documented.
- Many respondents believe that commercial trawl fisheries in the Gulf of Alaska and Bering Sea/Aleutian Islands are detrimental to Chinook salmon because of excessive legal and suspected illegal bycatch. Some respondents believe this to be among the greatest pressures on Chinook salmon stocks.

- Many respondents are concerned about proposed and ongoing mining activity in proximity to the Canadian portion of the Stikine and Iskut rivers and their tributaries.
- Many respondents are concerned about perceived liberal bag limits, gear efficiency, and limited oversight of inriver commercial fisheries in the Canada portion of the Stikine River.
- Some respondents think that climate change and associated ocean acidification, warming, and changes in currents are affecting Chinook salmon migration patterns. They suggested that more scientific information is needed on Chinook salmon life history at sea.
- Several respondents note the historical importance of the Bradfield River/Bradfield Canal Chinook salmon fisheries and an apparent "decimation" of these stocks over time, presumably caused in part by overfishing and logging activities.
- Some respondents note that historical fishery practices and gear types were extremely detrimental to Chinook salmon, especially commercial fish traps prior to Alaska statehood.
- Respondents seemed to have mixed opinions toward local salmon hatchery programs. Of particular concern is a negative perception of historical and recent egg-take operations from Andrew Creek.
- Many respondents perceive a recent substantial increase in local marine mammals to have a very detrimental impact on Chinook salmon due to predation of both Chinook salmon and the species that Chinook salmon prey upon.
- Many respondents acknowledge that advances in gear efficiency have caused local commercial fisheries to have a greater impact on Chinook salmon over the past century.
- Several respondents note that significant local declines in herring and other small fish over the past century have been detrimental to Chinook salmon that feed on them.
- Some respondents believe that a portion of nonlocal sport fishers exceed harvest limits and sometimes sell their catch of Chinook salmon commercially.
- Most respondents support the inriver subsistence fishery on the U.S. portion of the Stikine River, provided that certain provisions are in place to ensure that salmon caught in nets are harvested and not wasted or preyed upon by marine mammals.
- While residents generally support local Chinook salmon derbies and acknowledge the economic and cultural importance of these, many believe that lower sport fishing bag limits have led to increased mortality of salmon caught and subsequently released in an effort to catch larger fish.

In addition, respondents offered several suggestions for research and management of Chinook salmon stocks:

- Several respondents indicated support for increased funding of studies to refine knowledge of Chinook salmon life history at sea.
- Several respondents indicated that while the Wrangell Chinook salmon derby is important to the local economy, it is among the longest in the state at nearly a month in duration. Some respondents indicated a willingness to consider shortening this duration to further protect local Chinook salmon stocks. In addition, some respondents indicated that lower bag limits are detrimental to Chinook salmon during the derbies and that this leads to increased catch-and-release mortality.
- Several respondents indicated that more research is necessary to better understand the decline of Bradfield River/Bradfield Canal Chinook salmon stocks over time and what can be done to restore these stocks in the future.
- Several respondents indicated that the Pacific Salmon Treaty failed to meet the needs and expectations of U.S. residents and some perceived the treaty as providing excessive concessions to Canada. Respondents noted that they would like a greater voice in future negotiations of the treaty.

- Some respondents indicated support for increased oversight and enforcement of sport fisheries, particularly nonresidents who participate in local Chinook salmon derbies and charter operations.
- Several respondents indicated that the Marine Mammal Protection Act is detrimental to Chinook salmon and ultimately to local communities. Many believe that the Act does not allow proper management of these stocks and that subsistence harvest, predator control measures, or both should be permitted by all residents regardless of race, particularly for harbor seals and Steller sea lions.
- Some respondents were both concerned and interested in the increasing number and migratory behavior (or lack thereof) of local humpback whales and squid. Several respondents suggested that more data are needed to understand these species locally, including their impact on Chinook salmon.
- Several respondents indicated that they would like to see a reduction in the amount of Chinook salmon commercial bycatch allowed in commercial trawling operations. They also indicated support for increased observer coverage of this fleet in the Gulf of Alaska.

In addition to documenting knowledge and perceptions of Chinook salmon stocks and associated management, this project has successfully archived an extensive oral history collected from resource users in the region. This critical historical and contemporary knowledge is consistently in jeopardy of being lost if it is not recorded and properly archived.

# ACKNOWLEDGMENTS

We are extremely grateful to the key respondents in both Wrangell and Petersburg that agreed to participate in this study and that provided such rich local and traditional knowledge of the subject matter. We are also thankful for the support of the Wrangell Cooperative Association and the Petersburg Indian Association for helping to make this project possible. Thanks also to our local research assistants Arthur Larson and Abbey Jackson, to Dustin Murray and Rosalie Grant for providing interview and transcription assistance, and to the U.S. Forest Service, Wrangell Ranger District for providing lodging, meeting space, and opportunities for public dissemination.

# REFERENCES CITED


ADF&G Chinook Salmon Research Team

2013 *Chinook salmon stock assessment and research plan, 2013*. Alaska Department of Fish and Game, Special Publication No. 13-01: Anchorage. http://www.adfg.alaska.gov/FedAidPDFs/SP13-01.pdf

Alaska Department of Fish and Game and Alaska Inter-Tribal Council

2000 *Recommendations for a Unified Subsistence Fisheries Harvest Monitoring Program*. Prepared by the Subsistence Fisheries Harvest Assessment Working Group for the Office of Subsistence Management, U.S. Fish and Wildlife Service: Anchorage. http://www.subsistence.adfg.state.ak.us/download/download/rusfhap.pdf

Alaska Geographic Society

1979 *The Stikine River*, v. 6, no. 4 book in the Alaska geographic. Alaska Geographic Society: Edmonds, Wash. ISBN 0-88240-133-5

Allen, B.M. and R.P. Agliss

2013 "*Harbor seal* (Phoca vitulina richardii)" [in] *Alaska marine mammal stock assessments, 2012*. U. S, Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-245: n.p. [Seattle]

2015 "*Steller sea lion* (Eumetopias jubatus)*: eastern U. S. stock*" [in] *Alaska marine mammal stock assessments, 2014*. U. S, Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-301: n.p. [Seattle]

Baker, L., K. Koski, D. Albert, and N. Cohen

2011rev. A Conservation Action Plan for Estuarine Ecosystems of Southeastern Alaska. The Nature Conservancy: n.p. [Juneau]. http://www.seakfhp.org/wp-content/uploads/2013/03/estuaries_cap_final_03_30_11.pdf

Bendock, T. and M. Alexandersdottir

1991 *Hook-and-release mortality in the Kenai River Chinook salmon fishery*. Alaska Department of Fish and Game Division of Sport Fish, Fishery Data Series No. 91-39: Anchorage

1993 *Hooking mortality of Chinook salmon released in the Kenai River, Alaska*. North American Journal of Fisheries Management 13(3), pages 540–549.

Bernard, D.R., S.A. McPherson, K.A. Pahlke, and P. Etherton

2000 *Optimal production of Chinook salmon from the Stikine River*. Alaska Department of Fish and Game, Fishery Manuscript No. 00-1: Anchorage. http://www.sf.adfg.state.ak.us/fedaidpdfs/Fms00-01.pdf

Calkins, D.G., D.C. Mallister, K.W. Pitcher, and G.W. Pendleton

1999 *Steller Sea Lion Status and Trend in Southeast Alaska: 1979–1997*. Marine Mammal Science 15(2), pages 462–477.

Clark, J.H., A. McGregor, R.D. Mecum, P. Krasnowski, and A.M. Carroll

2006 *The commercial salmon fishery in Alaska*. Alaska Fishery Research Bulletin 12(1), pages 1–146

Conrad, S. and D. Gray

2014 *Overview of the 2014 southeast Alaska and Yakutat commercial, personal use, and subsistence salmon fisheries*. Alaska Department of Fish and Game Division of Commercial Fisheries, Fishery Management Series Report No. 14-61: Anchorage. http://www.adfg.alaska.gov/FedAidPDFs/FMR14-61.pdf

Feldhamer, G.A., B.C. Thompson, and J.A. Chapman editors.

2003 *Wild mammals of North America: biology, management, and conservation*, 2nd edition. Johns Hopkins University Press: Baltimore, Md. ISBN 978-0-8018-7416-1

Gharrett, A.J., S.M. Shirley, and G.R. Tromble

1987 *Genetic Relationships among Populations of Alaskan Chinook Salmon* (Oncorhynchus tshawytscha). Canadian Journal of Fisheries and Aquatic Sciences 44(4), pages 765–774.

Gjernes, T., A.R. Kronlund, and T.J. Mulligan

1993 *Mortality of Chinook and coho salmon in their first year of ocean life following catch and release by anglers*. North American Journal of Fisheries Management 13(3), pages 524–539.

Guthrie, Charles. M., Nguyen, Hv. T. (Hanhvan T.), and Guyon, Jeffrey Robert
2016a *Genetic stock composition analysis of the Chinook salmon bycatch from the 2014 Bering Sea walleye pollock* (Gadus chalcogrammus) *trawl fishery.* (Accessed March 9, 2016)

2016b *Genetic stock composition analysis of the Chinook salmon bycatch samples from the 2014 Gulf of Alaska trawl fishery*. (Accessed March 9, 2016)

Hard, J.J., A.C. Wertheimer, and W.F. Johnson
1989 *Geographic Variation in the Occurrence of Red- and White-Fleshed Chinook Salmon* (Oncorhynchus tshawytscha) *in Western North America*. Canadian Journal of Fisheries and Aquatic Sciences 46(7), pages 1107–1113.

Johannes, M.R.S.
2011 *Pacific Salmon resources in northern British Columbia and Yukon transboundary rivers*. Pacific Fisheries Resource Conservation Council: Vancouver, BC

Lewis, B., W.S. Grant, R.E. Brenner, and T. Hamazaki
2015 *Changes in Size and Age of Chinook Salmon* Oncorhynchus tshawytscha *Returning to Alaska*. PLOS ONE 10(7), page e0132872.

Lough, M.J.
1980 *An overview survey of the Tahltan River and the status of Tahltan steelhead trout*. Skeena Fisheries Report No. 80—2, British Columbia Fish and Wildlife Branch: Skeena, BC. http://www.env.gov.bc.ca/skeena/fish/sk_series_reports/sk31.pdf

Moser, J.F.
1899 *The Salmon and Salmon Fisheries of Alaska: Report of the Operations of the United States Fish Commission Steamer Albatross for the Year Ending June 30, 1898*. Government Printing Office: Washington, D.C.

1902 *Alaska salmon investigations in 1900 and 1901*. Government Printing Office: Washington, D.C.

Pacific Salmon Commission
2014rev *[1985] Treaty between the government of Canada and the government of the United States of America concerning Pacific salmon*. : Vancouver, B.C. http://www.psc.org/pubs/Treaty/Treaty.pdf

1997 *Incidental Fishing Mortality of Chinook Salmon: Mortality Rates Applicable to Pacific Salmon Commission Fisheries*. Pacific Salmon Commission Joint Chinook Technical Committee, Tcchinook (97)-1: Vancouver, B.C. http://www.psc.org/download/35/chinook-technical-committee/2166/tcchinook97-1.pdf

Pahlke, K.A. and P. Etherton
1998 *Abundance of Chinook salmon on the Stikine River (previously published under the title "Chinook salmon research on the Stikine River, 1996")*. Alaska Department of Fish and Game, Fishery Data Series No. 97-37: Douglas. http://www.sf.adfg.state.ak.us/fedaidpdfs/Fds97-37.pdf

Paige, A.W., S. Churchill, N. Ratner, M. Turek, and P. Coiley-Kenner
2009 *Local knowledge, harvest patterns, and community uses of salmon in Wrangell, Alaska*. Alaska Department of Fish and Game, Division of Subsistence. http://www.adfg.alaska.gov/techpap/TP%20323.pdf (Accessed December 11, 2012)

Parker, R.R. and E.C. Black
1959 *Muscular Fatigue and Mortality in Troll-Caught Chinook Salmon* (Oncorhynchus tshawytscha). Journal of the Fisheries Research Board of Canada 16(1), pages 95–106.

Penn, J.R.
2001 *Rivers of the world: a social, geographical, and environmental sourcebook*. ABC-CLIO: Santa Barbara, Calif. ISBN 1-57607-579-6

Reid, G.R.
1971 *Age composition, weight, length, and sex of herring,* Clupea pallasii, *used for reduction in Alaska, 1929–66*. National Oceanic and Atmospheric Administration Technical Report NMFS SSRF 634: Seattle

Sauter, S.T., J. McMillan, and J. Dunham
2001 *Salmonid behavior and water temperature*. United States Environmental Protection Agency, Issue Paper 1 EPA-901-D-01-001: n.p.

Scannell, P.W.
2012 *Stikine River mining activity assessment*. Alaska Department of Fish and Game, Technical Report No. 10-06: Douglas

Skannes, P. and G. Hagerman
2014 *History of the Winter Salmon Troll Fishery in Southeast Alaska/Yakutat*. Alaska Department of Fish and Game, Fishery Management Report No. 14-38: Anchorage. http://www.adfg.alaska.gov/FedAidPDFs/FMR14-38.pdf

Skannes, P., G. Hagerman, and L. Shaul
2016 *Annual management report for the 2015 Southeast Alaska/Yakutat salmon troll fisheries*. Alaska Department of Fish and Game, Fishery Management Report No. 16-05: Anchorage

Starr, C., C.A. Evers, and L. Starr
2008 *Biology: concepts and applications without physiology*. ISBN 978-0-538-73925-2

Stevick, P., J. Allen, P. Clapham, N. Friday, S. Katona, F. Larsen, J. Lien, D. Mattila, P. Palsbøll, J. Sigurjónsson, T. Smith, N. Øien, and P. Hammond
2003 *North Atlantic humpback whale abundance and rate of increase four decades after protection from whaling*. Marine Ecology Progress Series 258, pages 263–273.

Straley, J.M.
1990 "*Fall and winter occurrence of humpback whales* (Megaptera novaeangliae) *in southeastern Alaska*" [in] P.S. Hammond, S.A. Mizroch, and G.P. Donovan, editors *Individual recognition of cetaceans: use of photo-identification and other techniques to estimate population parameters: incorporating the proceedings of the Symposium and Workshop on Individual Recognition and the Estimation of Cetacean Population Parameters*. International Whaling Commission: Cambridge.

Tahltan Fisheries Program
2015 *Tahltan fisheries: post season newsletter*. Tahltan Band Council: Telegraph Creek, B. C. http://www.tahltan.ca/wp-content/uploads/2015/05/Final-TF-newsletter-March-2015.pdf

Thornton, T.F., V. Butler, F. Funk, M. Moss, J. Hebert, and T. Elder
2010 *Herring synthesis: documenting and modeling herring spawning areas within socio-ecological systems over time in the southeastern Gulf of Alaska*. North Pacific Research Board, Final Report: Project No. 728: n.p. http://herringsynthesis.research.pdx.edu/final_docs/HerringSynthesisFINAL102710.pdf

Wertheimer, A.
1988 *Hooking mortality of Chinook salmon released by commercial trollers*. North American Journal of Fisheries Management 8(3), pages 346–355.

# APPENDIX A:
# MAPS

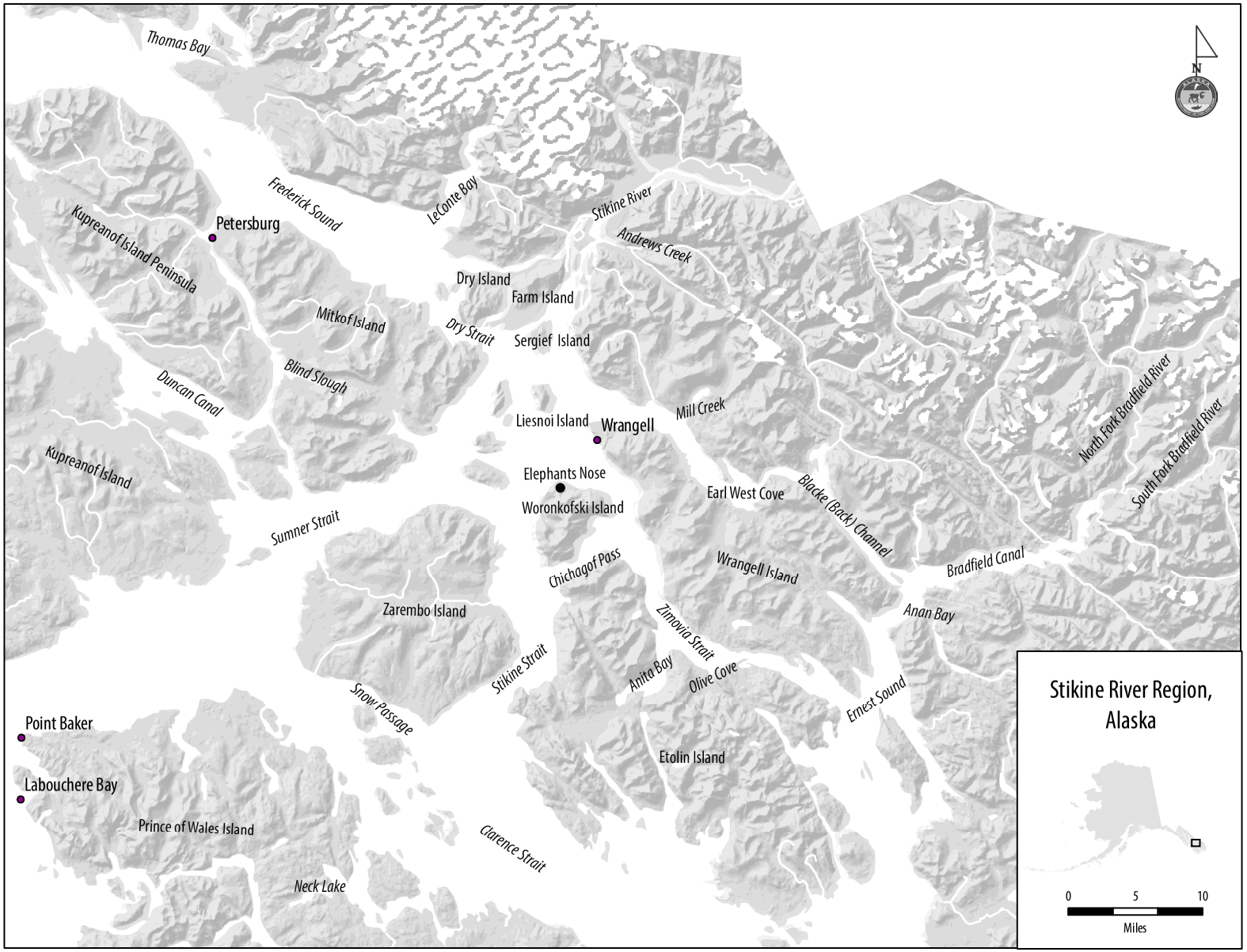



*Figure A-1.–Stikine River Region, Alaska.*

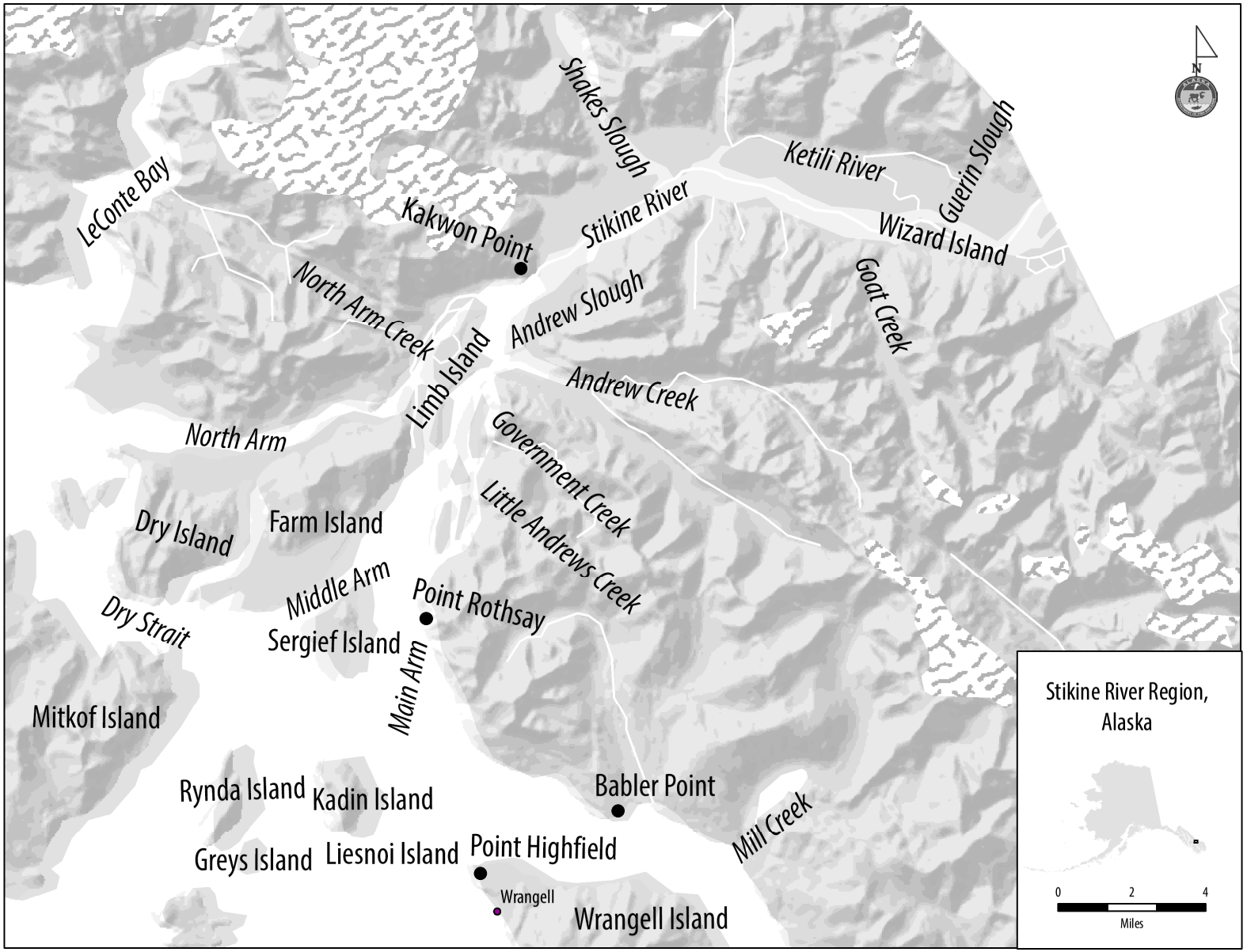



*Figure A-2.–Stikine River mouth, Alaska.*

*Figure A-3.–Stikine River watershed, Alaska & Canada.*

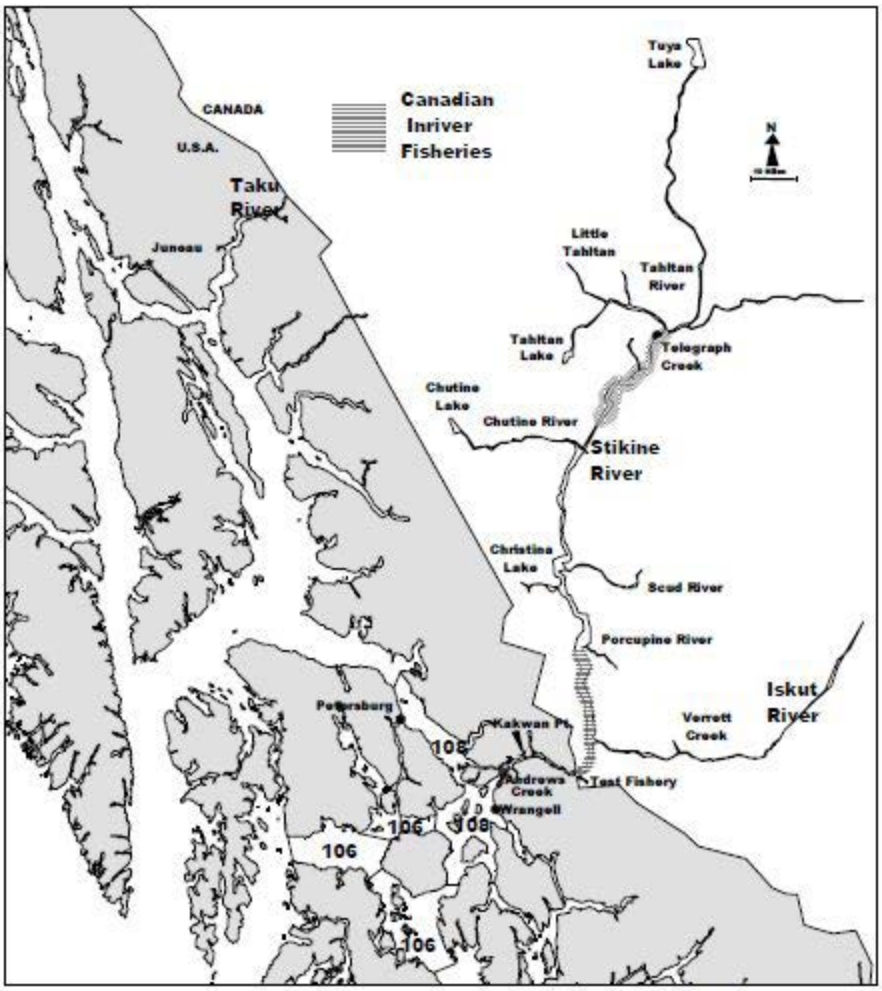



*Figure A-4.–Stikine River Federal subsistence salmon fishing boundaries (Larson 2013), copied with permission.*

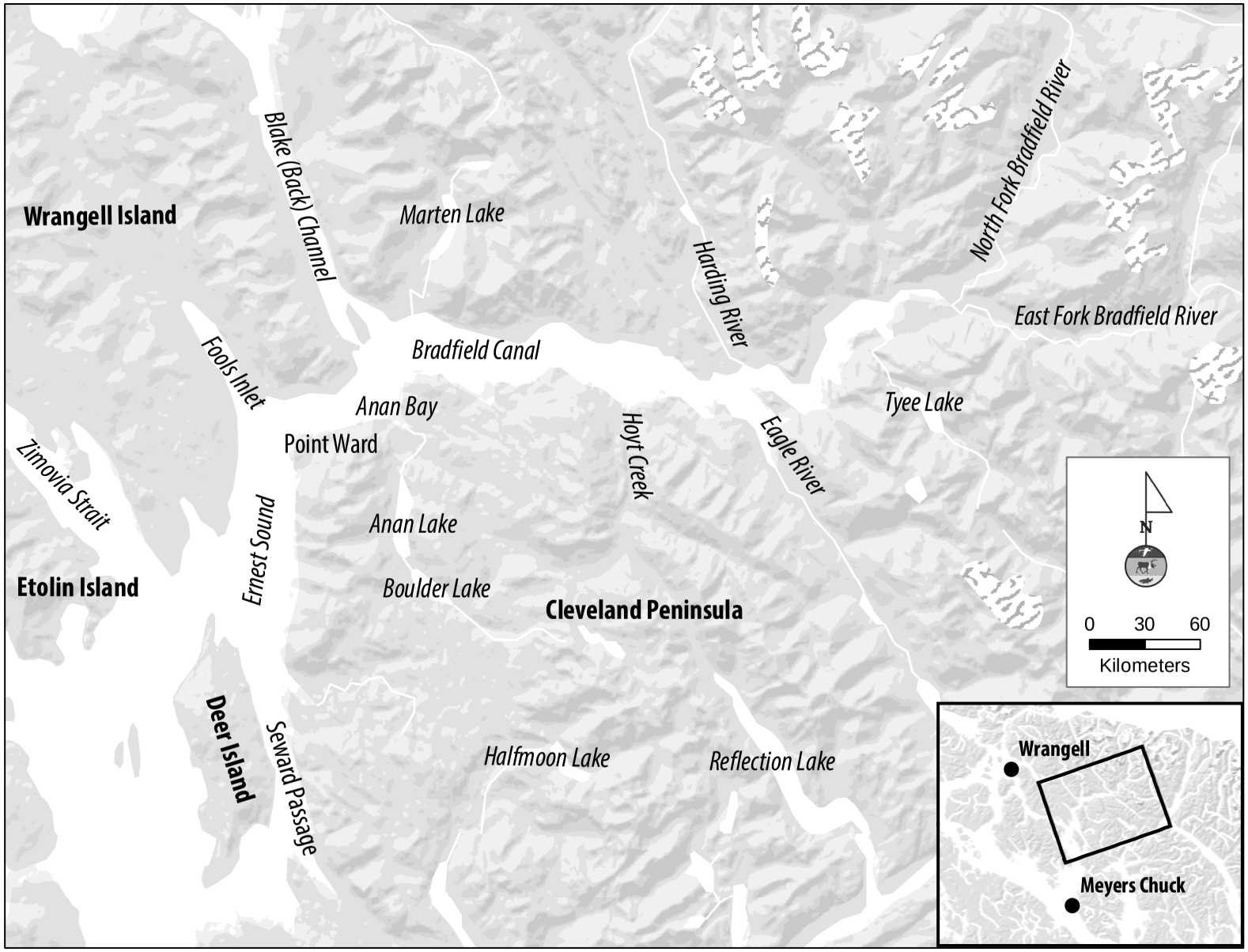



*Figure A-5.–Bradfield Canal area, Alaska.*

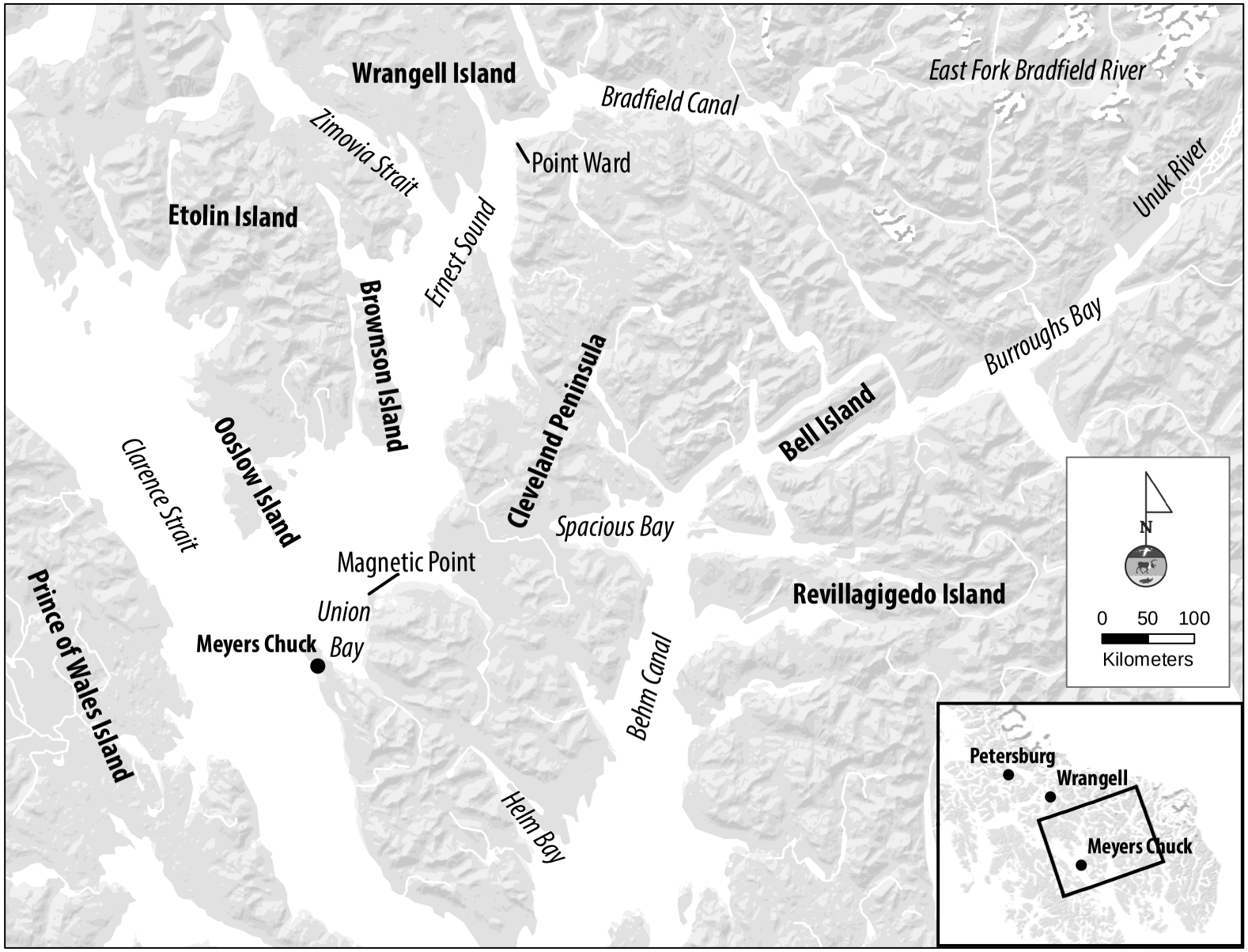



*Figure A-6.–Meyers Chuck area, Alaska*

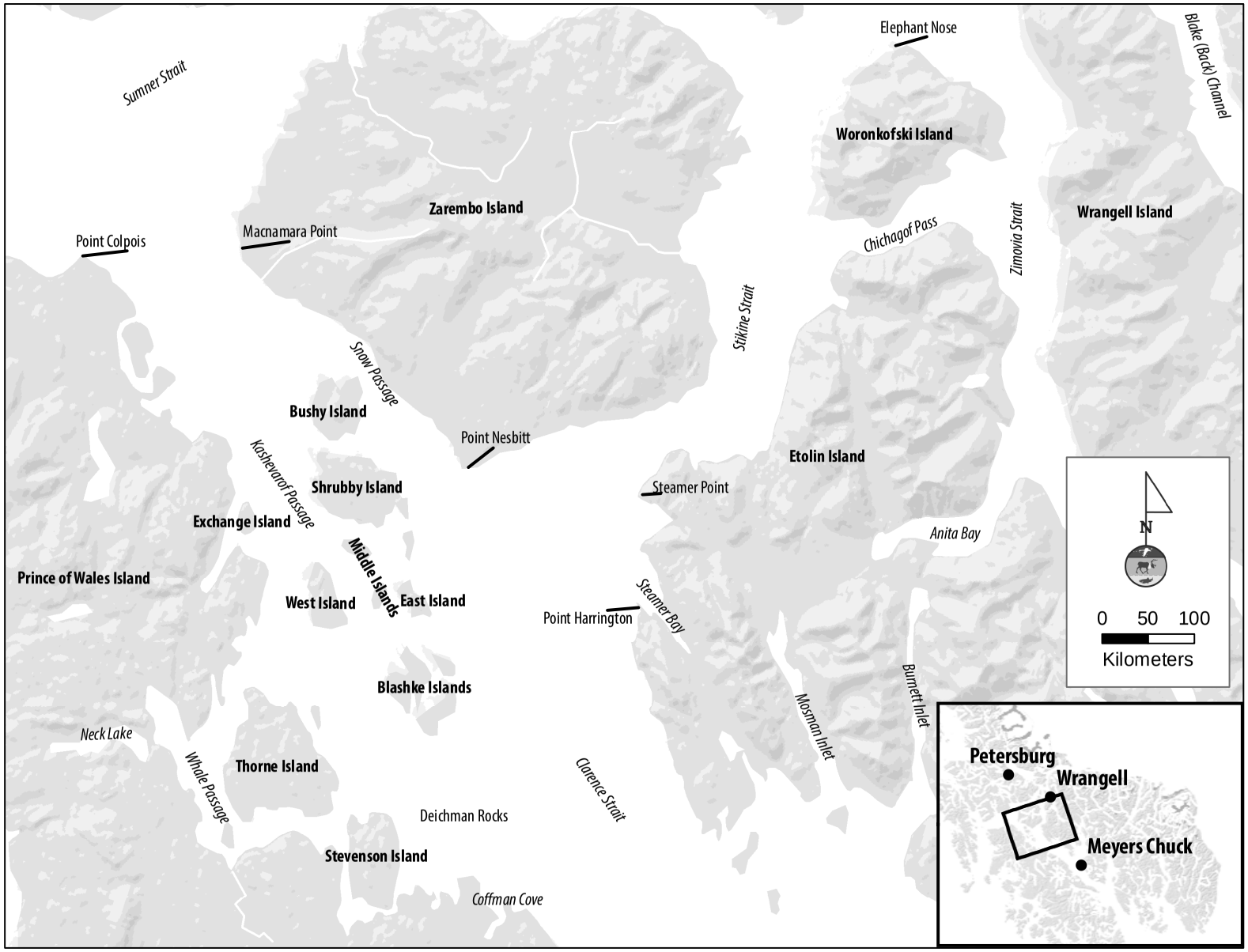



*Figure A-7.–Zarembo Island area, Alaska.*

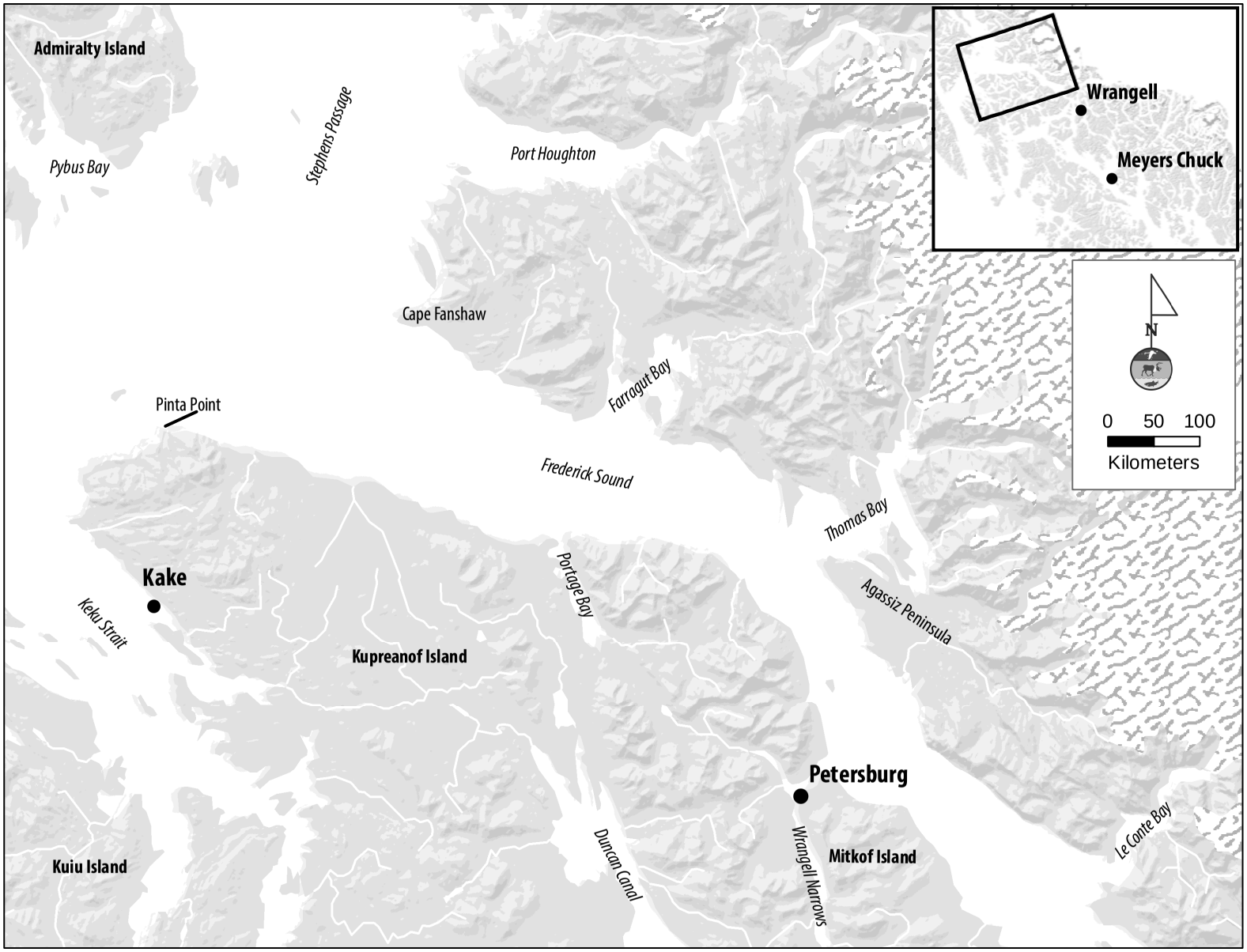
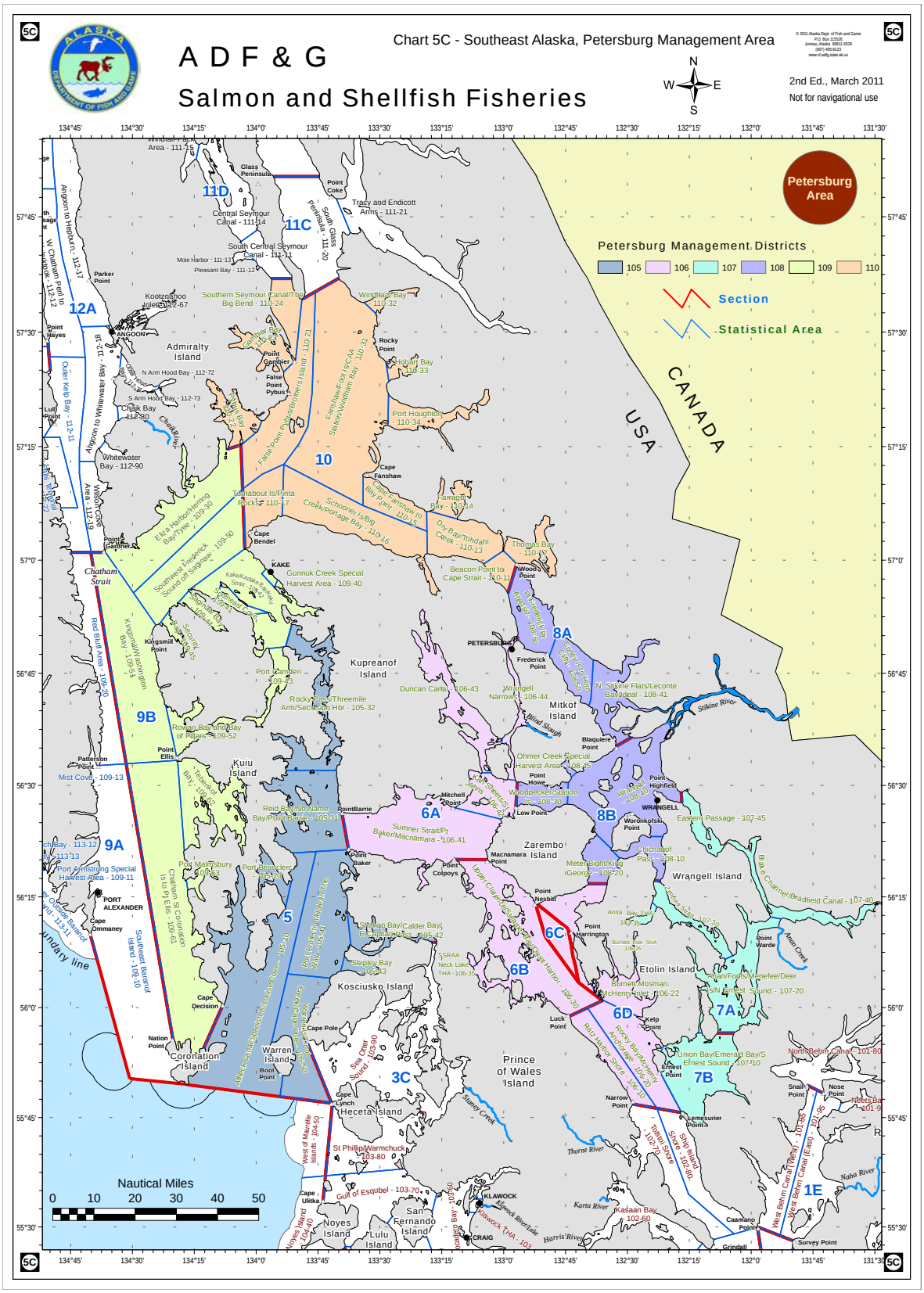



*Figure A-8.–Frederick Sound area, Alaska.*


A D F & G
Salmon and Shellfish Fisheries
Chart 5C - Southeast Alaska, Petersburg Management Area
2nd Ed., March 2011
Not for navigational use
Petersburg Area
Petersburg Management Districts
105
106
107
108
109
110
Section
Statistical Area
USA
CANADA
Nautical Miles
0 10 20 30 40 50
11D
11C
12A
10
9B
9A
8A
8B
6A
6B
6C
6D
5
3C
7A
7B
1E
Kupreanof Island
Mitkof Island
Kuiu Island
Zarembo Island
Wrangell Island
Etolin Island
Kosciuske Island
Prince of Wales Island
Heceta Island
Coronation Island
Warren Island
Noyes Island
Lulu Island
San Fernando Island
Admiralty Island
Chatham Strait
Sumner Strait
Frederick Sound
Stikine River
Thorne River
Karta River
Harris River
Naha River
Petersburg
Wrangell
Ketchikan
Kake
Angoon
Port Alexander
Craig
Klawock
Hoonah
Tenakee Springs
Port Protection
Point Baker
Point Ellis
Point Barrie
Point Colpoys
Point Nesbit
Point Harrington
Point Highfield
Point Hows
Point Gardner
Point Ellis
Point Baker

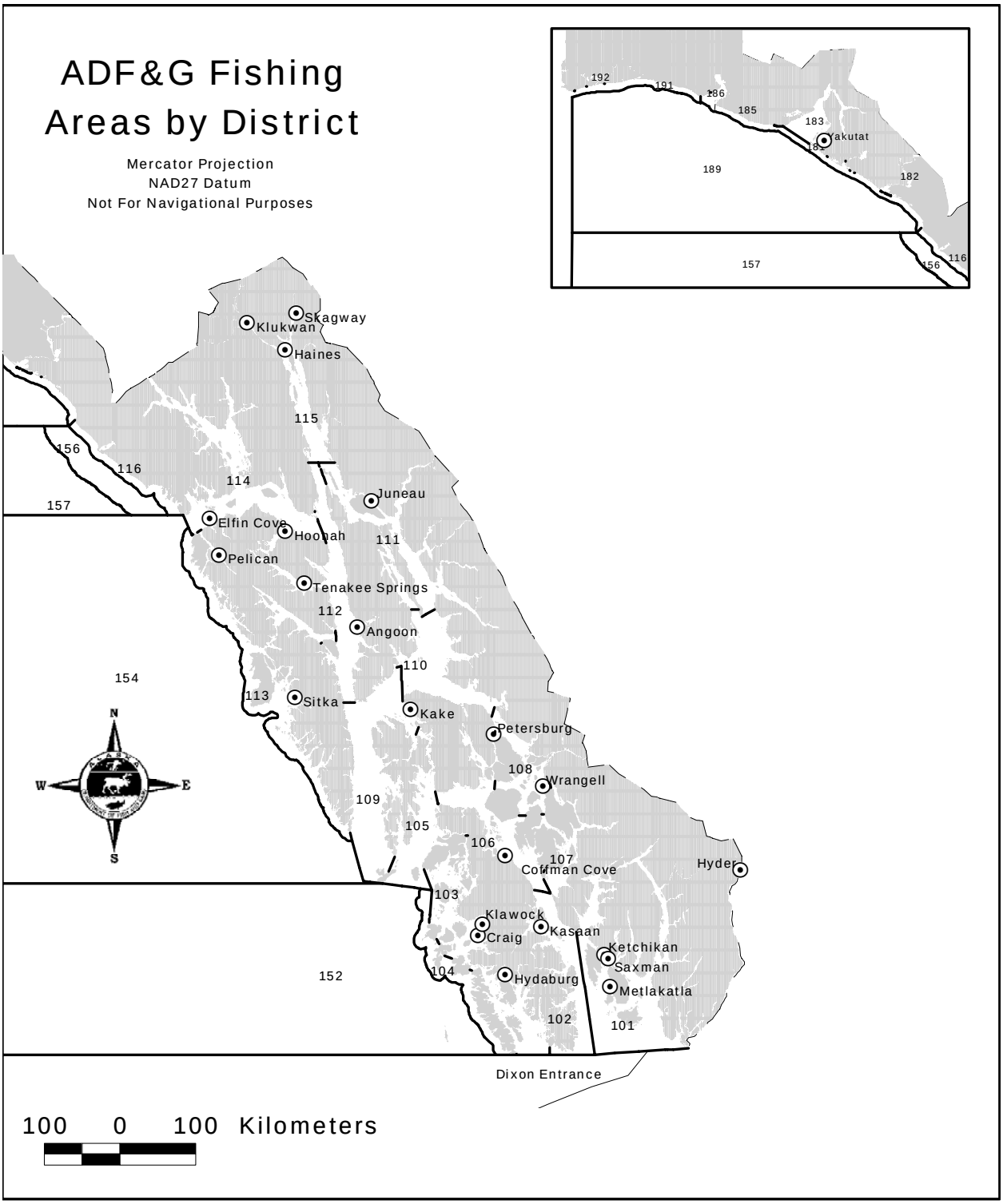



*Figure A-10.–ADF&G fishing areas, by district, Southeast Alaska.*

# APPENDIX B:
# CONDITIONS OF THE 2014 LOWER STIKINE RIVER COMMERCIAL SALMON LICENSE

# CONDITIONS OF THE 2014 LOWER STIKINE RIVER COMMERCIAL SALMON LICENCE

## Authority

The Department of Fisheries and Oceans (DFO) has authority to set licence conditions under subsection 22(1) of the *Fishery (General) Regulations* for the proper management and control of fisheries and the conservation and protection of fish.

Persons fishing under authority of this licence may only do so in accordance with the conditions stated below.

Also, it is the responsibility of individual fishers to be informed of, and comply with, the *Fisheries Act* and the regulations made there under, in addition to these conditions.

For information on management of the Stikine River salmon fishery, obtain a copy of the current Integrated Fisheries Management Plan from the Department of Fisheries and Oceans Pacific Region Management Plan website at:

http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html. The Management Plan is intended for general information purposes only. Where there is a discrepancy between the Plan and the *Fisheries Act*, regulations or conditions, the Act, the regulations and conditions prevail.

## Definitions

"24 hour period" means from 1200 hours (noon) one day until 1200 hours (noon) the following day.

"anchored gill net" means a gill net, one end of which is attached to shore.

"daily reporting deadline" means within 2 hours after the daily closing time except on the last calendar day on which fishing occurs in any given week, in which case it means within 4 hours after the weekly closing time.

"Department (DFO)" means the Department of Fisheries and Oceans

"drift net" means a gill net, one end of which is attached to a fishing vessel.

"fish landing station" means any place, premises, vessel or vehicle used to receive fish landed, whether directly or indirectly, from a fishing vessel.

'fish vending licence" means a licence issued pursuant to the *Fisheries Act of British Columbia* and required by commercial fishers who sell their catch directly to the public for personal use.

"gill net set time" is the period of time beginning with entry of the first portion of the web into the water and ending when the last portion of the web leaves the water.

"large Chinook" means a fish with a fork length (measured from tip of nose to fork of tail) greater than 735 mm.

"small Chinook" means a fish which has a fork length (measured from tip of nose to fork of tail) of 735 mm or less.

"weekly reporting deadline" means within 4 hours of the closing time of the last fishing day of the week.

**1. Species of Fish permitted to be retained:**

Subject to close times set out in the *Pacific Fishery Regulations, 1993*, the attached licence permits the retention of Chinook, Chum, Sockeye, Coho, and Pink Salmon.

**2. Waters in which fishing is permitted:**

Subject to the variations of close times set out in the *Pacific Fishery Regulations, 1993*, fishing under the authority of this licence is permitted for commercial fishing on the waters of the Lower Stikine River, defined by fishing boundary markers located near the confluence of the Flood River downstream to fishing boundary markers near the Canada-US border, and includes the lower reach of the Iskut River from the mouth of Iskut River upstream approximately 10 km to fishing boundary markers.

**3. Landing and Reporting Requirements:**

**(1) Downstream from fish boundary markers near the confluence of the Stikine and Porcupine rivers**:

(a) All fish retained within each 24 hour period, other than those sold or being held for sale through a fish vending licence to an individual for consumption by that individual, shall be landed at a registered fish landing station by the daily reporting deadline.

**(2) Upstream from fishing boundary markers near the confluence of the Stikine and Porcupine rivers**:

(a) All fish retained within each 24 hour period other than those sold or being held for sale through a fish vending licence to an individual for consumption by that individual ,shall be reported by the daily reporting deadline. Reporting can be done through personal delivery or communicated via radio or satellite phone to personnel at a registered fish landing station.

(b) All fish retained, other than those sold or being held for sale through a fish vending licence to an individual for consumption by that individual, shall be landed at a registered fish landing station by the weekly reporting deadline.

(3) If a fishery opening exceeds seven consecutive days, fish caught on the morning of the seventh day of the fishery shall be landed at a registered fish landing station by 1600 hours Sunday of the current fishing week.

(4) For DFO sampling purposes, Sockeye retained below the confluence of the Iskut River shall be kept separate from Sockeye caught in other locations.

(5) Fishers are required to provide a current daily catch estimate to DFO personnel or their representatives at any time during the course of the fishing day.

**4. Fish slips:**

(1) Each fisher (vessel master) shall provide catch records, on the form commonly known as fish slips, of all the fish retained under the authority of each licence, for each 24 hour period.

Fish slip books may be purchased directly from the printer:

Proforma Business Forms and Promotions
attn: Tony DeSouza
6660 - 122 St
Surrey, B.C. V6C 3S4
ph 604-596-6133
fax 604-596-6143Or for more information Phone (604) 666-2716.

(2) Fish slips shall specify:

(a) the gill net mesh size used;

(b) the type of gill net used;

(i) **SN** for set net; or

(ii) **DN** for drift net;

(c) the area fished;

(i) **AI** for above Iskut;

(ii) **BI** for below Iskut;

(iii) **II** for in Iskut; or

(iv) **AP** for above Porcupine;

(d) the number of each species retained;

(e) the number of fish landed in the round or dressed; and

(f) the number of large and small Chinook Salmon harvested.

(Note: For example purposes, a fish slip reporting catches from a set net located near the Porcupine-Stikine confluence would be marked "**SNAI**". Catches from a drift net near Boundary House would be noted on the fish slip as "**DNBI**".)

(3) When fishing downstream of the boundary markers near the confluence of the Stikine and Porcupine rivers, a copy of the fish slips shall be delivered to DFO personnel or designate by the daily reporting deadline.

(4) When fishing upstream of the boundary markers near the confluence of the Stikine and Porcupine rivers, a copy of the fish slips shall be delivered to DFO personnel or designate by the weekly reporting deadline.

(5) If a fishery opening exceeds seven consecutive days, fish slips shall be delivered by the weekly reporting deadline.

**5. Log Books:**

(1) After each check of a drift gill net, pick of an anchored gill net or check of a fish wheel, any fish caught but subsequently returned to the water shall be documented, by species and quantity, in a logbook provided by the Department of Fisheries and Oceans.

(2) Completed logbook pages shall be delivered to DFO personnel or designate by the reporting deadline.

(3) In the event no fish were caught and released in a 24 hour period, a report of 'zero' shall be submitted on a log book page by the reporting deadline.

**6. Tag Recovery Program:**

(1) All tags recovered during an opening shall be recorded by date, capture location, and fisher's name. Envelopes shall be supplied to contain the tag and to record the data associated with the tag recovery.

(2) When fishing downstream of boundary markers near the confluence of the Stikine and Porcupine rivers, all tags recovered in a 24 hour period shall be delivered to DFO personnel by the daily reporting deadline.

(3) When fishing upstream of boundary markers near the confluence of the Stikine and Porcupine rivers, all tags recovered in a 24 hour period shall be reported to a registered fish landing station by the daily reporting deadline. Reporting can be done through personal delivery or communicated through a radio or satellite phone to personnel at a registered fish landing station. All tags recovered from fishing sites located above the Porcupine and Stikine River confluence shall be delivered to DFO personnel by the weekly reporting deadline.

**7. Type, size, and quantity of fishing gear and equipment permitted to be used and the manner in which it may be used:**

(1) When fishing under the authority of this licence, only one (1) gill net may be used, either deployed as a drift net or as a set net.

(2) In addition to any specifications prescribed in the *Fisheries Act* and regulations, gill nets shall meet the following specifications:

(a) the minimum number of filaments in each twine of the gill net web is 6, with each filament in the web having a diameter of no less than 0.20 mm;

(b) the minimum gill net mesh size is 100 mm;

(c) the maximum gill net mesh size is 204 mm;

(d) the maximum gill net length shall not exceed 135 m;

(e) the maximum gill net set time is 12 consecutive hours without the net being completely withdrawing it from the water and removing any fish caught therein; and

(f) the minimum distance between set gill nets fishing on the same side of the river is 150 m, measured between any points along the gill nets.

Note: *Specific gill net requirements can be found on each Fishery Notice*

**8. Gear Identification:**

(1) All anchored gill nets shall be identified with an orange coloured buoy that is at least 125 cm in circumference with the fisher's licence number marked clearly on it. The buoy shall be attached to the end of the fishing gear farthest from shore.

(2) All drift gill nets shall have the last float of the float line orange in colour and shall have the fisher's licence number marked clearly on one side of the float.

*Source:* Division of Fisheries and Oceans Canada

# APPENDIX C:
# PACIFIC SALMON TREATY ANNEX IV AS APPLIED TO THE STIKINE RIVER

# ANNEX IV: (AMENDED MAY 16, 2014)
# CHAPTER 1: TRANSBOUNDARY RIVERS[1]

The provisions of this Chapter shall apply for the period 2009 through 2018.

1. Recognizing the desirability of accurately determining exploitation rates and spawning escapement requirements of salmon originating in the Transboundary Rivers, the Parties shall maintain a joint Transboundary Technical Committee (the "Committee") reporting, unless otherwise agreed, to the Transboundary Panel and to the Commission. The Committee shall, *inter alia*:

   (a) assemble and refine available information on migratory patterns, extent of exploitation and spawning escapement requirements of the stocks;

   (b) examine past and current management regimes and recommend how they may be better suited to achieving escapement goals;

   (c) identify existing and/or future enhancement projects that:

      (i) assist the devising of harvest management strategies to increase benefits to fishermen with a view to permitting additional salmon to return to Canadian waters;

      (ii) have an impact on natural transboundary river salmon production.

2. The Parties shall improve procedures for coordinated or cooperative management of the fisheries on transboundary river stocks. To this end, the Parties affirm their intent to continue to implement and refine abundance-based management regimes for Transboundary Chinook in the Taku and Stikine Rivers, sockeye in the Taku and Stikine Rivers, and coho salmon in the Taku River. Further, the Parties affirm their intent to continue to fully develop and implement abundance-based management regimes for Chinook and sockeye in the Alsek River and coho in the Stikine River during the Chapter period.

3. Recognizing the objectives of each Party to have viable fisheries, the Parties agree that the following arrangements shall apply to the United States and Canadian fisheries harvesting salmon stocks originating in the Canadian portion of:

   (a) the Stikine River:

      (1) Sockeye Salmon:

         (i) Assessment of the annual run of Stikine River sockeye salmon shall be made as follows:

            a. a pre-season forecast of the Stikine River sockeye run will be made by the Committee prior to April 1 of each year. This forecast may be modified by the Committee prior to the opening of the fishing season;

            b. in-season estimates of the Stikine River sockeye run and the Total Allowable Catch (TAC) shall be made under the guidelines of an agreed Stikine Management Plan and using a forecast model developed by the Committee. Both U.S. and Canadian fishing patterns shall be based on current weekly estimates of the TAC. At the beginning of the season and up to an agreed date, the weekly

1. Pacific Salmon Commission, 2008rev., *Treaty Between the Government of Canada and the Government of the United States of America Concerning Pacific Salmon,* Accessed March 16, 2017. http://www.psc.org/download/45/miscellaneous/2337/treaty.pdf

estimates of the TAC shall be determined from the pre-season forecast of the run strength. After that date, the TAC shall be determined from the in- season forecast model;

c. modifications to the Stikine Management Plan and forecast model may be made prior to June 1 of each year by agreement of both Parties. Failure to reach agreement in modifications shall result in use of the model and parameters used in the previous year;

d. estimates of the TAC may be adjusted in- season only by concurrence of both Parties' respective managers. Reasons for such adjustments shall be provided to the Committee.

(ii) The Parties desire to maximize the harvest of Tahltan/Tuya sockeye salmon in their existing fisheries while considering the conservation needs of wild salmon runs. The Parties agree to manage the returns of Stikine River sockeye to ensure that each country obtains 50% of the TAC in their existing fisheries. Canada will endeavour to harvest all of the fish surplus to escapement and broodstock needs returning to the Tuya and Tahltan Lake systems.

(iii) During this Chapter period, the Parties will continue to develop and implement joint Stikine enhancement programs designed to produce annually 100,000 returning sockeye salmon. If either Party intentionally departs from this goal, harvest share adjustments will be made as follows:

a. A Stikine Enhancement Production Plan (SEPP), designed to produce 100,000 returning adult sockeye salmon per year, shall be prepared annually by the Committee by February 1. The SEPP will summarize planned projects for the coming year and

b. expected production from all planned enhancement activities including expected production from site specific egg takes, access improvements, and all other enhancement activities outlined in the annual SEPP. The Committee will use these data to prepare an enhancement production forecast based on the best available information.

c. The Panel shall review the annual SEPP and make recommendations to the Parties concerning the SEPP by February 28.

d. The Committee shall annually review and document joint enhancement projects and activities undertaken by the Parties, including returns, and present the results to the Panel during the annual post season review.

e. During 2009 through 2013, the Parties harvest shares will be as per paragraph 3(a)(1)(ii). During 2014 through 2018, the Parties performance relative to the SEPP produced 5 years earlier will be evaluated by the Panel. The Panel will make recommendation to the Parties if harvest shares as outlined in paragraph 3(a)(1)(ii) are to be adjusted. A Party's catch share shall be reduced by 1.5 percentage points for each 10,000 lost expected enhanced production if a Party:

(i) intentionally did not comply with the SEPP five years earlier; and/or

(ii) intentionally affected the ability of the other Party to comply with that SEPP.

(iii) If the loss of expected enhanced production is caused by both Parties, penalties will be prorated according to the division of responsibility assessed each Party for the loss.

Catch shares will be adjusted to total 100% of the TAC. Net reductions in the catch share of one Party will be offset by increases in the catch share of the other Party.

f. For new enhancement projects, Canada will endeavour to harvest fish surplus to escapement and brood stock needs.

(iv) Pursuant to this agreement, a directed U.S. subsistence fishery in U.S. portions of the Stikine River will be permitted, with a guideline harvest level of 600 sockeye salmon to be taken between June 19 and July 31. These fish will be part of the existing U.S. allocation of Stikine River sockeye salmon. For this fishery:

a. The fishing area will include the main stem of the Stikine River, downstream of the international border, with the exception that fishing at stock assessment sites identified prior to each season is prohibited unless allowed under specific conditions agreed to by both Parties' respective managers.

b. Catches will be reported weekly, including all incidentally caught fish. All tags recovered shall be submitted to the Alaska Department of Fish and Game.

c. A written report on the fishery summarizing harvests, fishing effort and other pertinent information requested by the Transboundary Panel will be submitted by the management agency for consideration by the Panel at its annual post season meeting.

d. Any proposed regulatory changes to the fishery during the remaining years of this annex would need to be reviewed by the bilateral Transboundary panel and approved by the Pacific Salmon Commission.

(2) Coho salmon:

(i) By 2018, the Parties agree to develop and implement an abundance-based approach to managing coho salmon on the Stikine River. Assessment programs need to be further developed before a biologically based escapement goal can be established. By 2014, the Parties shall review progress on this obligation.

a. In the interim, the United States' management intent is to en-

sure that sufficient coho salmon enter the Canadian section of the Stikine River to meet the agreed spawning objective, plus an annual Canadian catch of 5,000 coho salmon in a directed coho salmon fishery. The catch limit of 5,000 coho salmon specified herein for the Canadian fishery in the Stikine River may be exceeded provided that bilaterally agreed in-season run assessments indicate that salmon passage into Canada has exceeded or is projected to exceed the specified 5,000 fish Canadian harvest limit plus bilaterally agreed spawning requirements.

(ii) Pursuant to this agreement, a directed U.S. subsistence fishery in U.S. portions of the Stikine River will be permitted, with a guideline harvest level of 400 coho salmon to be taken between August 1 and October 1. For this fishery:

a. The fishing area will include the main stem of the Stikine River, downstream of the international border, with the exception that fishing at stock assessment sites identified prior to each season is prohibited unless allowed under specific conditions agreed to by both Parties' respective managers.

b. Catches will be reported weekly, including all incidentally caught fish. All tags recovered shall be submitted to the Alaska Department of Fish and Game.

c. A written report on the fishery summarizing harvests, fishing effort and other pertinent information requested by the Transboundary Panel will be submitted by the management agency for consideration by the Panel at its annual post season meeting.

d. Any proposed regulatory changes to the fishery during the remaining years of this annex would need to be reviewed by the bilateral TBR Panel and approved by the Pacific Salmon Commission.

(3) Chinook salmon:

(i) This agreement shall apply to large (greater than 659 mm mid-eye to fork length) Chinook salmon originating in the Stikine River.

(ii) Both Parties shall take the appropriate management action to ensure that the necessary escapement goals for Chinook salmon bound for the Canadian portions of the Stikine River are achieved. The Parties agree to share in the burden of conservation. Fishing arrangements must take biodiversity and eco-system requirements into account.

(iii) Consistent with paragraph 2 above, management of directed fisheries will be abundance-based through an approach developed by the Committee. The Parties agree to implement assessment programs in support of the abundance-based management regime.

(iv) Unless otherwise agreed, directed fisheries on Stikine River Chinook

salmon will occur only in the Stikine River drainage in Canada, and in District 108 in the U.S.

(v) Pursuant to this agreement, a directed U.S. subsistence fishery in U.S. portions of the Stikine River will be permitted, with a guideline harvest level of 125 Chinook salmon to be taken between May 15 and June 20. For this fishery:

a. The fishing area will include the main stem of the Stikine River, downstream of the international border, with the exception that fishing at stock assessment sites identified prior to each season is prohibited unless allowed under specific conditions agreed to by both Parties' respective managers.

b. Catches will be reported weekly, including all incidentally caught fish. All tags recovered shall be submitted to the Alaska Department of Fish and Game.

c. A written report on the fishery summarizing harvests, fishing effort and other pertinent information requested by the Transboundary Panel will be submitted by the management agency for consideration by the Panel at its annual post season meeting.

d. Any proposed regulatory changes to the fishery during the remaining years of this annex would need to be reviewed by the bilateral TBR Panel and approved by the Pacific Salmon Commission.

(vi) Management of Stikine River Chinook salmon will take into account the conservation of specific stocks or conservation units when planning and prosecuting their respective fisheries. To avoid over-harvesting of specific components of the run, weekly guideline harvests or other agreed management measures will be developed by the Committee by apportioning the allowable harvest of each Party over the total Chinook season based on historical weekly run timing.

(vii) Commencing 2009, the Parties agree to implement through the Committee an agreed Chinook genetic stock identification (GSI) program to assist the management of Stikine Chinook salmon. The Parties agree to continue the development of joint GSI baselines.

(viii) The Parties agree to periodically review the above- border Stikine River Chinook salmon spawning escapement goal which will be expressed in terms of large fish (greater than 659 mm mid-eye to fork length).

(ix) A preseason forecast of the Stikine River Chinook salmon terminal run[2] size will be made by the Committee by December 1 of each year.

(x) Directed fisheries may be implemented based on preseason forecasts only if the preseason forecast terminal run size equals or exceeds the midpoint of the MSY escapement goal range plus the combined Canada, U.S. and test fishery base level catches (BLCs) of Stikine River Chinook

2. Terminal run = total Stikine Chinook run size minus the US troll catch of Stikine Chinook salmon outside District 108.

salmon. The preseason forecast will only be used for management until inseason projections become available.

(xi) For the purposes of determining whether to allow directed fisheries using inseason information, such fisheries will not be implemented unless the projected terminal run size exceeds the bilaterally agreed escapement goal point estimate (NMSY) plus the combined Canada, U.S. and test fishery BLCs of Stikine River Chinook salmon. The Committee shall determine when inseason projections can be used for management purposes and shall establish the methodology for inseason projections and update them weekly or at other agreed intervals.

(xii) The allowable catch (AC) will be calculated as follows: Base terminal run (BTR) = escapement target + test fishery

BLC + U.S. BLC +Cdn BLC

Terminal run – (BTR) = AC

(xiii) BLCs include the following:

a. U.S. Stikine BLC: 3,400 large Chinook[3];

b. Canadian Stikine BLC: 2,300 large Chinook[4];

c. Test fishery: 1,400 large Chinook.

(xiv) Harvest sharing and accounting of the AC shall be as follows:

| Allowable Catch Range | | Allowable Catch Share | | | |
|---|---|---|---|---|---|
| | | U.S. | | Canada | |
| **Lower** | **Upper** | **Lower** | **Upper** | **Lower** | **Upper** |
| 0 | 5,000 | 0 | 500 | 0 | 4,500 |
| 5,001 | 20,000 | 501 | 11,000 | 4,500 | 9,000 |
| 20,001 | 30,000 | 11,001 | 17,500 | 9,000 | 12,500 |
| 30,001 | 50,000 | 17,501 | 30,500 | 12,500 | 19,500 |
| 50,001 | 100,000 | 30,501 | 63,000 | 19,500 | 37,000 |

Within each Allowable Catch Range, each Party's Allowable Catch Share will be calculated proportional to where the AC occurs within the range.

(xv) The U.S. catch of the Stikine Chinook salmon AC will not count towards the SEAK AABM allocation. In particular:

a. non-Stikine Treaty Chinook salmon harvested in District 108 will continue to count toward the SEAK AABM harvest limit;

b. the U.S. BLC of Stikine Chinook salmon in District 108 will count toward the SEAK AABM harvest limit;

c. the U.S. catch of Stikine Chinook salmon in District 108 above

3. Includes average combined US gillnet, troll and sport catches of Stikine Chinook salmon in District 108.

4. Includes average combined Canadian Aboriginal, commercial and sport catches of Stikine Chinook salmon.

the U.S. BLC will not count towards the SEAK AABM allocation.

Accounting for the SEAK AABM Chinook salmon catches as pertains to transboundary rivers harvests will continue to be the responsibility of the Chinook Technical Committee as modified by (a) through (c) above.

(xvi) With the exception of the provisions included in paragraph (v) above, the Parties shall determine the domestic allocation of their respective harvest shares.

(xvii) When the terminal run is insufficient to provide for the Party's Stikine Chinook BLC and the lower end of the escapement goal range, the reductions in each Party's base level fisheries, i.e. the fisheries that contributed to the BLCs, will be proportionate to the BLC shares, excluding the test fishery.

(xviii) If the escapement of Stikine River Chinook salmon is below the lower bound of the agreed escapement range for three consecutive years, the Parties will examine the management of base level fisheries and any other fishery which harvests Stikine River Chinook salmon stocks, with a view to rebuilding the escapement.

# APPENDIX D:
# WRANGELL CHINOOK SALMON DERBY WINNER STATISTICS, 1953–2013

*Table D-1.–Wrangell Chinook Salmon Derby winner statistics, 1953–2013*

| Year | Name of fisher | Fish weight (pounds) | Year | Name of fisher | Fish weight (pounds) |
|---|---|---|---|---|---|
| 1953 | Fred Angerman | 45.3 | 1984 | Anne Lowe | 51.3 |
| 1954 | Barney Iverson | 47.1 | 1985 | Al Binkley | 55.6 |
| 1955 | Doris Iverson | 74.4 | 1986 | Harry Sundburg | 62.7 |
| 1956 | Marvin Peterson | 47.3 | 1987 | Dave Grukey | 53.7 |
| 1957 | Stu Rose Sr. | 46.0 | 1988 | Mike Phillips | 51.7 |
| 1958 | Bill Reach | 47.8 | 1989 | Deane Smith | 57.9 |
| 1959 | Bob Wickman | 49.4 | 1990 | Jim Colier | 52.9 |
| 1960 | Doris Iverson | 50.8 | 1991 | Carla Smith | 51.2 |
| 1961 | John Coulter | 55.1 | 1992 | Duncan McDougal | 50.6 |
| 1962 | Benny Lanting | 51.1 | 1993 | Pat Kellog | 56.7 |
| 1963 | Benny Lanting | 65.8 | 1994 | Laurie Broad | 48.4 |
| 1964 | Barney Iverson | 59.0 | 1995 | Barney Iverson | 42.0 |
| 1965 | Bob Neimeyer | 58.7 | 1996 | Ron Silvester | 53.6 |
| 1966 | Gordon Buness | 56.8 | 1997 | Robert Blank | 44.6 |
| 1967 | Clark Whitney | 58.9 | 1998 | Mike Patterson | 57.6 |
| 1968 | Bob Dennison | 52.1 | 1999 | Arlene Neyman | 50.0 |
| 1969 | Ron Castle | 44.8 | 2000 | Austin O'Brian | 44.8 |
| 1970 | Randy Rasler | 56.5 | 2001 | Mark Turner | 44.4 |
| 1971 | George Wigg | 54.6 | 2002 | Adrienne Nore | 49.1 |
| 1972 | George Wigg | 55.5 | 2003 | Brian Merritt | 49.1 |
| 1973 | Joe Turner | 59.0 | 2004 | James Rowland | 55.4 |
| 1974 | Max Dalton | 66.1 | 2005 | Mike Ekberg | 42.6 |
| 1975 | Ed Rilatos Jr. | 52.8 | 2006 | Ken Davidson, Jr. | 47.5 |
| 1976 | Joyce Bryner | 51.8 | 2007 | Neal Soeteber | 45.8 |
| 1977 | Bob Kurtti | 56.7 | 2008 | Jan Herron | 41.2 |
| 1978 | Jack N. Urata | 61.7 | 2009 | Wayne Spencer | 53.4 |
| 1979 | Elmer Woods | 48.0 | 2010 | Randy Churchill, Jr. | 43.0 |
| 1980 | Dean Baehr | 51.4 | 2011 | Chris Guggenbickler | 44.7 |
| 1981 | Wayne Kaer | 52.7 | 2012 | David Svendsen | 46.5 |
| 1982 | Bill Grover | 55.0 | 2013 | Jeannie Easterly | 43.6 |
| 1983 | Taku Hasegawa | 51.1 | | | |

*Source* Wrangell, Alaska Chamber of Commerce

# APPENDIX E:
# HISTORIC SALMON SMOLT RELEASES BY THE SOUTHERN SOUTHEAST REGIONAL AQUACULTURE ASSOCIATION FROM 1990–2012

*Table E-1.–Historic Chinook salmon smolt releases, SSRAA, 1990–2012.*

| Year | Whitman Lake | Neets Bay (reared at Crystal Lake) | Long Lake presmolts | Anita Bay | Crystal Lake | Carroll In | Earl West Cove | **Total** |
|---|---|---|---|---|---|---|---|---|
| 1990 | 75,400 | 1,608,000 | | | | 1,004,000 | 486,500 | **3,173,900** |
| 1991 | 73,700 | 388,200 | | | | 1,102,100 | 399,600 | **1,963,600** |
| 1992 | 106,200 | 728,500 | | | | 1,217,800 | 368,100 | **2,420,600** |
| 1993 | 109,000 | 377,697 | | | | 1,062,600 | 436,300 | **1,985,597** |
| 1994 | 123,000 | 214,980 | | | | 1,147,000 | 316,000 | **1,800,980** |
| 1995 | 233,600 | | | | | 513,300 | 203,550 | **950,450** |
| 1996 | 239,000 | 564,655 | | | | | 241,600 | **1,045,255** |
| 1997 | 697,169 | 339,767 | | | | | 396,829 | **1,433,765** |
| 1998 | 713,331 | 542,388 | 25,000 | | | | 386,426 | **1,667,145** |
| 1999 | 741,900 | 598,400 | 275,000 | | | | 364,400 | **1,979,700** |
| 2000 | 780,000 | 422,000 | 273,500 | | | | 441,000 | **1,916,500** |
| 2001 | 782,650 | 416,329 | 248,698 | 369,647 | 595,728 | | | **2,413,052** |
| 2002 | 689,634 | 452,644 | 250,000 | | 554,113 | | | **1,946,391** |
| 2003 | 702,300 | 520,500 | 257,000 | 406,800 | 727,600 | | | **2,614,200** |
| 2004 | 715,400 | 491,882 | 257,609 | 470,975 | 665,287 | | | **2,601,153** |
| 2005 | 633,000 | 484,629 | | 330,140 | 587,900 | | | **2,035,669** |
| 2006 | 720,000 | 654,349 | | 438,244 | 652,675 | | | **2,465,268** |
| 2007 | 715,000 | 585,000 | | 370,000 | 540,000 | | | **2,210,000** |
| 2008 | 725,000 | 640,000 | | 345,000 | 600,000 | | | **2,310,000** |
| 2009 | 740,000 | 650,000 | | 547,000 | 550,000 | | | **2,487,000** |
| 2010 | 786,000 | 670,000 | | 550,000 | 670,000 | | | **2,676,000** |
| 2011 | 738,000 | 709,000 | | 468,000 | 718,000 | | | **2,633,000** |
| 2012 | 720,000 | 726,000 | | 441,000 | 628,000 | | | **2,515,000** |

*Source* Southern Southeast Regional Aquaculture Association

*Table E-2.–Historic coho salmon smolt releases, SSRAA, 1990–2012.*

| Year | Whitman Lake | Neets Bay | Burnett Inlet | Earl West Cove | Nakat Inlet | Anita Bay | Crystal Lake | Neck Lake | Bakewell Lake | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 300,700 | 2,204,000 | | 223,000 | 99,800 | | | | | **2,827,500** |
| 1991 | 304,200 | 2,216,000 | | 214,200 | 100,000 | | | | | **2,834,400** |
| 1992 | 304,300 | 2,303,000 | | 227,300 | 114,500 | | | | | **2,949,100** |
| 1993 | 300,000 | 2,650,000 | | 203,500 | 92,200 | | | | | **3,245,700** |
| 1994 | 301,000 | 2,334,000 | | 189,000 | 95,000 | | | | | **2,919,000** |
| 1995 | 301,350 | 2,672,000 | | 202,000 | 199,000 | | | | | **3,374,350** |
| 1996 | 282,526 | 2,993,832 | | 205,514 | 203,500 | | | 609,233 | | **4,296,601** |
| 1997 | 544,456 | 3,381,909 | | 227,737 | 206,774 | | | 1,248,263 | | **5,611,136** |
| 1998 | 300,196 | 2,430,206 | 164,000 | 194,434 | 198,970 | | | 1,320,000 | | **4,609,804** |
| 1999 | 305,000 | 2,751,460 | 178,950 | 227,200 | 201,500 | | | 1,600,000 | | **5,264,110** |
| 2000 | 344,000 | 3,099,500 | 163,500 | 244,600 | 233,300 | | | 1,695,000 | | **5,779,900** |
| 2001 | 301,339 | 2,737,762 | 167,229 | | 301,792 | 199,555 | 176,240 | 1,695,318 | | **5,579,235** |
| 2002 | 314,150 | 3,065,019 | 236,635 | | 299,960 | 215,349 | 178,425 | 1,600,000 | | **5,909,538** |
| 2003 | 320,000 | 3,027,000 | 251,200 | | 308,300 | 222,200 | 178,900 | 1,700,800 | | **6,008,400** |
| 2004 | 158,200 | 2,539,949 | 190,375 | | 232,000 | 183,781 | 158,245 | 1,528,481 | | **4,991,031** |
| 2005 | 304,000 | 2,998,579 | 228,804 | | 301,999 | 227,927 | 144,318 | 1,472,257 | | **5,677,884** |
| 2006 | 307,500 | 3,075,656 | 222,653 | | 291,000 | 219,928 | 141,965 | 1,644,511 | | **5,903,213** |
| 2007 | 320,000 | 2,800,000 | 205,000 | | 300,000 | 218,000 | 130,000 | 1,700,000 | | **5,673,000** |
| 2008 | 300,000 | 2,800,000 | 168,000 | | 300,000 | 220,000 | 125,000 | 1,740,000 | | **5,653,000** |
| 2009 | 300,000 | 2,750,000 | 215,000 | | 295,000 | 228,500 | 195,000 | 1,759,000 | | **5,742,500** |
| 2010 | 312,000 | 3,000,000 | 211,000 | | 296,000 | 225,000 | 225,000 | 1,865,600 | 510,000 | **6,644,600** |
| 2011 | 301,000 | 3,100,000 | 216,000 | | 299,000 | 241,000 | 186,000 | 1,799,000 | 1,000,000 | **7,142,000** |
| 2012 | 309,000 | 2,823,000 | 233,000 | | 300,000 | 218,000 | 233,000 | 1,730,000 | | **5,846,000** |

*Source* Southern Southeast Regional Aquaculture Association

*Table E-3.–Historic sockeye salmon smolt releases, SSRAA, 1990–2012.*

| Year | Beaver Falls | Shrimp Bay | Fry Plants | Neck Creek | Burnett Inlet | Hugh Smith | McDonald Lake | **Total** |
|---|---|---|---|---|---|---|---|---|
| 1990 | 367,500 | | 248,700 | | | | | **616,200** |
| 1991 | 65,100 | 306,100 | 235,500 | | | | | **606,700** |
| 1992 | | 926,000 | 2,155,500 | | | | | **3,081,500** |
| 1993 | | 850,900 | 2,672,000 | | | | | **3,522,900** |
| 1994 | | 750,000 | 3,700,000 | | | | | **4,450,000** |
| 1995 | | | 2,524,000 | | | | | **2,524,000** |
| 1996 | | | 2,094,600 | | | | | **2,094,600** |
| 1997 | | | 869,800 | | | | | **869,800** |
| 1998 | | | | | | | | **0** |
| 1999 | | | | | | 202,000 | | **202,000** |
| 2000 | | | | | | 380,400 | | **380,400** |
| 2001 | | | | 443,240 | | 449,271 | | **892,511** |
| 2002 | | | | 461,000 | | 464,000 | | **925,000** |
| 2003 | | | | 356,100 | 38,000 | 423,996 | | **818,096** |
| 2004 | | | | 139,127 | 29,300 | | | **168,427** |
| 2005 | | | | 486,391 | 175,889 | | | **662,280** |
| 2006 | | | | 136,747 | 196,343 | | | **333,090** |
| 2007 | | | | | 695,000 | | | **695,000** |
| 2008 | | | | | 107,000 | | | **107,000** |
| 2009 | | | | | | | 276,000 | **276,000** |
| 2010 | | | | | 56,000 | | 160,000 | **216,000** |
| 2011 | | | | | | | 323,000 | **323,000** |
| 2012 | | | | | | | | **------** |

*Source* Southern Southeast Regional Aquaculture Association

*Table E-4.–Historic summer chum salmon smolt releases, SSRAA, 1990–2012.*

| Year | Nakat Inlet | Neets Bay | Kendrick Bay | Anita Bay | Earl West Cove | **Total** |
|---|---|---|---|---|---|---|
| 1990 | 2,088,500 | 9,022,000 | | | | **11,110,500** |
| 1991 | 5,987,000 | 20,740,000 | 6,206,000 | | 6,016,000 | **38,949,000** |
| 1992 | 4,814,000 | 23,282,000 | 8,021,000 | | 6,031,000 | **42,148,000** |
| 1993 | 8,250,200 | 32,524,700 | 8,167,600 | | 7,069,600 | **56,012,100** |
| 1994 | 8,000,000 | 40,000,000 | 9,100,000 | | 7,400,000 | **64,500,000** |
| 1995 | 8,180,000 | 45,520,000 | 9,300,000 | | 7,484,000 | **70,484,000** |
| 1996 | 8,461,000 | 43,377,000 | 8,236,700 | | 7,742,000 | **67,816,700** |
| 1997 | 8,075,400 | 45,195,000 | 9,159,400 | | 8,061,300 | **70,491,100** |
| 1998 | 8,483,109 | 45,292,435 | 9,304,465 | | 8,227,253 | **71,307,262** |
| 1999 | 8,205,000 | 45,106,000 | 9,159,000 | | 8,004,000 | **70,474,000** |
| 2000 | 8,381,300 | 45,374,700 | 10,170,200 | | 8,204,500 | **72,130,700** |
| 2001 | 8,466,740 | 45,977,158 | 10,100,055 | 8,334,691 | | **72,878,644** |
| 2002 | 8,279,000 | 36,494,000 | 9,973,268 | 13,959,774 | | **68,706,042** |
| 2003 | 8,496,300 | 39,026,400 | 10,629,000 | 13,630,600 | | **71,782,300** |
| 2004 | 8,160,000 | 47,785,445 | 19,730,892 | 13,895,916 | | **89,572,253** |
| 2005 | 7,916,488 | 48,633,176 | 19,699,199 | 13,551,626 | | **89,800,489** |
| 2006 | 8,409,868 | 46,334,620 | 20,844,154 | 22,494,830 | | **98,083,472** |
| 2007 | 8,200,000 | 54,000,000 | 21,600,000 | 20,400,000 | | **104,200,000** |
| 2008 | 7,700,000 | 34,500,000 | 20,500,500 | 20,000,000 | | **82,700,500** |
| 2009 | 9,300,000 | 48,500,000 | 21,000,000 | 22,900,000 | | **101,700,000** |
| 2010 | 8,300,000 | 53,000,000 | 21,300,000 | 23,700,000 | | **106,300,000** |
| 2011 | 8,400,000 | 51,800,000 | 20,160,000 | 22,900,000 | | **103,260,000** |
| 2012 | 8,045,000 | 59,265,000 | 29,147,000 | 22,201,000 | | **118,658,000** |

*Source* Southern Southeast Regional Aquaculture Association

*Table E-5.–Historic fall chum salmon smolt releases, SSRAA, 1990–2012.*

| Year | Nakat Inlet | Neets Bay | **Total** |
|---|---|---|---|
| 1990 | 2,094,700 | 23,556,000 | **25,650,700** |
| 1991 | 5,794,000 | 23,867,000 | **29,661,000** |
| 1992 | 8,968,000 | 25,205,000 | **34,173,000** |
| 1993 | 7,905,700 | 25,585,600 | **33,491,300** |
| 1994 | 8,000,000 | 27,000,000 | **35,000,000** |
| 1995 | 7,517,000 | 20,176,000 | **27,693,000** |
| 1996 | 7,844,000 | 18,278,603 | **26,122,603** |
| 1997 | 7,986,000 | 20,908,000 | **28,894,000** |
| 1998 | 7,200,447 | 20,764,160 | **27,964,607** |
| 1999 | 7,203,000 | 19,829,000 | **27,032,000** |
| 2000 | 7,567,100 | 20,005,900 | **27,573,000** |
| 2001 | 8,213,534 | 12,480,135 | **20,693,669** |
| 2002 | 8,165,000 | 17,440,539 | **25,605,539** |
| 2003 | 5,276,900 | 14,077,800 | **19,354,700** |
| 2004 | 8,733,000 | 16,972,010 | **25,705,010** |
| 2005 | 9,764,148 | 21,432,221 | **31,196,369** |
| 2006 | - - - - - - - | 13,553,461 | **13,553,461** |
| 2007 | 6,600,000 | 17,400,000 | **24,000,000** |
| 2008 | 8,000,000 | 27,000,000 | **35,000,000** |
| 2009 | 7,900,000 | 19,750,000 | **27,650,000** |
| 2010 | 8,700,000 | 16,500,000 | **25,200,000** |
| 2011 | ------ | 10,300,000 | **10,300,000** |
| 2012 | 7,805,000 | 19,648,000 | **27,453,000** |

*Source* Southern Southeast Regional Aquaculture Association

# APPENDIX F:
# CHINOOK SALMON COLLECTIONS FROM ANDREW'S CREEK FOR AQUACULTURE OPERATIONS, 1976–1983

*Appendix E.– Chinook salmon collections from Andrew's Creek for aquaculture operations, 1976–1983.*

| Brood year | Brood source | Adults used for broodstock: females/males (total) | # of eggs | Comments |
|---|---|---|---|---|
| 1976 | Andrew Creek | 38/25 (63) | 203,000 | First egg take at Andrew Creek. |
| 1977 | Andrew Creek | 44/31 (75) | 237,000 | |
| 1978 | Andrew Creek | 7/5 (12) | 35,000 | Flood waters, in August, destroyed the weir and crew was unable to achieve desired egg take goal since fish that were held for broodstock escaped. |
| 1979 | Andrew Creek | Unknown | 150,000 | Was expected to be the last year of remote egg takes at Andrew Creek. Planned to begin to take eggs at CLH from returning adults (Andrew Creek ancestral stock). |
| 1982 | Andrew Creek | Unknown | 772,000 | Additional eggs taken at Andrew Creek to supplement egg take at CLH, due to lower than expected adult returns at the hatchery. |
| 1983 | Andrew Creek | Unknown | 138,000 | Additional eggs taken at Andrew Creek to supplement egg take at CLH, due to lower than expected adult returns at the hatchery. |

Provided by Lorraine Vercessi on 11.17.14 and adapted from ADF&G 1998.

# APPENDIX G:
# STIKINE RIVER FEDERAL SUBSISTENCE FISHERY MANAGEMENT DRAFT BRIEFING, USDA FOREST SERVICE, ALASKA REGION, MARCH 7, 2016

**USDA Forest Service -- Alaska Region**

**March 7, 2016**

# Stikine River Federal Subsistence Fishery Management

## Background

The Stikine River Federal subsistence sockeye salmon fishery was first implemented in 2004 after a lengthy process where the Federal Subsistence Board (Board) adopted regulations (36 CFR 242. 27(e) (13) (xiv) and 50 CFR 100. 27(e) (13) (xiv)) and the Pacific Salmon Commission included provisions for the fishery in Annex IV of the U.S./Canada Pacific Salmon Treaty (Treaty). Chinook and Coho Salmon fisheries were subsequently approved in 2005. The Board adopted a regulation that required nets be checked twice each day in 2015.

## Subsistence Fishery In-season Management

The Board closed the Stikine River Chinook Salmon subsistence fishery pre-season in both 2013 and 2014 because there was no U.S. Allowable Catch (as defined in the Treaty, this is the U.S. allocation above base level harvests in the sport, commercial and test fisheries). The Wrangell District Ranger opened the fishery prior to the end of the Chinook Salmon season in both years. In-season actions were not necessary in 2015 and are not anticipated in 2016. The Chinook and Sockeye Salmon subsistence fisheries are defined as "Directed" fisheries and the subsistence harvest is a component of the total U.S. harvest.

## Subsistence Fishery Performance

The recent five year average catch is 54 large Chinook, 30 Chinook <30 inches, 63 Chum, 122 Coho, 6 Dolly Varden char, 128 Pink, 1,617 Sockeye Salmon and 1 steelhead taken by 127 households. The Guideline Harvest Levels for the subsistence fishery contained in Federal regulations and the Treaty are 125 Chinook, 600 Sockeye and 400 Coho Salmon. Chum and Pink Salmon, Dolly Varden char and steelhead are not targeted but are taken as incidental harvest.

## 2016 Season Subsistence Fishery Management

**Chinook Salmon:** The 2016 preseason terminal run size forecast for Stikine River large Chinook Salmon is 33,900 fish. The resulting U.S. Allowable Catch is 1,100 large Chinook salmon. An Allowable Catch of 1,100 fish allows for limited directed commercial fisheries to occur in District 8 beginning May 2. The recent average return is about 42,000 large Chinook Salmon.
**Sockeye Salmon:** The 2016 pre-season terminal run size preliminary forecast for the Stikine River is approximately 220,000 fish. For comparison, the recent 10-year average total Stikine Sockeye Salmon run size is 179,800 fish. The preliminary U.S. allowable catch is approximately 80,000 fish.

**Coho Salmon:** The U.S. fisheries are managed to allow a 5,000 fish harvest by Canada.

**In-season Monitoring:** A Federal subsistence fishing permit is required. Weekly catch estimates are provided to ADF&G and Canadian fishery managers and an annual fishery summary report provided to the U.S./Canada Bilateral Transboundary Panel of the Pacific Salmon Commission (TBR Panel).

## Current Events in Canada

In the early summer of 2014, there was a significant landslide on the Tahltan River, a major spawning tributary for Sockeye and Chinook Salmon. Although most of the Chinook Salmon were unable to negotiate the slide area in 2014, Sockeye Salmon passed the slide area in 2014 and both Sockeye and Chinook Salmon appeared to pass during the low water periods in 2015.

There are several large scale mining operations that are in the planned for the upper Stikine River watershed. The potential negative effects on water quality and fishery production in the waters of Southeast Alaska is a current concern to residents of the Southeast Region. The Southeast Alaska Subsistence Regional Advisory Council (Council) sent a letter through the Board to the Secretaries of the Interior and Agriculture detailing those concerns.

## Regulatory Process

The Board adopted a regulation requiring fishers to check a set gillnet at least twice a day at their meeting on January 21-23, 2015, consistent with the recommendation of the Council. The Board also expressed the desire to remove the guideline harvests from Federal regulations. The Board is authorized to adopt regulations describing net tending but deleting the guideline harvest levels from Federal regulations is contingent on approval and concurrent action by the Pacific Salmon Commission to remove that language from the Treaty.

The Treaty is in the process of being renegotiated. The U.S. positions are developed by the U.S. delegates to the TBR Panel. The U.S. subsistence salmon fishery on the Stikine River is part of that negotiation process but the U.S. position is currently confidential and may not be known until the agreement is finalized in 2018.

## Summary

- Subsistence fishery targets salmon that originate in Canada
- Stocks of all Stikine River salmon are healthy
- Sockeye, Chinook and Coho Salmon have harvest sharing agreements between the U.S. and Canada
- Subsistence Sockeye and Chinook Salmon catches are a part of the "U.S. Allowable Catch"
- The Alaska Commissioner to the Pacific Salmon Commission (Charles Swanton) is the advocate for the subsistence fishery
- The Pacific Salmon Treaty is being renegotiated with implementation in 2018.

Key Contacts:
Bob Dalrymple – USFS Wrangell District Ranger/In-season manager – 907-874-7500
Tom Whitford – USFS Subsistence Program Leader – 907-743-9461
Robert Larson – PSG/WRG Subsistence Biologist & SEASRAC Coordinator – 907-772-5930
Gene Peltola, Jr. – USFWS Assistant Regional Director– 907-786-3888

# APPENDIX H:
# TIMELINE OF COMMERCIAL HERRING FISHERIES IN SOUTHEAST ALASKA, 1867–2008

**TIMELINE OF COMMERCIAL HERRING FISHERIES IN SOUTHEAST ALASKA**

1867 The United States purchases Alaska from Russia*.

1878 Commercial herring production in Alaska begins in 1878. A combination of beach seines, gill nets and a form of Norwegian seining produces an initial total catch of 30,000 lbs. Jigs and rakes produce a small fraction of that, usually by individuals for use as bait or for curing (Huizer 1952, Rauwolf 2006).

"As early as 1878 persons in Wrangell engaged in the business of catching herring, from which they extracted the oil, in addition to salting and drying the fish" (Cobb 1906).

The Northwest Trading Company establishes a trading station at Killisnoo*.

1880 The trading station at Killisnoo begins rendering whale oil.

1882 The trading station, turned oil-reduction plant at Killisnoo experiences an explosion caused by a whaling harpoon. Whaling operations cease but herring oil reduction begins at the site: 1,520 tons of herring are processed for oil this year *.

1883 The Killisnoo herring reduction plant processes 4,200 tons of herring.

1884 The Killisnoo plant begins processing herring into fertilizer as well as oil*.

1887 The U.S. Bureau of Commercial Fisheries sends a research vessel "Albatross" to the inside waters of Alaska*.

1889 Thirty seven canneries are operating in Southeast Alaska (Cobb 1905).

1889 Fifteen canneries are operating in Southeast Alaska (Cobb 1905).

1897 The first 'official' catch statistics are collected by the research vessel 'Albatross' and reported to the United States Fish Commission*.

1900 Fishing operations begin purse seining from power boats allowing fishermen to increase catch rates in less time with less human labor (Huizer 1952).

Herring bait production begins; 4–6 million lb (1,800–2,700 mt) per year. (ADF&G 2007a).

"Soon after 1900 the small operators of Petersburg and Ketchikan commenced using purse seines from power boats" (Rounesfell 230:1930).

Petersburg-based fishermen begin curing herring. Many of these early operations were off-shore operations where salt packing was done on scows*.

* See Chapter V. History of Commercial Herring Fisheries in Southeast Alaska

| | |
|---|---|
| 1902 | Sixty four canneries are operating in Southeast Alaska (Cobb 1905). |
| 1904 | The Bureau of Fisheries first requires every individual and company fishing in Alaska to record annual statistics such as total fish products, fishing gear, and vessels. |
| 1905 | Forty seven canneries are operating in Southeast Alaska (Cobb 1905) |
| 1906 | An annual report "Fisheries of Alaska" (also known as the 'fish and fur seal' report) begins to be published by the US Bureau of Commercial Fisheries*. |
| 1907 | The Tyee Whaling Company is established at Murder Cove on Admiralty Island. It operates until 1913*. |
| 1910 | The first herring are frozen for bait for the halibut fisheries at the New England Fish Co. plant in Ketchikan (Marsh and Cobb 1911). |
| 1911 | The method of salt-ruing herring expands rapidly. |
| 1912 | The United States Whaling Company opens a station at Port Armstrong. The company operates until 1923, and processes nearly 1,600 whales*. |
| 1912-13 | Halibut fishing is introduced as an important Alaskan industry. The need for herring bait fuels both fisheries (Rounsefell 1930). |
| 1916 | The Bureau of Commercial Fisheries hires experts to train fishery workers in the method of "Scotch Curing" *. |
| 1918 | Power seine boats almost totally replace the old Norwegian method of operation in all of Southeast Alaska. All are powered by gas internal-combustion engines. Each boat employs a five to seven man crew. The average net tonnage is 17 tons (range of 11-31 tons) (Rounsefell 1930).<br><br>Herring caught for the food market (salt-cured, dried) peaks at 12,304 tons. Large herring become hard to find in the following years and many salt-cure operations move to Prince William Sound and Kodiak *. |
| 1919 | Three additional reduction plants are built in Chatham Strait *. |
| 1925 | Herring plants begin to record the quantity of fish being processed into meal or oil (Reid 1927) |
| 1926-1966 | Ninety percent of herring catches go to the reduction process (Reid 1971). |
| 1927 | The purse-seine boat average net tonnage is 31 (range of 20-42 tons). Half of the fleet is powered by diesel engines. Each boat employs a six to eight man crew (Rounsefell 1930).<br><br>The halibut industry uses over 8,000,000 pounds of herring bait from Alaska: 4,600,000 from the southeastern region (Rounsefell 1930). |

* See Chapter V. History of Commercial Herring Fisheries in Southeast Alaska

| | |
|---|---|
| 1929-1956 | Approximately 812,290 tons of herring is harvested from southeast Alaska (Skud, Sakuda and Reid 1960). |
| 1930-31 | Rounsefell is assigned the task of studying the cause of fluctuating herring populations. Using catch per unit (CPUE) data from the 1920s, he concludes that there is no evidence to support the hypothesis that the reduction plants were the source of depletion (1930) but does attribute declines to fishing and recommends restricting the fishing fleet (1931)*. |
| 1932-1934 | Herring populations undergo three successive recruitment "failures" and cause the collapse of the herring fishery in the late 1930s (Dahlgren and Kolloen 1944). |
| 1935 | Tagging surveys of herring are attempted (Rounsefell and Dahlgren 1935). Rounsefell and Dahlgren find that Kootznahoo Inlet was once an abundant herring spawning ground, but the population had declined*. |
| 1937 | Peak herring reduction year: 125,000 tons are processed. Production levels begin to decline rapidly after 1937 (Reid 1971). |
| 1939 | Because of evidence of severe depletion of herring, commercial fishing for herring other than for bait purposes is prohibited after August 2, 1939 in all of southeast Alaska*. |
| | The Bureau of Commercial Fisheries opens an 'exploratory' fishery in an attempt to locate herring and possibly reopen the commercial fishery. No herring is found *. |
| 1941 | A 6,250 ton quota is set for the herring fishery. Half of the quota is filled*. |
| 1942 | All of southeast Alaska is closed to allow herring populations to rebuild*. |
| 1943 | Annual catch quotas are implemented, beginning with 12,500 tons. |
| 1947 | Kolloen (1947) develops 'cohort analysis,' a means to track herring using age composition. Using this technique, Kolloen describes the herring population as recovering: 41,828 tons of herring are harvested. Shortly thereafter, in the late 1940s, herring populations crash once again*. |
| 1948 | The annual catch quota is set at 50,000 tons; 16,114 tons of herring are actually harvested. |
| 1950s | Japanese and Russian ships begin trawling for herring in the Bering Sea. (ADF&G 2007a). |
| | Herring reduction plants begin to decline due to competing Peruvian anchovy production (ADF&G 2007a). |

* See Chapter V. History of Commercial Herring Fisheries in Southeast Alaska

The Sitka Chamber of Commerce lodges an official protest against commercial herring fishing for reduction purposes (STA Chamber of Commerce 1954).

1951 The annual quota is decreased to 100,000 barrels.

1959 The state of Alaska begins managing herring fisheries.

1966 The last herring reduction plant shuts down due to market conditions and depleted herring stocks (Reid 1971)

1964 The first commercial spawn-on-kelp fishery opens in Sitka (Ad Hoc Committee on Herring Spawn on Kelp Statements of Findings, n.d.)

1967-1972 "Unregulated bait fisheries deplete stocks in George Inlet (9000) tons and Caroll Inlet (1200) tons while being surveyed by ADF&G's biologists aboard the vessel Sundance" (Rauwolf 2006).

1968 ADF&G opens the spawn on kelp fishery (Rauwolf 2006).

1969 The first unofficial sac roe fishery in Sitka begins operation (Garza 1996).

1970s Herring stocks experience the first collapse (ADF&G 2007a)

Herring sac roe production begins in the 1970s to provide for declining herring numbers in Japanese waters. Much of the current herring sac roe harvest in Alaska is destined for these Japanese markets although younger generations are not so keen on this traditional dish.

Japanese and Russian ships trawling for herring in the Bering Sea harvest 320 million lb (146,000 mt) in 1970 (ADF&G 2007a).

"The development of extensive crab fisheries in the 1970s greatly increased the demand for herring bait" (ADF&G 2007a). Bait harvests increase to 4,000-6,000 tons annually*.

1972-1975 ADF&G conducts stock surveys on spawning grounds in preparation for the sac roe fisheries. The results of these surveys on diminished stocks are called "pristine biomass" by ADF&G biologists (Rauwolf 2006).

1974 The commercial spawn-on-kelp fishery closes in Sitka (Ad Hoc Committee on Herring Spawn on Kelp Statements of Findings, n.d.)

1976 The Magnuson Fishery Conservation and Management Act creates the following for all commercial fisheries:
"A fishery conservation zone between the territorial seas of the US and 200 nautical miles offshore. An exclusive US fishery management authority over fish within the fishery conservation zone (excluding highly migratory species). Regulations for foreign fishing within the fishery conservation zone through international fishery agreements, permits and import prohibitions. National standards for fishery conservation and management

* See Chapter V. History of Commercial Herring Fisheries in Southeast Alaska

| | |
|---|---|
| | and eight regional fishery management councils to apply those national standards in fishery management plans" (MMS 2007). |
| | ADF&G opens commercial sac roe fisheries in southeast Alaska (gillnet and seine) (Rauwolf 2006) |
| 1980s | "[C]onsensus emerged among west coast herring biologists that a 20% maximum exploitation rate was appropriate for herring, and management agencies began shifting to this target. By the late 1980s, a consensus to set thresholds at 25% of the average unfished biomass also emerged. This policy was initially developed for British Columbia (Hall et al. 1988), and the rationale was extended for Alaskan herring fisheries by Zheng et al. (1993) and Funk and Rowell (1995)"*. |
| 1980 | West Behm Canal closes to commercial herring fishing after only one year of sac roe and three years of bait fishing. (Rauwolf 2006) |
| | Auke Bay/Lynn Canal fishery collapses (third largest biomass in Southeast Alaska) (Rauwolf 2006) |
| 1980-1988 | Many small spawning areas are depleted by gillnet and seine fisheries (Rauwolf 2006) |
| 1990 | Kah Shakes gillnet sac roe fishery, second largest biomass in southeast Alaska closes (Rauwolf 2006). |
| 1991 | ADF&G moves the Kah Shakes gillnet fishery outside the legal boundary, 12 miles west to Cat Island, adjacent to the Annette Island Reserves herring fishery on Crab Bay flats. (Rauwolf 2006). |
| 1993 | Board of Fisheries tosses out proposals from local concerned citizens, and does not allow testimony on these proposals. At the same time the BOF expands the legal boundary of Kah Shakes to Include Cat and Mary Island, and classifies all area stocks as one stock (Revilla Channel Stock) (Rauwolf 2006). |
| 1994 | Local citizens file a lawsuit in an attempt to protect the remaining herring populations in Kah Shakes and Cat Island (Rauwolf 2006) |
| 1995 | People begin to notice a reduced size in herring in Revilla channel. Spawning biomass at Kah Shakes has shrunk to 143 tons from a high of over 20,000 tons at the onset of the fishery (Rauwolf 2006) |
| 1995 | The Sitka Tribe of Alaska implements a "branch watch" program to try to protect branches set out by subsistence harvesters from theft and other destructive activities (see Appendix D). |
| 1996 | The chairman of the Sitka Tribe of Alaska sends a letter to the Area Manager of the Commercial Fisheries asking the agency to close the commercial herring sac roe harvest in Sitka (Cockerman 1996a). |

* See Chapter V. History of Commercial Herring Fisheries in Southeast Alaska

| | |
|---|---|
| | The Sitka Tribe of Alaska files a proposal to the Board of Fisheries to increase the threshold for the commercial fishery (see Appendix D). |
| 1996 | The combined spawning biomass of herring at Kah Shakes and Cat Island total 4338 tons, 1662 tons below the required 6,000 ton biomass threshold set by ADF&G before they are supposed to allow a commercial harvest for the coming season (Rauwolf 2006) |
| | An experimental commercial herring roe on kelp program is established by the Board of Fisheries in Sitka (see Appendix D). |
| 1998 | Gillnetters exceed the quota at Cat Island by 11%. No fishery has been conducted at Cat Island since (Rauwolf 2006) |
| 2000 | The Sitka Tribe of Alaska submits a proposal to the Board of Fisheries to implement an 'ecosystem' management approach to the fishery. The proposal was denied (see Appendix D). |
| 2001 | The Sitka Tribe of Alaska submits an 'agenda change request' to the Board of Fisheries in order to address the detrimental effects of the 2001 commercial sac roe fishery in Sitka Sound. Affidavits, surveys, personal statements, and additional data is collected to support this proposal (see Appendix D). |
| 2002 | The Board of Fisheries reviews the 2001 proposal and data submitted by the Sitka Tribe of Alaska. The Board sets subsistence harvest levels at 105,000 to 158,000 pounds of herring spawn annually and requests that the Sitka Tribe of Alaska and ADF&G enter into a Memorandum of Agreement, a document that was signed on November 4, 2002. This document created a collaborative responsibility for both the Tribe and ADF&G to 1) participate in the pre-season and post-season stakeholder meetings, 2) communicate, collect and share data, and 2) conduct a collaborative post-season subsistence survey. The first post-season subsistence survey documented 111,962 pounds of herring roe (see Appendix D). |
| 2003 | The Board of Fisheries opens West Behm Canal to commercial herring harvests in spite of intense local opposition and ADF&G briefing documents requesting more time to study the fishery (Rauwolf 2006). |
| | The Sitka Tribe of Alaska expands the post-season subsistence survey and documents 209,995 pounds of harvested herring roe (see Appendix D). |
| 2005 | The Sitka Tribe of Alaska expands the post-season subsistence survey once again and documents only 73,432 pounds of harvested herring roe, well below the threshold designated by the Board of Fisheries in 2002 (Craig 2009). |
| 2006 | The Sitka Tribe of Alaska files a proposal with the Board of Fisheries to review the inability of subsistence users to meet the 105-000 – 158,000 harvest quota set by the Board in 2002. The Board determines that it is not |

* See Chapter V. History of Commercial Herring Fisheries in Southeast Alaska

| | |
|---|---|
| | the responsibility of ADF&G to guarantee that this subsistence harvest quota is met (see Appendix D). |
| 2008 | The Sitka Tribe of Alaska documents another failure to meet the subsistence harvest threshold set by the Board of Fisheries in 2002 (see Appendix D). |

* See Chapter V. History of Commercial Herring Fisheries in Southeast Alaska

***Source*** Thomas F. Thornton, Virginia Butler, Fritz Funk, et al., 2010, Herring Synthesis: Documenting and Modeling Herring Spawning Areas within Socio-Ecological Systems Over Time in the Southeastern Gulf of Alaska, n.p,: North Pacific Research Board, Final Report: Project No. 728, Accessed March 13, 2017, http://herringsynthesis.research.pdx.edu/final_docs/HerringSynthesisFINAL102710.pdf

# APPENDIX I:
# 2014/2015 FISHING LICENSES AND CONDITIONS ISSUED BY FISHERIES AND OCEANS CANADA FOR ABORIGINAL COMMUNAL FISHING

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XFSC 95 2014
Valid From: 01-Apr-2014
Expiry Date: 31-Mar-2015

This licence is issued under the authority of SECTION 4 OF THE ABORIGINAL COMMUNAL FISHING LICENCES REGULATIONS.

This licence is not intended to define an Aboriginal right to fish or its scope; however, for the fishing season, it is intended to provide a mechanism, for reasons of proper management and control of the fisheries and conservation and protection of fish, for requiring compliance with the provisions of this licence.

This licence is subject to the *Fisheries Act* and regulations thereunder, and confers the authority to fish under the following conditions: Food, Social, and Ceremonial purposes.

**Licence Holders:**

FIN: 117734
Po Box 46
Telegraph Creek BC V0J 2W0

Tahltan Band Council

Contact Number: 250-235-3144

FIN: 126363
Box 30
Iskut BC V0J 2W0

Iskut First Nation

Contact Number: 250-234-3331
Fax Number: 250-234-3200

**Species, Quantity of Fish, Area(s) and Gear:**

| | |
|---|---|
| **Licence Holder:** | All |
| **Species:** | CHINOOK SALMON (Oncorhynchus tshawytscha) |
| **Gear:** | Fish Wheel<br>Gaff<br>Gill Net<br>Net, Dip<br>Rod And Reel<br>Trap<br>Weir, Temporary |
| **Licence Area:** | Yukon/Transboundary; - Stikine River Watershed |
| **Maximum Harvest Amount:** | 2000 |
| **Units:** | Individual Pieces |

| | |
|---|---|
| **Licence Holder:** | All |
| **Species:** | SOCKEYE SALMON (Oncorhynchus nerka) |
| **Gear:** | Fish Wheel<br>Gaff<br>Gill Net<br>Net, Dip<br>Rod And Reel<br>Trap<br>Weir, Temporary |
| **Licence Area:** | Yukon/Transboundary; - Stikine River Watershed |
| **Maximum Harvest Amount:** | 10000 |
| **Units:** | Individual Pieces |

Fisheries and Oceans Canada | Pêches et Océans Canada

Licence Number: XFSC 95 2014
Valid From: 01-Apr-2014
Expiry Date: 31-Mar-2015

| | |
|---|---|
| **Licence Holder:** | All |
| **Species:** | COHO SALMON (Oncorhynchus kisutch) |
| **Gear:** | Fish Wheel<br>Gaff<br>Gill Net<br>Net, Dip<br>Rod And Reel<br>Trap<br>Weir, Temporary |
| **Licence Area:** | Yukon/Transboundary; - Stikine River Watershed |
| **Maximum Harvest Amount:** | 200 |
| **Units:** | Individual Pieces |
| **Additional Descriptions:** | Gear Identification: All fishing gear must be clearly marked with the Person's name and Band number or in the case of an additional Participant, the fishing gear is to be marked with the unique designation number associated with the designation card. |

**Terms and Conditions:**

**Definitions**:

"DFO" means the Department of Fisheries and Oceans.

"First Nations" means the Tahltan and Iskut First Nations.

"Participant" means an individual designated in accordance with this licence to fish.

"Fishery" means fishing under the authority of this licence.

**General Provisions**:

Subject to amendments to the conditions of this licence and subject to closed times as may be varied by the Director General, Pacific Region, DFO in accordance with the Fishery (General) Regulations, and as provided within the Agreement species of fish set out in this licence may be harvested under this licence.

The Fishery is subject to closures and other terms and conditions of this licence, the authority to fish each species as set out under this licence will expire on March 31, 2015 or earlier if DFO, after consultation with the First Nation, has determined that a conservation problem exists.

This licence authorizes a harvest for the term of this licence for management purposes only, and is without prejudice to authorized harvests in future years.

**Designation:**

The members of the Tahltan and Iskut First Nations are designated to fish under this licence. Authorized representative(s) may designate additional Participants who may fish under the authority of this licence, and will issue a designation card to such individuals which will bear a unique designation number. The First Nations will provide DFO with a list of additional Participants and their designation numbers as they are issued. The information is to be communicated by fax or phone attention Area Chief of C&P in Whitehorse:

Fax: 867-393-6738
Phone 867-393-6722

Designations are personal and non-transferable. Persons designated to fish and additional Participants shall carry documentation to establish their membership in the First Nation or their designation card while participating in the Fishery and while transporting fish harvested in the Fishery and will present such documentation upon request by any fishery officer or fishery guardian.

**Use of Fisheries Resources Caught Under Authority of This Licence:**

Fish caught under this licence are for food, social and ceremonial purposes. Without prejudice to future agreements or regulations, sale of fish caught under this licence is not permitted.

**Dates and Times:**

Fishing is authorized by this licence 7 days a week from April 1, 2014 to March 31, 2015. Fishing dates and times are subject to amendment to the conditions of this licence and subject to close times as may be varied by the Director-General, Pacific Region, DFO in accordance with the Fishery (General) Regulations.

**Monitoring and Catch Reporting:**

Catch monitoring will be conducted by the Tahltan and Iskut First Nations in conjunction with DFO. Persons designated to fish shall supply the Tahltan and Iskut First Nations with their total catches by species. The Tahltan and Iskut First Nations will provide catch information to the local DFO office once per week during the Fishery.

**Compliance with the Fisheries Act**

Pursuant to subsection 22(6) of the Fishery (General) Regulations, compliance with the Fisheries Act and the regulations made under the Act is a condition of this licence.

---

Licence Issued: 09 May 2014

Licence Printed: 09 May 2014
Licence Issued By: LOUISE NAYLOR

# APPENDIX J:
# DIRECTED AND INCIDENTAL COMMERCIAL SALMON HARVESTS AND PERMITS OVER TIME

*Table J-1.–Southeast Alaska Region annual commercial Chinook salmon harvest by harvest type, in numbers and percent, from 1984–2014.*

| Year | Seine | % | Driftnet | % | Setnet | % | Troll | % | Annette Island | % | Hatchery | % | Misc. [a] | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1984 | 20,762 | 8% | 10,338 | 4% | 1,062 | <1% | 235,694 | 87% | 237 | <1% | 937 | <1% | 1,063 | 270,093 |
| 1985 | 21,535 | 8% | 10,386 | 4% | 1,231 | <1% | 216,049 | 85% | 713 | <1% | 2,658 | 1% | 1,121 | 253,693 |
| 1986 | 13,271 | 5% | 8,441 | 3% | 1,428 | 1% | 237,699 | 90% | 121 | <1% | 1,093 | <1% | 1,537 | 263,590 |
| 1987 | 6,284 | 2% | 8,430 | 3% | 2,072 | 1% | 242,529 | 92% | 565 | <1% | 2,376 | 1% | 932 | 263,188 |
| 1988 | 12,165 | 5% | 9,079 | 3% | 893 | <1% | 231,110 | 87% | 941 | <1% | 9,649 | 4% | 1,044 | 264,881 |
| 1989 | 17,103 | 6% | 9,579 | 3% | 798 | <1% | 235,609 | 83% | 892 | <1% | 19,680 | 7% | 1,395 | 285,056 |
| 1990 | 14,777 | 4% | 14,693 | 4% | 663 | <1% | 287,100 | 83% | 1,840 | 1% | 26,692 | 8% | 390 | 346,155 |
| 1991 | 17,107 | 5% | 18,457 | 6% | 1,747 | 1% | 263,153 | 79% | 4,015 | 1% | 25,995 | 8% | 703 | 331,177 |
| 1992 | 20,320 | 9% | 11,285 | 5% | 2,025 | 1% | 183,353 | 78% | 1,210 | 1% | 16,723 | 7% | 1,371 | 236,287 |
| 1993 | 12,291 | 4% | 18,011 | 6% | 1,311 | <1% | 226,561 | 80% | 639 | <1% | 23,246 | 8% | 2,752 | 284,811 |
| 1994 | 21,089 | 9% | 16,735 | 7% | 3,820 | 2% | 186,299 | 75% | 230 | <1% | 17,750 | 7% | 1,513 | 247,436 |
| 1995 | 26,777 | 12% | 13,342 | 6% | 9,374 | 4% | 138,117 | 63% | 133 | <1% | 31,405 | 14% | 1,281 | 220,429 |
| 1996 | 23,155 | 11% | 9,982 | 5% | 4,854 | 2% | 141,447 | 66% | 243 | <1% | 33,496 | 16% | 1,410 | 214,587 |
| 1997 | 10,841 | 4% | 11,006 | 4% | 3,264 | 1% | 246,402 | 81% | 505 | <1% | 30,144 | 10% | 2,294 | 304,456 |
| 1998 | 16,167 | 7% | 5,937 | 3% | 2,804 | 1% | 192,066 | 82% | 304 | <1% | 15,943 | 7% | 1,390 | 234,611 |
| 1999 | 20,849 | 11% | 8,983 | 5% | 5,108 | 3% | 146,218 | 74% | 744 | <1% | 15,100 | 8% | 1,093 | 198,095 |
| 2000 | 22,044 | 9% | 13,475 | 6% | 2,460 | 1% | 158,791 | 68% | 4,769 | 2% | 31,637 | 14% | 719 | 233,895 |
| 2001 | 22,314 | 9% | 13,644 | 6% | 2,631 | 1% | 153,280 | 62% | 4,156 | 2% | 49,028 | 20% | 783 | 245,836 |
| 2002 | 18,725 | 5% | 10,216 | 3% | 2,510 | 1% | 325,368 | 84% | 1,818 | <1% | 28,445 | 7% | 859 | 387,941 |
| 2003 | 25,236 | 6% | 10,704 | 3% | 3,842 | 1% | 330,719 | 79% | 780 | <1% | 45,723 | 11% | 868 | 417,872 |
| 2004 | 39,984 | 8% | 20,148 | 4% | 2,734 | 1% | 354,607 | 73% | 1,914 | <1% | 62,470 | 13% | 2,170 | 484,027 |
| 2005 | 20,421 | 5% | 55,754 | 12% | 766 | <1% | 338,024 | 75% | 1,697 | <1% | 29,408 | 7% | 1,922 | 447,992 |
| 2006 | 25,970 | 7% | 47,202 | 13% | 1,208 | <1% | 282,258 | 76% | 806 | <1% | 12,794 | 3% | 1,403 | 371,641 |
| 2007 | 28,398 | 8% | 30,067 | 8% | 1,562 | <1% | 267,986 | 75% | 1,232 | <1% | 28,167 | 8% | 1,817 | 359,229 |
| 2008 | 16,018 | 7% | 32,044 | 13% | 850 | <1% | 151,852 | 62% | 743 | <1% | 41,799 | 17% | 931 | 244,237 |
| 2009 | 29,888 | 11% | 25,221 | 9% | 1,533 | 1% | 175,335 | 65% | 1,033 | <1% | 35,107 | 13% | 516 | 268,633 |
| 2010 | 16,551 | 6% | 19,316 | 7% | 501 | <1% | 195,482 | 75% | 943 | <1% | 28,135 | 11% | 530 | 261,458 |
| 2011 | 27,770 | 8% | 31,009 | 9% | 1,123 | <1% | 242,184 | 70% | 1,705 | <1% | 41,301 | 12% | 976 | 346,068 |
| 2012 | 21,713 | 8% | 26,243 | 9% | 942 | <1% | 209,023 | 75% | 1,623 | 1% | 18,809 | 7% | 1,582 | 279,935 |
| 2013 | 24,516 | 10% | 34,525 | 14% | 1,401 | 1% | 149,472 | 62% | 1,453 | 1% | 29,770 | 12% | 144 | 241,281 |
| **2014** | **28,290** | **7%** | **27,877** | **7%** | **1,403** | **<1%** | **355,426** | **83%** | **1,418** | **<1%** | **13,148** | **3%** | **767** | **428,329** |
| **Averages** | | | | | | | | | | | | | | |
| 1962–2013 | 16,258 | 6% | 15,661 | 5% | 2,133 | 1% | 249,049 | 83% | 782 | <1% | - | - | - | 299,158 |
| 2004–2013 | 25,123 | 8% | 32,153 | 10% | 1,262 | <1% | 236,622 | 71% | 1,315 | <1% | 32,776 | 10% | 1,199 | 330,450 |
| Max. & year | 39,984 | 2004 | 55,754 | 2005 | 9,374 | 1995 | 375,427 | 1978 | 4,769 | 2000 | 62,470 | 2004 | 2,752 | 484,027 |
| Min. & year | 1,428 | 1976 | 4,598 | 1983 | 501 | 2010 | 138,117 | 1995 | 3 | 1966 | 937 | 1984 | 6 | 196,650 |

*Source:* (Conrad and Gray 2014:14)

*Note:* Chinook salmon harvest is reported by season (Oct. 1–Sept. 30) beginning October 1, 1979, for the 1980 season.

a Includes confiscation, test fisheries, and sanctioned sport derbies where fish were sold.

*Table J-2.–Southeast Alaska Region commercial salmon harvest, in numbers, by harvest type and fishery, 2014.*

| FISHERY | Chinook[a] | Jacks[b] | Sockeye | Coho | Pink | Chum | TOTAL |
|---|---|---|---|---|---|---|---|
| **Total Purse Seine** | 27,185 | 1,105 | 900,955 | 388,692 | 33,471,883 | 2,384,335 | 37,174,155 |
| Southern Purse Seine Total[c] | 25,041 | 973 | 882,264 | 358,562 | 29,984,492 | 1,098,648 | 32,349,980 |
| Southern Purse Seine Traditional | 15,868 | 577 | 880,608 | 320,143 | 29,891,218 | 915,740 | 32,024,154 |
| Southern Purse Seine Hatchery Terminal | 9,173 | 396 | 1,656 | 38,419 | 93,274 | 182,908 | 325,826 |
| Northern Purse Seine Total[d] | 2,144 | 132 | 18,691 | 30,130 | 3,487,391 | 1,285,596 | 4,824,084 |
| Northern Purse Seine Traditional | 361 | 34 | 14,862 | 27,775 | 3,335,706 | 215,366 | 3,594,104 |
| Northern Purse Seine Hatchery Terminal | 1,783 | 98 | 3,829 | 2,355 | 151,685 | 1,070,230 | 1,229,980 |
| **Total Drift Gillnet** | 27,877 | 0 | 497,968 | 554,301 | 1,417,432 | 2,381,367 | 4,878,945 |
| Tree Point | 1,267 | 0 | 55,828 | 91,342 | 708,357 | 184,289 | 1,041,083 |
| Prince of Wales | 2,092 | 0 | 58,430 | 286,815 | 415,392 | 106,243 | 868,972 |
| Stikine | 8,023 | 0 | 19,808 | 30,184 | 33,830 | 84,771 | 176,616 |
| Taku-Snettisham | 1,465 | 0 | 109,732 | 53,899 | 29,182 | 291,355 | 485,633 |
| Lynn Canal | 1,338 | 0 | 213,905 | 57,804 | 84,322 | 1,225,551 | 1,582,920 |
| Drift Gillnet Hatchery Terminal | 13,692 | 0 | 40,265 | 34,257 | 146,349 | 489,158 | 723,721 |
| **Set Gillnet** | 1,403 | 0 | 116,435 | 161,977 | 20,733 | 621 | 301,169 |
| **Total Troll** | 355,426 | - | 7,289 | 2,243,782 | 75,278 | 199,707 | 2,881,482 |
| Hand Troll Total | 18,281 | - | 185 | 119,703 | 4,643 | 2,849 | 145,661 |
| Hand Troll Traditional | 13,218 | - | 119 | 118,744 | 3,635 | 1,022 | 136,738 |
| Hand Troll Hatchery Terminal | 388 | - | 2 | 637 | 816 | 1,451 | 3,294 |
| Hand Troll Spring Fishery | 4,675 | - | 64 | 322 | 192 | 376 | 5,629 |
| Power Troll Total | 337,145 | - | 7,104 | 2,124,079 | 70,635 | 196,858 | 2,735,821 |
| Power Troll Traditional | 298,425 | - | 6,488 | 2,107,864 | 50,533 | 89,231 | 2,552,541 |
| Power Troll Hatchery Terminal | 847 | - | 197 | 12,630 | 17,820 | 87,989 | 119,483 |
| Power Troll Spring Fishery | 37,873 | - | 419 | 3,585 | 2,282 | 19,638 | 63,797 |
| **Total Annette Island Reservation** | 1,418 | 0 | 21,675 | 51,275 | 1,961,842 | 129,478 | 2,165,688 |
| Annette Island Purse Seine | 193 | 0 | 12,970 | 5,464 | 1,476,628 | 31,307 | 1,526,562 |
| Annette Island Drift Gillnet | 1,094 | 0 | 8,675 | 45,305 | 484,572 | 98,023 | 637,669 |
| Total Annette Island Troll | 131 | - | 30 | 506 | 642 | 148 | 1,457 |
| Annette Island Hand Troll | 131 | - | 30 | 506 | 642 | 148 | 1,457 |
| Annette Island Power Troll | 0 | - | 0 | 0 | 0 | 0 | 0 |
| Hatchery Cost Recovery | 13,148 | 0 | 123,029 | 387,988 | 236,214 | 1,577,145 | 2,337,524 |
| Miscellaneous[e] | 767 | 0 | 2,581 | 1,604 | 10,364 | 8,509 | 23,825 |
| Southern SE Totals[f] | 135,605 | 973 | 1,040,963 | 1,559,284 | 33,213,584 | 2,444,188 | 38,394,597 |
| Northern SE Totals[g] | 282,252 | 132 | 512,505 | 2,009,638 | 3,959,394 | 4,236,327 | 11,000,248 |
| Yakutat Area Totals[h] | 9,367 | 0 | 116,464 | 220,697 | 20,768 | 647 | 367,943 |
| **REGION TOTALS** | **427,224** | **1,105** | **1,669,932** | **3,789,619** | **37,193,746** | **6,681,162** | **49,762,788** |

*Source:* (Conrad and Gray 2014:12)

a Harvest accounting period for the Chinook salmon season goes from October 1, 2013, through September 30, 2014.

b Jack Chinook salmon are ≤ 28 inches. Chinook salmon of < 21 inches may be retained and sold in the purse seine fishery, and Chinook of all sizes may be sold in the drift gillnet fishery. Jack fish ticket data were revised in 2012, for the years 2005–2012, to provide more accurate accounting of gillnet harvested Chinook salmon for Pacific Salmon Treaty (PST) accounting purposes. Chinook salmon in the drift gillnet fishery will be based on recording of all sizes as one category on fish tickets, and separate accounting of jacks for PST purposes will be based on port sampling data. The PST accounts for Large Chinook salmon, ≥ 28 inches overall length, as Treaty Chinook.

c Southern Southeast Alaska includes Districts 101 to 108.

d Northern Southeast Alaska includes Districts 109 to 114.

e Includes salmon that were confiscated, caught in sport fish derbies, or commercial test fisheries, and sold.

f Districts 101 to 108, 150, and 152 (troll fishery Oct. 1–Sept 30).

g Districts 109 to 116, 154, 156, and 157 (troll fishery Oct. 1–Sept 30).

h Districts 181, 182, 183, 185, 186, 189, 191, 192 (troll fishery Oct. 1–Sept 30).

-continued-

*Table J-3.–Chinook salmon mortality in GOA groundfish fisheries.*

**Chinook salmon mortality in GOA groundfish fisheries**

| Year | Annual Total | GOA Pollock Fisheries | | | | | Other Fisheries |
|---|---|---|---|---|---|---|---|
| | | First Quarter | Second Quarter | Third Quarter | Fourth Quarter | Annual | |
| 1991 | 38,893 | 3,239 | 538 | 1,799 | 2,862 | 8,438 | 30,455 |
| 1992 | 16,788 | 2,289 | 2,663 | 1,457 | 1,801 | 8,210 | 8,578 |
| 1993 | 19,260 | 6,499 | 157 | 2,730 | 4,192 | 13,578 | 5,682 |
| 1994 | 13,616 | 3,685 | 88 | 1,973 | 1,474 | 7,220 | 6,396 |
| 1995 | 14,653 | 1,408 | 32 | 2,342 | 1,136 | 4,918 | 9,735 |
| 1996 | 15,761 | 4,802 | 57 | 6,421 | 100 | 11,380 | 4,381 |
| 1997 | 15,229 | 4,622 | 48 | 4,742 | 30 | 9,442 | 5,787 |
| 1998 | 16,983 | 1,672 | 1 | 8,550 | 4,005 | 14,228 | 2,755 |
| 1999 | 30,600 | 10,408 | 35 | 5,981 | 10,003 | 26,427 | 4,173 |
| 2000 | 26,730 | 4,298 | 2,313 | 9,744 | 2,058 | 18,413 | 8,317 |
| 2001 | 15,104 | 4,204 | 3,107 | 754 | 1,466 | 9,531 | 5,573 |
| 2002 | 12,919 | 1,505 | 640 | 553 | 2,463 | 5,161 | 7,758 |
| 2003 | 15,367 | 765 | 389 | 948 | 2,298 | 4,400 | 10,967 |
| 2004 | 17,778 | 3,632 | 2,176 | 2,207 | 5,137 | 13,152 | 4,626 |
| 2005 | 31,271 | 11,100 | 5,123 | 1,076 | 10,629 | 27,928 | 3,343 |
| 2006 | 18,762 | 2,918 | 4,292 | 4,636 | 3,859 | 15,705 | 3,057 |
| 2007 | 40,519 | 1,525 | 28,389 | 1,315 | 3,866 | 35,095 | 5,424 |
| 2008 | 16,264 | 578 | 7,691 | 389 | 2,087 | 10,745 | 5,519 |
| 2009 | 8,475 | 718 | 1,406 | 653 | 412 | 3,189 | 5,286 |
| 2010 | 54,631 | 4,992 | 2,038 | 4,863 | 32,926 | 44,819 | 9,812 |
| 2011 | 21,519 | 1,717 | 1,260 | 1,317 | 10,296 | 14,590 | 6,929 |
| 2012 | 19,959 | 2,907 | 861 | 4,398 | 8,129 | 16,295 | 3,664 |
| 2013 | 23,333 | 4,303 | 684 | 1,156 | 6,807 | 12,950 | 10,383 |
| 2014 | 15,752 | 1,718 | 1,626 | 3,406 | 4,134 | 10,884 | 4,868 |
| 2015 | 18,965 | 2,592 | 4,253 | 2,184 | 4,575 | 13,604 | 5,361 |
| 2016 | 2,582 | 2,446 | 123 | 0 | 0 | 2,569 | 13 |

Note:
1991 - 2002: Blend data. Week end date was used to determine quarters. Week end dates do not always match quarter dates.
2003 - Current: Catch Accounting System.
Due to changes in regulatory pollock season dates from 1991 to 2001 and to match current pollock season dates, data were grouped by quarter.
Multiple fixes were applied to the Catch Accounting System in early 2014. This has resulted in minor changes in prior years.
First Quarter Jan 1 - Feb 28
Second Quarter Mar 1 - May 31
Third Quarter Jun 1 - Sep 30
Fourth Quarter Oct 1 - Dec 31

*Source* NOAA Fiisheries, Alaska Regional Office, "Fisheries Catch and Landing Reports," Accessed March 16, 2017, https://alaskafisheries.noaa.gov/fisheries-catch-landings

*Table J-4.–Chinook salmon mortality in BSAI groundfish fisheries (including pollock).*

**Chinook salmon mortality in BSAI groundfish fisheries (including pollock)**

| Year | ANNUAL WITH CDQ | ANNUAL NO CDQ | ANNUAL CDQ | SEASON A With CDQ | SEASON B With CDQ | SEASON A No CDQ | SEASON B No CDQ | SEASON A CDQ Only | SEASON B CDQ Only |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | 48,880 | 48,880 | 0 | 46,392 | 2,488 | 46,392 | 2,488 | 0 | 0 |
| 1992 | 41,954 | 41,954 | 0 | 31,418 | 10,536 | 31,418 | 10,536 | 0 | 0 |
| 1993 | 46,013 | 46,013 | 0 | 24,688 | 21,325 | 24,688 | 21,325 | 0 | 0 |
| 1994 | 43,821 | 40,613 | 3,207 | 38,921 | 4,899 | 36,698 | 3,915 | 2,222 | 984 |
| 1995 | 23,436 | 21,430 | 2,005 | 18,939 | 4,497 | 18,284 | 3,145 | 654 | 1,351 |
| 1996 | 63,204 | 60,744 | 2,460 | 43,316 | 19,888 | 42,027 | 18,716 | 1,288 | 1,171 |
| 1997 | 50,530 | 48,046 | 2,483 | 16,401 | 34,128 | 14,902 | 33,144 | 1,499 | 984 |
| 1998 | 60,548 | 55,431 | 5,117 | 19,869 | 40,679 | 18,930 | 36,500 | 939 | 4,178 |
| 1999 | 14,599 | 12,937 | 1,662 | 8,793 | 5,805 | 8,204 | 4,732 | 589 | 1,073 |
| 2000 | 8,222 | 7,473 | 749 | 6,567 | 1,655 | 6,137 | 1,336 | 430 | 319 |
| 2001 | 40,547 | 37,986 | 2,561 | 24,871 | 15,676 | 23,093 | 14,893 | 1,778 | 783 |
| 2002 | 39,683 | 37,580 | 2,103 | 26,276 | 13,407 | 24,858 | 12,722 | 1,418 | 685 |
| 2003 | 53,661 | 50,948 | 2,713 | 40,058 | 13,603 | 38,262 | 12,685 | 1,795 | 918 |
| 2004 | 60,038 | 57,028 | 3,010 | 30,766 | 29,272 | 29,626 | 27,402 | 1,140 | 1,870 |
| 2005 | 75,084 | 73,028 | 2,056 | 33,622 | 41,462 | 32,326 | 40,702 | 1,296 | 760 |
| 2006 | 87,115 | 85,325 | 1,790 | 62,547 | 24,568 | 60,943 | 24,381 | 1,603 | 187 |
| 2007 | 130,000 | 124,356 | 5,644 | 78,156 | 51,844 | 75,062 | 49,294 | 3,094 | 2,550 |
| 2008 | 23,914 | 23,197 | 717 | 18,828 | 5,086 | 18,223 | 4,973 | 604 | 113 |
| 2009 | 14,171 | 13,668 | 503 | 11,345 | 2,825 | 10,931 | 2,736 | 414 | 89 |
| 2010 | 12,444 | 12,109 | 335 | 9,496 | 2,948 | 9,160 | 2,948 | 335 | 0 |
| 2011 | 26,609 | 25,845 | 764 | 7,602 | 19,007 | 7,171 | 18,673 | 430 | 334 |
| 2012 | 12,930 | 12,552 | 378 | 8,981 | 3,949 | 8,636 | 3,915 | 344 | 34 |
| 2013 | 16,007 | 15,346 | 661 | 9,186 | 6,821 | 8,714 | 6,632 | 472 | 189 |
| 2014 | 18,096 | 17,203 | 893 | 13,836 | 4,261 | 13,143 | 4,060 | 692 | 201 |
| 2015 | 25,254 | 23,805 | 1,449 | 17,503 | 7,751 | 16,455 | 7,350 | 1,048 | 401 |
| 2016 | 12,996 | 11,969 | 1,027 | 12,996 | 0 | 11,969 | 0 | 1,027 | 0 |

**Chinook salmon mortality in BSAI pollock directed fisheries**

| Year | ANNUAL WITH CDQ | ANNUAL NO CDQ | ANNUAL CDQ | SEASON A With CDQ | SEASON B With CDQ | SEASON A No CDQ | SEASON B No CDQ | SEASON A CDQ Only | SEASON B CDQ Only |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | 40,906 | 40,906 | 0 | 38,791 | 2,114 | 38,791 | 2,114 | 0 | 0 |
| 1992 | 35,950 | 35,950 | 0 | 25,691 | 10,259 | 25,691 | 10,259 | 0 | 0 |
| 1993 | 38,516 | 38,516 | 0 | 17,264 | 21,252 | 17,264 | 21,252 | 0 | 0 |
| 1994 | 33,136 | 30,572 | 2,564 | 28,451 | 4,686 | 26,871 | 3,701 | 1,580 | 985 |
| 1995 | 14,984 | 12,978 | 2,006 | 10,579 | 4,405 | 9,924 | 3,053 | 655 | 1,351 |
| 1996 | 55,623 | 53,162 | 2,460 | 36,068 | 19,554 | 34,780 | 18,383 | 1,289 | 1,172 |
| 1997 | 44,909 | 42,434 | 2,475 | 10,935 | 33,973 | 9,445 | 32,989 | 1,490 | 985 |
| 1998 | 56,440 | 51,322 | 5,118 | 16,132 | 40,308 | 15,193 | 36,130 | 939 | 4,179 |
| 1999 | 11,978 | 10,381 | 1,597 | 6,352 | 5,627 | 5,768 | 4,614 | 584 | 1,013 |
| 2000 | 4,961 | 4,242 | 719 | 3,422 | 1,539 | 2,992 | 1,250 | 430 | 289 |

Mar 3, 2016, 5:00 AM

*Table J-2.–Page 2 of 2.*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2001 | 33,444 | 30,937 | 2,507 | 18,484 | 14,961 | 16,711 | 14,227 | 1,773 | 734 |
| 2002 | 34,495 | 32,402 | 2,093 | 21,794 | 12,701 | 20,378 | 12,024 | 1,416 | 677 |
| 2003 | 45,661 | 43,096 | 2,565 | 33,478 | 12,183 | 30,913 | 12,183 | 2,565 | 0 |
| 2004 | 51,762 | 48,796 | 2,966 | 24,925 | 26,837 | 21,959 | 26,837 | 2,966 | 0 |
| 2005 | 68,184 | 66,251 | 1,933 | 27,960 | 40,224 | 26,027 | 40,224 | 1,933 | 0 |
| 2006 | 82,752 | 81,015 | 1,737 | 58,547 | 24,205 | 56,810 | 24,205 | 1,737 | 0 |
| 2007 | 124,723 | 116,575 | 8,148 | 72,943 | 51,780 | 67,323 | 49,252 | 5,620 | 2,528 |
| 2008 | 21,307 | 20,667 | 640 | 16,495 | 4,811 | 15,891 | 4,775 | 604 | 36 |
| 2009 | 12,579 | 12,132 | 447 | 9,882 | 2,697 | 9,524 | 2,608 | 358 | 89 |
| 2010 | 9,763 | 9,428 | 335 | 7,665 | 2,098 | 7,330 | 2,098 | 335 | 0 |
| 2011 | 25,499 | 24,735 | 764 | 7,137 | 18,362 | 6,707 | 18,028 | 430 | 334 |
| 2012 | 11,344 | 10,995 | 349 | 7,765 | 3,579 | 7,421 | 3,574 | 344 | 5 |
| 2013 | 13,034 | 12,514 | 520 | 8,237 | 4,797 | 7,765 | 4,749 | 472 | 48 |
| 2014 | 15,031 | 14,303 | 728 | 11,539 | 3,492 | 10,847 | 3,456 | 692 | 36 |
| 2015 | 18,330 | 17,299 | 1,031 | 12,305 | 6,025 | 11,524 | 5,775 | 781 | 250 |
| 2016 | 8,867 | 7,992 | 875 | 8,867 | 0 | 7,992 | 0 | 875 | 0 |

Notes:
Starting in 2011, the sampling method for salmon in BS pollock directed fisheries changed to census counts
Non-CDQ data for 1991-2002 from blend program database (bsahalx.dbf)
Non-CDQ data for 2003-2010 from Catch Accounting System database (akfish_cas2.v_cas_psc_estimate)
Non-CDQ data for 2011-2012 from Catch Accounting System database (akfish_cas2.v_cas_txn_primary_psc)
CDQ data for 1992-1997 from blend program database (bsahalx.dbf)
CDQ data for 1998 from blend program database (boatrate.dbf)
CDQ data for 1999-2007 from CDQ catch report database (akfish.v_cdq_catch_report_total_catch)
CDQ data for 2008-2010 from Catch Accounting System database (akfish_cas2.v_cas_psc_estimate)
CDQ data for 2011-2012 from Catch Accounting System database (akfish_cas2.v_cas_txn_primary_psc)
A season - January 1 to June 10
B season - June 11 to December 31
For specific pollock season dates by year see http://www.alaskafisheries.noaa.gov/sustainablefisheries/plckseas.pdf

Mar 3, 2016, 5:00 AM

*Source* NOAA Fiisheries, Alaska Regional Office, "Fisheries Catch and Landing Reports," Accessed March 16, 2017, https://alaskafisheries.noaa.gov/fisheries-catch-landings

*Table J-5.–Number of active limited entry and interim use permits issued and fished in the Southeast Alaska and Yakutat salmon fisheries, from 1975–2014.*

| | Number of Permits | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Purse Seine | | Drift Gillnet | | Set Gillnet | | Hand Troll | | Power Troll | | Total | |
| Year | Issued | Fished | Issued | Fished | Issued | Fished | Issued | Fished | Issued | Fished | Issued | Fished |
| 1975 | 477 | 287 | 511 | 443 | 215 | 141 | 2,088 | 1,092 | 1,079 | 762 | 4,370 | 2,725 |
| 1976 | 418 | 280 | 487 | 432 | 159 | 133 | 2,082 | 1,238 | 998 | 745 | 4,144 | 2,828 |
| 1977 | 414 | 325 | 474 | 438 | 159 | 144 | 2,953 | 1,836 | 970 | 750 | 4,970 | 3,493 |
| 1978 | 420 | 376 | 491 | 474 | 164 | 155 | 3,923 | 2,624 | 976 | 816 | 5,974 | 4,445 |
| 1979 | 418 | 319 | 491 | 449 | 167 | 155 | 3,702 | 2,207 | 980 | 819 | 5,758 | 3,949 |
| 1980 | 418 | 335 | 489 | 445 | 167 | 159 | 2,436 | 1,667 | 974 | 842 | 4,484 | 3,448 |
| 1981 | 418 | 364 | 487 | 447 | 167 | 158 | 2,048 | 1,153 | 970 | 793 | 4,090 | 2,915 |
| 1982 | 421 | 370 | 487 | 431 | 164 | 147 | 1,914 | 1,067 | 968 | 810 | 3,954 | 2,825 |
| 1983 | 421 | 338 | 481 | 432 | 165 | 145 | 2,150 | 946 | 968 | 810 | 4,185 | 2,671 |
| 1984 | 423 | 383 | 481 | 437 | 164 | 140 | 2,147 | 860 | 963 | 795 | 4,178 | 2,615 |
| 1985 | 420 | 368 | 485 | 446 | 164 | 148 | 2,030 | 903 | 963 | 830 | 4,062 | 2,695 |
| 1986 | 420 | 368 | 488 | 460 | 164 | 154 | 1,983 | 804 | 957 | 827 | 4,012 | 2,613 |
| 1987 | 420 | 381 | 486 | 465 | 165 | 154 | 1,937 | 763 | 957 | 828 | 3,965 | 2,591 |
| 1988 | 420 | 394 | 485 | 470 | 165 | 159 | 1,870 | 777 | 956 | 828 | 3,896 | 2,628 |
| 1989 | 420 | 365 | 485 | 466 | 166 | 160 | 1,817 | 694 | 955 | 830 | 3,843 | 2,515 |
| 1990 | 420 | 360 | 486 | 465 | 166 | 158 | 1,782 | 699 | 956 | 839 | 3,810 | 2,521 |
| 1991 | 420 | 383 | 485 | 465 | 168 | 161 | 1,741 | 700 | 959 | 847 | 3,773 | 2,556 |
| 1992 | 420 | 354 | 485 | 467 | 170 | 159 | 1,689 | 645 | 957 | 837 | 3,721 | 2,462 |
| 1993 | 419 | 382 | 482 | 460 | 171 | 157 | 1,633 | 600 | 956 | 836 | 3,661 | 2,435 |
| 1994 | 418 | 390 | 483 | 446 | 171 | 150 | 1,579 | 547 | 954 | 804 | 3,605 | 2,337 |
| 1995 | 418 | 373 | 483 | 452 | 171 | 147 | 1,540 | 460 | 954 | 818 | 3,566 | 2,250 |
| 1996 | 417 | 357 | 484 | 439 | 171 | 139 | 1,501 | 412 | 967 | 737 | 3,540 | 2,084 |
| 1997 | 416 | 351 | 482 | 423 | 170 | 141 | 1,459 | 387 | 968 | 740 | 3,495 | 2,042 |
| 1998 | 416 | 377 | 479 | 422 | 170 | 142 | 1,409 | 304 | 967 | 732 | 3,441 | 1,977 |
| 1999 | 416 | 359 | 481 | 430 | 170 | 128 | 1,370 | 338 | 965 | 721 | 3,402 | 1,976 |
| 2000 | 416 | 356 | 480 | 422 | 170 | 125 | 1,329 | 315 | 963 | 712 | 3,358 | 1,930 |
| 2001 | 415 | 345 | 482 | 433 | 169 | 114 | 1,295 | 307 | 965 | 701 | 3,326 | 1,900 |
| 2002 | 415 | 273 | 482 | 391 | 167 | 87 | 1,247 | 253 | 965 | 666 | 3,276 | 1,670 |
| 2003 | 416 | 235 | 477 | 375 | 167 | 104 | 1,189 | 265 | 965 | 637 | 3,214 | 1,616 |
| 2004 | 414 | 209 | 478 | 348 | 168 | 112 | 1,139 | 324 | 961 | 688 | 3,160 | 1,681 |
| 2005 | 415 | 232 | 478 | 368 | 168 | 114 | 1,108 | 353 | 961 | 715 | 3,130 | 1,782 |
| 2006 | 414 | 230 | 477 | 358 | 167 | 104 | 1,104 | 371 | 961 | 737 | 3,123 | 1,800 |
| 2007 | 415 | 237 | 476 | 387 | 166 | 120 | 1,083 | 375 | 961 | 740 | 3,101 | 1,859 |
| 2008 | 380 | 212 | 475 | 392 | 165 | 128 | 1,065 | 375 | 961 | 745 | 3,046 | 1,852 |
| 2009 | 379 | 256 | 474 | 406 | 167 | 122 | 1,055 | 364 | 961 | 745 | 3,036 | 1,893 |
| 2010 | 379 | 235 | 474 | 422 | 167 | 127 | 1,044 | 339 | 962 | 729 | 3,026 | 1,852 |
| 2011 | 379 | 269 | 474 | 442 | 167 | 121 | 1,037 | 372 | 962 | 760 | 3,019 | 1,964 |
| 2012 | 315 | 233 | 474 | 444 | 168 | 113 | 1,019 | 353 | 961 | 743 | 2,937 | 1,886 |
| 2013 | 315 | 276 | 473 | 440 | 168 | 106 | 1,002 | 362 | 961 | 722 | 2,919 | 1,906 |
| **2014** | **315** | **261** | **473** | **432** | **168** | **117** | **1,002** | **346** | **961** | **758** | **2,919** | **1,914** |
| Averages | | | | | | | | | | | | |
| 1975-2013 | 410 | 322 | 482 | 432 | 168 | 137 | 1,705 | 729 | 967 | 770 | 3,733 | 2,390 |
| 2004-2013 | 381 | 239 | 475 | 402 | 167 | 117 | 1,066 | 359 | 961 | 733 | 3,050 | 1,849 |

*Source:* (Conrad and Gray 2014:11)

*Notes:* Data is provided beginning in the year salmon limited entry permits were first issued; 1975 for seine, drift gillnet, set gillnet, and power troll. Permits for hand troll were first issued in 1982. Permits issued and fished data provided by Commercial Fisheries Entry Commission (www.cfec.state.ak.us).

Data for 2014 is preliminary.

*Table J-6.–Southeast Alaska Region annual commercial total salmon harvest by harvest type, in numbers and percent, from 1984–2014.*

| Year | Seine | % | Driftnet | % | Setnet | % | Troll[a] | % | Annette Island | % | Hatchery[b] | % | Misc.[c] | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1984 | 24,332,522 | 76% | 3,132,879 | 10% | 337,983 | 1% | 1,979,620 | 6% | 1,736,351 | 5% | 650,799 | 2% | 15,915 | 32,186,069 |
| 1985 | 50,238,448 | 84% | 4,117,020 | 7% | 467,777 | 1% | 2,839,247 | 5% | 1,611,119 | 3% | 640,062 | 1% | 35,718 | 59,949,391 |
| 1986 | 46,156,636 | 84% | 3,161,172 | 6% | 268,174 | <1% | 2,605,376 | 5% | 2,047,763 | 4% | 367,868 | 1% | 35,458 | 54,642,447 |
| 1987 | 8,691,654 | 54% | 3,016,768 | 19% | 413,943 | 3% | 1,792,464 | 11% | 538,333 | 3% | 1,642,715 | 10% | 90,459 | 16,186,336 |
| 1988 | 11,274,603 | 64% | 2,607,418 | 15% | 518,455 | 3% | 1,348,285 | 8% | 1,058,584 | 6% | 645,811 | 4% | 61,563 | 17,514,719 |
| 1989 | 54,320,898 | 82% | 4,450,699 | 7% | 580,479 | 1% | 3,511,698 | 5% | 2,691,297 | 4% | 444,565 | 1% | 43,401 | 66,043,037 |
| 1990 | 30,330,838 | 76% | 2,917,511 | 7% | 530,825 | 1% | 2,963,172 | 7% | 1,727,293 | 4% | 1,414,924 | 4% | 45,422 | 39,929,985 |
| 1991 | 62,191,634 | 88% | 2,803,393 | 4% | 404,417 | 1% | 2,447,041 | 3% | 1,127,702 | 2% | 1,811,164 | 3% | 68,797 | 70,854,148 |
| 1992 | 34,808,120 | 75% | 3,832,020 | 8% | 632,425 | 1% | 2,894,863 | 6% | 1,190,707 | 3% | 3,094,606 | 7% | 45,990 | 46,498,731 |
| 1993 | 60,196,878 | 83% | 3,946,447 | 5% | 598,618 | 1% | 4,075,696 | 6% | 1,725,815 | 2% | 1,727,084 | 2% | 49,886 | 72,320,424 |
| 1994 | 60,075,945 | 79% | 4,255,756 | 6% | 570,976 | 1% | 4,948,777 | 7% | 725,117 | 1% | 5,386,836 | 7% | 76,180 | 76,039,587 |
| 1995 | 51,650,711 | 80% | 4,885,907 | 8% | 514,753 | 1% | 2,907,372 | 5% | 2,165,624 | 3% | 2,374,544 | 4% | 53,726 | 64,552,637 |
| 1996 | 72,547,199 | 84% | 4,054,104 | 5% | 474,783 | 1% | 3,277,938 | 4% | 1,066,239 | 1% | 5,352,633 | 6% | 71,534 | 86,844,430 |
| 1997 | 32,418,643 | 71% | 3,861,436 | 8% | 530,584 | 1% | 2,313,468 | 5% | 649,343 | 1% | 5,655,779 | 12% | 91,387 | 45,520,640 |
| 1998 | 49,057,331 | 78% | 4,332,833 | 7% | 365,039 | 1% | 2,213,999 | 4% | 1,070,302 | 2% | 5,700,976 | 9% | 89,256 | 62,829,736 |
| 1999 | 81,768,382 | 84% | 4,347,194 | 4% | 351,396 | <1% | 3,039,972 | 3% | 1,068,721 | 1% | 7,053,481 | 7% | 139,129 | 97,768,275 |
| 2000 | 27,180,728 | 69% | 3,918,771 | 10% | 338,124 | 1% | 1,953,985 | 5% | 1,128,736 | 3% | 5,028,361 | 13% | 95,943 | 39,644,648 |
| 2001 | 67,965,608 | 84% | 4,141,301 | 5% | 382,060 | <1% | 2,734,661 | 3% | 2,224,126 | 3% | 3,854,849 | 5% | 89,800 | 81,392,405 |
| 2002 | 45,891,149 | 80% | 3,129,105 | 5% | 331,848 | 1% | 1,845,766 | 3% | 1,548,231 | 3% | 4,378,603 | 8% | 98,216 | 57,222,918 |
| 2003 | 55,331,699 | 81% | 3,926,654 | 6% | 281,529 | <1% | 2,004,826 | 3% | 674,026 | 1% | 5,759,988 | 8% | 93,598 | 68,072,320 |
| 2004 | 49,621,064 | 80% | 3,914,562 | 6% | 312,708 | 1% | 2,503,067 | 4% | 876,978 | 1% | 4,978,262 | 8% | 104,429 | 62,311,070 |
| 2005 | 59,823,736 | 85% | 3,832,649 | 5% | 223,835 | <1% | 2,670,355 | 4% | 706,778 | 1% | 3,264,074 | 5% | 146,956 | 70,668,383 |
| 2006 | 16,281,579 | 56% | 4,796,219 | 17% | 315,892 | 1% | 1,867,125 | 6% | 475,603 | 2% | 5,233,643 | 18% | 77,642 | 29,047,703 |
| 2007 | 46,461,718 | 79% | 4,176,973 | 7% | 405,180 | 1% | 1,947,109 | 3% | 1,092,752 | 2% | 4,340,585 | 7% | 204,904 | 58,629,221 |
| 2008 | 17,811,215 | 63% | 3,787,192 | 13% | 255,562 | 1% | 1,533,878 | 5% | 1,139,310 | 4% | 3,537,129 | 13% | 17,864 | 28,082,150 |
| 2009 | 39,070,600 | 76% | 4,051,167 | 8% | 318,993 | 1% | 2,182,554 | 4% | 1,951,852 | 4% | 3,975,060 | 8% | 41,431 | 51,591,657 |
| 2010 | 24,151,627 | 65% | 4,446,106 | 12% | 445,692 | 1% | 2,022,645 | 5% | 1,742,725 | 5% | 4,374,123 | 12% | 59,940 | 37,242,858 |
| 2011 | 58,825,905 | 80% | 5,229,708 | 7% | 500,818 | 1% | 2,760,124 | 4% | 1,255,465 | 2% | 5,081,084 | 7% | 64,894 | 73,717,998 |
| 2012 | 24,466,785 | 66% | 5,246,294 | 14% | 253,904 | 1% | 2,058,831 | 6% | 1,341,963 | 4% | 3,549,733 | 10% | 60,964 | 36,978,474 |
| 2013 | 95,415,053 | 85% | 6,018,618 | 5% | 396,575 | <1% | 4,285,913 | 4% | 2,823,488 | 3% | 3,419,702 | 3% | 80,963 | 112,440,312 |
| **2014** | **37,174,155** | **75%** | **4,878,945** | **10%** | **301,169** | **1%** | **2,881,482** | **6%** | **2,165,688** | **4%** | **2,337,524** | **5%** | **23,825** | **49,762,788** |
| **Averages** | | | | | | | | | | | | | | |
| 1962–2013 | 32,199,534 | 77% | 3,005,121 | 9% | 353,453 | 1% | 2,004,942 | 6% | 961,428 | 2% | - | - | - | 40,588,488 |
| 2004–2013 | 43,192,928 | 74% | 4,549,949 | 9% | 342,916 | 1% | 2,383,160 | 5% | 1,340,691 | 3% | 4,175,340 | 9% | 85,999 | 56,070,983 |
| Max.& year | 95,415,053 | 2013 | 6,018,618 | 2013 | 632,425 | 1992 | 4,948,777 | 1994 | 2,823,488 | 2013 | 7,053,481 | 1999 | 204,904 | 112,440,312 |
| Min. & year | 3,929,881 | 1975 | 868,518 | 1975 | 166,361 | 1970 | 582,091 | 1975 | 30,866 | 1969 | 752 | 1980 | 6,931 | 5,688,347 |

*Source:* (Conrad and Gray 2014:13)

a Salmon harvest is reported by calendar year except for the troll fishery. Troll is reported by season (Oct. 1–Sept. 30) beginning October 1, 1979, for the 1980 season.

b Includes salmon caught and sold in private, state, and federal hatchery's fisheries and carcass sales.

c Includes confiscations, commercial test fisheries, and sport derbies where fish were sold.

# APPENDIX K:
# CHRONOLOGICAL HISTORY OF SALMON CANNERIES IN SOUTHEAST ALASKA

# CHRONOLOGICAL HISTORY OF SALMON CANNERIES IN SOUTHEASTERN ALASKA

Compiled by Lewis G. MacDonald from records of the Bureau of Fisheries, Fish & Wildlife Service and other sources.

Long before the advent of the white man in Alaska, the native inhabitants utilized a small fraction of the abundant fisheries. The early Russian American Company shipped a few thousand barrels of choice salt fish to California and St. Petersburg. From Redoubt Lake, near Sitka, they supplied a large local area with red salmon without providing for sufficient escapement, thereby depleting the run there.

Salteries preceded the canneries. There was a saltery at Klawock before the first cannery was constructed there.

Mortality among the salmon canneries in Southeastern Alaska has been high. During the years, 1878-1949, covered by the following history, 134 canneries were built; 65 burned and were not rebuilt; five burned and were rebuilt; ten were moved to other sites; some operations were consolidated. There were 37 operating plants in Southeastern Alaska in 1949.

**1878**

It was not until eleven years after the United States purchased Alaska from Russia that the first cannery was built at Klawock by the North Pacific Trading and Packing Co. in 1878. It was operated until 1929 when Libby, McNeill & Libby bought it, operated it in 1929-30 and then closed it permanently.

The Cutting Packing Co. also built a cannery in 1878, but at Sitka. This cannery operated until 1880 when it was dismantled and moved to Cook Inlet.

**1882**

Chilkat Packing Co. (M. J. Kinney); Chilkat Inlet; burned 1892.

**1883**

Northwest Trading Co.; Pyramid Harbor (Chilkat Inlet); 1888 sold to D. L. Beck & Sons; burned 1889; rebuilt; sold to Alaska Packers 1893; abandoned 1908.

Fox Packing Co. (M. J. Kinney); Boca de Quadra; sold to Tongass Packing Co. and moved to Ketchikan 1886; burned 1889.

**1887**

Aberdeen Packing Co.; mouth of Stikine River; moved as Glacier Packing Co. to Pt. Highfield (Wrangell Is.) 1889; joined Alaska Packers 1893; closed 1927.

Boston Fishing & Trading Co. (Ford, Rhode & Johnson); Yes Bay; first operated 1889; sold to Pacific Packing & Navigation Co. 1901; sold to Northwestern Fisheries 1904; sold to C. A. Burkhart 1906; sold to Alaska Consolidated Canneries 1922; closed 1928.

**1888**

Cape Lees Packing Co. (Andrew and Benjamin Young); Burroughs Bay; closed 1890; sold to Alaska Packers, dismantled 1893.

Cutting Packing Co. (Alaska Salmon Packing & Fur Co.); Loring; joined Alaska Packers 1893; closed 1930.

**1889**

Astoria & Alaska Packing Co.; Pavlof Harbor; moved to Pt. Ellis 1890.

Baranof Packing Co.; Redoubt; moved to Red Fish Bay 1890.

Thlinket Packing Co.; Pt. Gerad (Wrangell Is.); sold to Pacific Packing & Navigation Co. 1901; closed 1902.

Chilkat Canning Co.; Chilkat Village; joined Alaska Packers 1893; later dismantled.

**1890**

Bartlett Bay Packing Co.; Bartlett Bay; crude packed 4,300 cases; ice from Glacier Bay halted operations 1891; sold to Alaska Packers 1893; dismantled.

Annette Island Packing Co.; Metlakatla; owned by the Village; burned; rebuilt; still operating.

**1891**

Boston Fishing & Trading Co.; Pt. Ellis; burned 1892. Baranof Packing Co.; Red Fish Bay (equipment from Redoubt plant); sold to Alaska Packers 1898; dismantled.

**1896**

Pacific Steam Whaling Co.; Hunters Bay; joined Pacific Packing & Navigation Co. 1901; closed 1904; sold to Northwestern Fisheries, Inc. 1905; closed finally 1930; plant sold to Pacific American Fisheries 1933 but not operated.

Quadra Packing Co.; Mink Arm (Boca de Quadra); sold to Pacific Packing & Navigation Co. 1901; closed 1904-05; sold to Northwestern Fisheries 1906; reopened 1907; closed 1931; plant sold to Pacific American Fisheries 1933 but not reopened.

**1899**

Icy Straits Packing Co. (stockholders of the Quadra Packing Co.) Petersburg; sold to Pacific Packing & Navigation Co. 1901; closed 1903-05; sold to Northwestern Fisheries 1905; sold to Norway Packing Co. 1906; taken over by Petersburg Packing Co. 1915; sold to Pacific American Fisheries 1929; operating.

**1900**

Western Fisheries Co.; Dundas Bay; sold to Pacific Packing & Navigation Co. 1901; sold to Northwestern Fisheries 1905; closed, 1931; sold to Pacific American Fisheries 1932 but not operated.

Royer Warnock Packing Co.; Beecher Pass; operated one year.

Taku Fishing Co.; southern shore Port Snettisham; sold to Pacific Packing & Navigation Co. 1901; closed 1902.

Chilkoot Packing Co.; head of Chilkoot Inlet; sold to Pacific Packing & Navigation Co. 1901; closed 1904.

Taku Packing Co.; Taku Inlet; joined Pacific Packing & Navigation Co. and closed 1904.

Fidalgo Island Packing Co.; Ketchikan; operating.

**1901**

Thlinket Packing Co.; Santa Anna; no operation 1903-05; sold to

Northwestern Fisheries 1905; closed 1920; plant sold to Pacific American Fisheries 1933; abandoned 1938.

Union Bay Packing Co.; Ken Bay (Affleck Canal); plant moved to

Bristol Bay 1904.

Pacific Coast & Norway Packing Co.; Tonka; moved to Petersburg 1906.

F. C. Barnes; Lake Bay; sold to Columbia River Packers 1929; closed 1930.

San Juan Fishing & Packing Co.; Taku Harbor; (cannery and cold storage plant); sold to Pacific Cold Storage Co. 1903; leased to Taku Alaskan Packing Co. 1906; leased to John L. Carlson & Co. 1907; sold to Carlson 1911; sold to Libby, McNeill & Libby 1918; operated to 1947 still maintained.

Chatham Straits Packing Co.; Sitkoh Bay; sold to Pacific Packing & Navigation Co. 1901; sold to George T. Myers 1904; sold to New England Fish Co. 1929; operating.

**1902**

Wales Island Packing Co.; Wales Is. (near Ketchikan); island became part of Canadian Territory in 1903; not listed as American plant.

Alaska Fisheries Union; Chilkat Inlet; leased to Lynn Canal Packing Co. 1905; sold to Pacific American Fisheries 1906; moved to Excursion Inlet 1908. Kasaan Bay Co.; Kasaan; closed 1904-05; sold to Gorman & Co. 1905; burned 1906; rebuilt 1911; sold to Booth Fisheries 1915; packing name changed to Northwestern Fisheries 1921; sold to Pacific American Fisheries 1933; operating.

Thlinket Packing Co.; Funter Bay; sold to Alaska Pacific Salmon Corp. 1926; closed 1931; sold to P. E. Harris 1941 but not operated.

Alaska Fish & Lumber Co.; Shakan; not operated 1904-05; sold to Gorman & Co. 1906 (Shakan Salmon Co.); sold to Booth Fisheries 1915 (operating as Northwestern Fisheries); closed 1930; plant sold to Pacific American Fisheries 1933; dismantled.

Pillar Bay Packing Co.; Pillar Bay; sold to Fidalgo Island Packing Co. 1918; operating.

**1904**

Yakutat & Southern Railway; Yakutat; nine-mile railway built to fishing site; sold to Libby, McNeill & Libby 1917; cannery maintained.

**1908**

Astoria Puget Sound Co.; Excursion Inlet; sold to Columbia River Packers 1948; burned 1948.

Pacific American Fisheries moved Chilkat Inlet plant to Excursion Inlet; closed 1935; consolidated with Astoria Puget Sound.

**1910**

St. Elias Packing Co.; Dry Bay; closed 1913.

**1911**

Hidden Inlet Canning Co.; Hidden Inlet; burned 1920; A&P Co. built on same site 1922; name changed to Nakat Packing Co. 1924; operating.

L. Gustav & Co.; Skowl Arm; sold to Straits Packing Co.; burned 1920; rebuilt 1923; leased to United Salmon Packers 1930; leased to Skowl Arm Packers 1932; sold to Deep Sea Canning Co. 1933; closed 1937.

Tee Harbor Packing Co.; Tee Harbor; sold to Alaska Pacific Fisheries 1920; sold to Alaska Consolidated Canneries 1922; burned 1924.

Hawk Inlet Fish Co.; Hawk Inlet; sold to P. E. Harris 1915; operating.

**1912**

Revilla Fish Products Co.; Ketchikan; closed after one year operation.

Oceanic Packing Co.; Waterfall; sold to Alaska Fish Co. 1913; sold to Nakat Packing Co. 1924; operating.

Lindenberger Packing Co.; Craig; sold to Sea Coast Packing Co. 1917; sold to Libby McNeil and Libby 1929; operating.

Lindenberger Packing Co.; Roe Point (Behm Canal); sold to Northwestern Fisheries 1916; closed 1920; burned 1929.

Alaska Sanitary Packing Co.; Wrangell; burned 1924.

Beauclerc Packing Co.; Port Beauclerc; burned 1926.

Sanborn Cram Co.; Burnett Inlet; sold to Burnett Inlet Packing Co. 1918; sold to Alaska Pacific Fisheries 1930; idle until sold to Burnett Inlet Salmon Co. 1937; burned 1940.

Hoonah Packing Co.; Hoonah; closed 1924; sold to Icy Strait Packing Co. 1934; operating.

G. W. Hume Co.; Nakat Inlet; burned 1920.

Karheen Packing Co.; Karheen; sold to Libby, McNeil & Libby 1929; operated 1930 and closed; burned 1933.

Admiralty Trading Co.; Gambier Bay; sold to Hoonah Packing Co.

1915; closed 1923.

Starr Collinson Packing Co.; Moira Sound; burned 1929.

Sunny Point Canning Co.; Ketchikan; name changed to Alaska Pacific Salmon Corp. 1929; sold to P. E. Harris Co. 1940; sold to Nakat Packing Co. 1949.

Swift Arthur Cresby Co.; Warm Chuck (Heceta Is.); leased to A&P Products Corp. 1922; named changed to Nakat Packing Co. 1925; closed 1929.

Point Warde Packing Co.; Point Warde (Behm Canal); operated until 1921; closed three years; reopened 1924; sold to Whitworth Fisheries, Inc. 1927; leased to Alaska Associated Canneries 1929; dismantled 1930.

Pure Food Fish Co.; Ketchikan; leased to Nakat Packing Co. 1927; sold to Nakat 1928; closed 1930.

Weise Packing Co.; Rose Inlet; sold to Southern Alaska Canning Co. 1918; went under Alaska Consolidated Canneries 1922; sold to Alaska Pacific Salmon Corp. 1929; sold to P. E. Harris 1941; maintained.

Walsh Moore Canning Co.; Ward's Cove; sold to Wards Cove Packing Co. 1914; operating. Canoe Pass Packing Co.; Canoe Pass; operated one year; dismantled and moved to Cordova 1914.

Sanborn Cutting Co.; Kake; sold to Alaska Pacific Salmon Corp. 1926; sold to P. E. Harris 1940; recently sold to the Organized Village of Kake; operating.

Deep Sea Salmon Co.; Fords Arm (near Cape Edwards); leased to A&P Products Corp. 1920; closed 1923.

Alaska Pacific Fisheries; Chomly; taken over by Alaska Consolidated Canneries 1922; sold to Alaska Pacific Salmon Corp. 1929; closed 1930.

**1914**

George Inlet Packing Co.; George Inlet; sold to Libby, McNeill & Libby 1927; operating.

**1915**

Doyhof Fish Products Co.; Scow Bay (Wrangell Narrows); sold to

G. W. Hume 1919; leased to P. E. Harris 1923; machinery moved to Lake Bay cannery 1925.

**1916**

J. L. Smiley Co.; Ketchikan; sold to Pacific American Fisheries 1928; closed 1932.

Tenakee Fisheries; Tenakee Inlet; sold to Standard Salmon Co. 1920; leased to J. D. Roop Co. 1922; sold to Superior Fish Co. 1923 and was reorganized in 1927 under the name of Superior Packing Co.; operating.

Union Bay Fisheries Co.; Union Bay; taken over by G. W. Hume 1923; sold to Atlantic & Pacific Tea Co. 1924; operation name changed to Nakat Packing Co. 1925; burned 1947.

Beegle Packing Co.; Ketchikan; taken over by P. E. Harris 1944.

Ketchikan Packing Co.; Ketchikan; closed 1921.

Auke Bay Salmon Canning Co.; Auke Bay; closed 1924.

**1917**

Baranof Packing Co.; Red Bluff Bay; closed 1921; used as saltery station.

Lane & Williams; Moira Sound; closed 1919.

Sitka Packing Co.; Sitka; leased to DeLong & Wolf 1921; leased to A. P. Wolf & Co. 1922; Sitka Packing Co. operated in 1923; sold to Pyramid Packing Co. 1924; operating.

Alaska Herring and Sardine Co.; Port Walter; closed 1925; sold to PAF in 1929 but not operated.

R. L. Cole & Co.; (north of Craig); closed 1920.

Alaska Pacific Herring Co.; Big Port Walter; sold to Southern Alaska Canning Co. after two years; closed 1922; later used as saltery and herring reduction plant.

Haines Packing Co.; Chilkat Inlet (Litnekof Cove); operating.

**1918**

Pyramid Packing Co.; Sitka; sold to Sitka Packing Co. 1923; reorganized 1942 under name of Pyramid Fisheries, Inc.; operating.

Columbia Salmon Co.; Tenakee; sold to Alaska Consolidated Canneries 1922; closed 1929.

Deep Sea Salmon Co.; Port Althorp; sold to Alaska Pacific Salmon Corp. 1929; burned 1940.

Northern Packing Co.; Juneau; closed 1920.

Pybus Bay Fish & Packing Co.; Pybus Bay; sold to Alaska Consolidated Canneries; 1922; sold to Alaska Pacific Salmon Corp. 1928; closed 1928.

Hidden Inlet Canning Co.; Hood Bay; sold to Hood Bay Canning Co. 1927; sold to Angoon native village 1949.

American Packing Co.; Juneau; closed after two years operation.

Noyes Island Packing Co.; Steamboat Bay; sold to Steamboat Bay Packing Co. 1922; sold to New England Fish Co. 1924.

T. E. P. Keegan; Douglas; operated one year; closed.

H. Van Vlack & Co.; Thomas Bay; operated 1918; later used as shrimp cannery and saltery station.

Alaska Packing & Navigation Co.; Pavlof Harbor; sold to Pavlof Harbor Packing Co. 1919; leased to Carlson Bros. 1921; closed 1923.

Alaska Fisheries Co.; Washington Bay; sold to Petersburg Packing Co. 1919; closed 1921; used as saltery and reduction plant.

Todd Packing Co.; Todd (Peril Straits); closed 1921; sold to Peril Straits Packing Co. 1927; reorganized as Todd Packing Co. 1942; operating.

Southern Alaska Canning Co.; Boca de Quadra; sold to Alaska Consolidated Canneries 1922; closed 1928; plant sold to Alaska Pacific Salmon Corp. 1929 but not operated.

**1919**

Mountain Point Packing Co.; Scow Bay; bought Alaska Clam Co. buildings and operated salmon cannery; leased to Wrangell Narrows Packing Co. 1929; leased to O. Nickolson 1932; leased to Hanseth Bros. 1933; sold to Scow Bay Packing Co. 1934; idle 1938-42; leased by Dean Kaylor 1942-45; leased to H. M. Parks Co. 1949.

Alaska Sanitary Packing Co.; Cape Fanshaw; operated 1919-20 then closed.

Marathon Fishing & Packing Co.; Cape Fanshaw; operated 1919-20 then closed.

Cape Fanshaw Fishing and Packing Co.; Cape Fanshaw; operated one year and closed.

Alaska Salmon & Herring Packers; Tyee; sold to Sebastian & Steward 1924; operating.

Hood Bay Packing Co.; Hood Bay; reconverted into reduction plant 1924.

Douglas Island Packing Co.; Douglas; leased to ElIson Packing Co. 1931; taken over by Douglas Fisheries 1933; sold to Douglas Canning Co. 1946; maintained.

John L. Carlson & Co.; Auke Bay; closed 1922; dismantled 1925.

**1920**

Revilla Packing Co.; Ketchikan; operated one year; dismantled 1924.

E. R. Strand; Wrangell Narrows; operated one year.

Alaska Union Fisheries, Inc.; Port Conclusion (Baranof Is.); operated 1920-21; closed 1921.

Hetta Packing Co.; Coppermount (Hetta Inlet); closed 1930.

**1922**

Ness Fish Co.; Petersburg; packed salmon one year then entered shrimp fisheries.

Big Harbor Packing Co.; Craig; packed one year and closed.

R. J. Peratrovich; Bayview; changed name to Bayview Packing Co. 1924; leased to Ocean Packing Co. 1932; taken over by Peratrovich & Son 1939; name changed to Peratrovich Packing Co. 1942; leased to West Coast Packing Co. 1945; operating.

**1923**

New England Fish Co.; Ketchikan; still operating.

Sunrise Packing Co.; Ketchikan; sold to Northland Packing Co. 1925; sold to Stuart Corp after one year's operation; sold to Ketchikan Packing Co. 1931; operating.

**1924**

Chas. W. Demmert Packing Co.; Bayview (Klawock); leased to Klawock Packing Co. 1933; leased to Ocean Packing Co. 1936; idle in 1937; leased to Spencer Packing Co. 1938; leased to Bellingham Canning Co. 1940; leased to Libby, McNeill & Libby 1946; now being sold to natives of Klawock; operating.

**1926**

Tongass Packing Co.; Nakat Inlet; put up one pack; went into receivership and closed.

**1927**

Far North Fisheries; beached the floating cannery Pioneer at Hydaburg; operated until 1930; leased to F. W. Kurth, former superintendent, 1930; repossessed, floated and moved to Ketchikan 1931.

Independent Salmon Canneries; Ketchikan; started in leased building; erected new building 1929; operating.

**1929**

Wrangell Packing Co.; Wrangell; taken over by Burnett Inlet Salmon Co. 1941; plant not operated after 1942; Far West Alaska Co. formed, consolidated with A. R. Breuger at Wrangell.

Iverson Packing Co.; Ketchikan; (in buildings formerly used by Independent Canneries); sold to Balcom-Payne Fisheries in 1933; closed 1942.

**1932**

Diamond K Packing Co.; Wrangell; became Far West Fishermen, Inc., 1939; reorganized as Far West Alaska Co. 1940.

**1934**

Berg Packing Co.; Ketchikan; taken over by Whiz Fish Co. 1940; closed 1943. Lindenberger Canning Co.; Craig; closed 1939-42; packed in 1942 and closed.

Lane Bros.; Moira Sound (near Ketchikan); operated until 1936 and closed.

**1935**

A. R. Breuger; Wrangell; operated until 1942; reorganized as Far West Wrangell 1942; operating.

Hydaburg Fisheries, Inc.; Hydaburg; packing name changed to Hydaburg Canning Co. 1939; changed to Hydaburg Cooperative Assn. 1944; operating.

**1936**

Seaport Salmon Co.; Ketchikan (in old Steve Selig estate building); packed one year and closed.

**1937**

Northern Fisheries; Ketchikan; closed 1942.

**1938**

Dean C. Kaylor; Petersburg (in old shrimp-crab plant; Scow Bay plant leased and operated until 1946; new plant built at Petersburg 1946 and has since packed under the name of Kaylor & Dahl.

Salt Sea Fisheries; Tenakee; make a pack nearly every year to date.

**1940**

Alaska Glacier Sea Food Co.; Petersburg (began packing salmon in its shrimp plant); burned 1942; rebuilt; now occupied by Kaylor & Dahl.

**1941**

Cape Cross Salmon Co.; Pelican; did not pack until 1944; dock and warehouse were used by a floating cannery; plant leased to Whiz Fish Co. 1946 but is still owned by Cape Cross Salmon Co.

**1942**

Burnett Inlet Salmon Co.; Saginaw Bay (near Wrangell) in the old Port Walter Herring and Packing Company's reduction plant; became Farwest Saginaw in 1943; taken over and operated by Grindall Fisheries 1946; but owned by Farwest Fishermen, Wrangell.

**1946**

Binkleys Canning Co.; Wrangell.

Lutak Fisheries; Lutak Inlet.

Fancy Packers; Ketchikan.

Smith Morrow; Sitka.

*Source* Alaska Historical Society, 2013, "Lewis MacDonald's Alaska Salmon Cannery Chronology, 1878-1950," Accessed March 17, 2017, http://alaskahistoricalsociety.org/lewis-macdonalds-alaska-salmon-cannery-chronology-1878-1950/

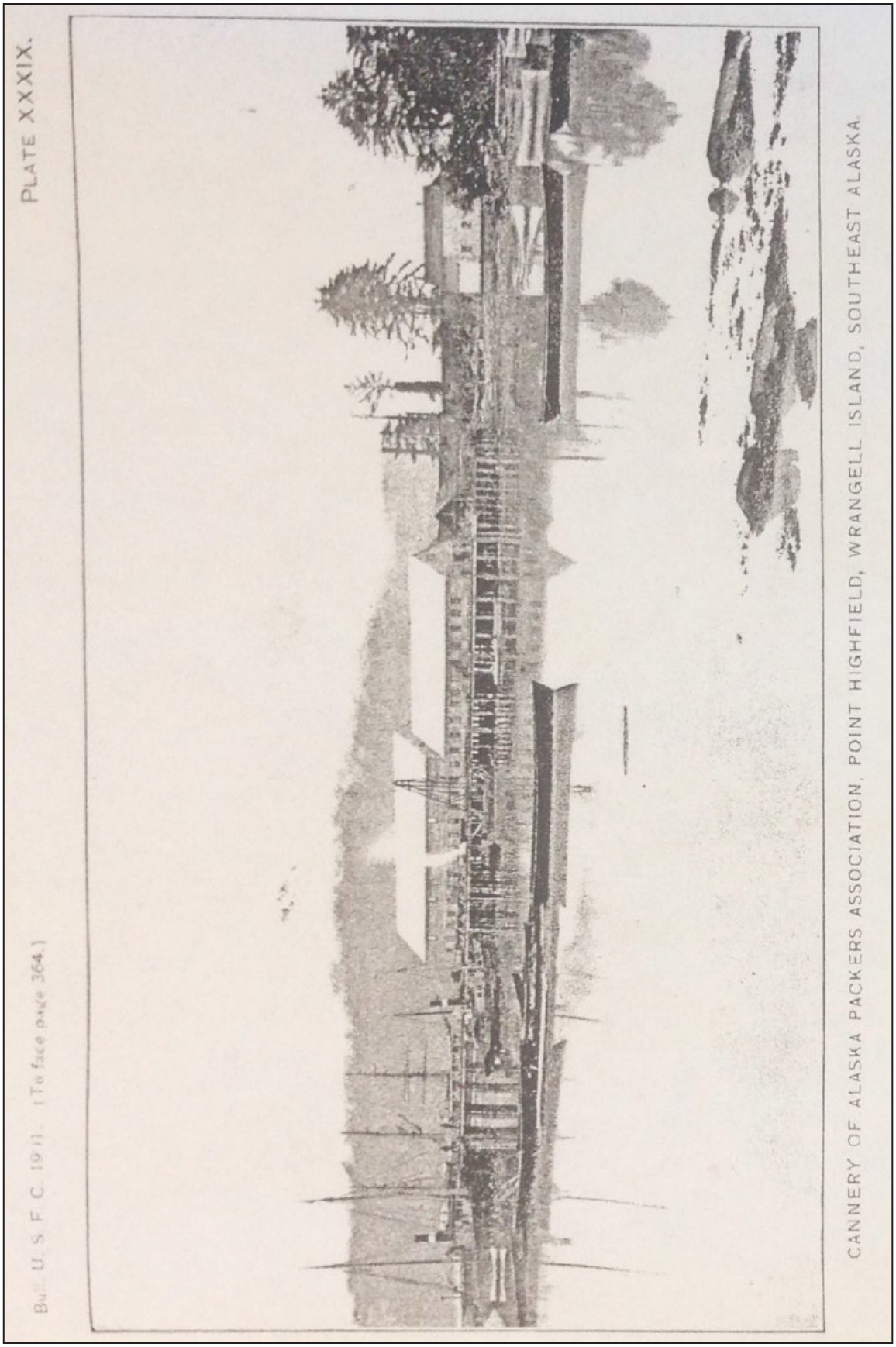



*Plate K-5.–Cannery of Alaska Packers Association, Point Highfeld, Wrangell Island, Southeast Alaska. Source Moser 1902*

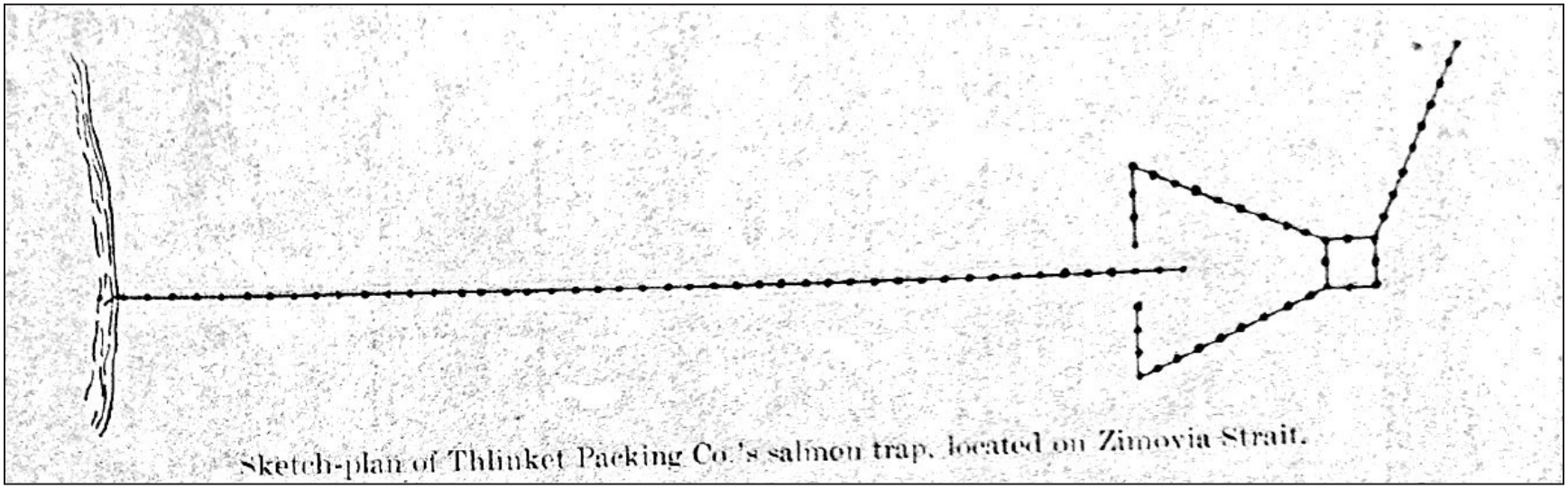



*Plate K-6.–Sketch plan of Thlinket Packing Company's Salmon Trap, Located on Zimovia Strait. Source  Moser 1902*

# APPENDIX L:
# STIKINE RIVER SUBSISTENCE SALMON HARVEST TABLES, 2004–2013

*Table L-1.–Stikine River Chinook salmon subsistence fishery, seasonal harvest by year.*

| Year | Chinook | Chum | Coho | Dolly Varden | Pink | Trout | Sockeye | Steelhead |
|---|---|---|---|---|---|---|---|---|
| 2004 | No Chinook salmon season in 2004 | | | | | | | |
| 2005 | 13 | 0 | 0 | 2 | 4 | 0 | 18 | 0 |
| 2006 | 13 | 1 | 0 | 0 | 0 | 0 | 8 | 0 |
| 2007 | 24 | 0 | 0 | 0 | 0 | 0 | 61 | 0 |
| 2008 | 8 | 0 | 0 | 1 | 0 | 0 | 2 | 0 |
| 2009 | 9 | 0 | 0 | 2 | 0 | 1 | 17 | 2 |
| 2010 | 14 | 0 | 0 | 1 | 0 | 0 | 65 | 3 |
| 2011 | 16 | 0 | 0 | 0 | 0 | 0 | 64 | 0 |
| 2012 | 16 | 0 | 0 | 0 | 0 | 0 | 137 | 0 |
| 2013 | 2 | 0 | 0 | 0 | 0 | 0 | 32 | 0 |

*Source* Robert Larson, USFS. Stikine River subsistence salmon fishery: 2013 season summary. United States Department of Agriculture Forest Service, unpublished report, 2013.

*Table L-2.–Stikine River sockeye salmon subsistence fishery, seasonal harvest by year.*

| Year | Chinook | Chum | Coho | Dolly Varden | Pink | Trout | Sockeye | Steelhead |
|---|---|---|---|---|---|---|---|---|
| 2004 | 12 | 11 | 0 | 1 | 22 | 0 | 243 | 1 |
| 2005 | 2 | 22 | 1 | 2 | 65 | 0 | 233 | 0 |
| 2006 | 24 | 19 | 0 | 3 | 23 | 0 | 377 | 0 |
| 2007 | 12 | 11 | 0 | 1 | 57 | 0 | 178 | 1 |
| 2008 | 17 | 5 | 0 | 4 | 0 | 0 | 426 | 0 |
| 2009 | 22 | 46 | 0 | 18 | 66 | 0 | 706 | 0 |
| 2010 | 44 | 33 | 13 | 11 | 38 | 0 | 1,554 | 4 |
| 2011 | 48 | 64 | 1 | 3 | 189 | 0 | 1,686 | 0 |
| 2012 | 34 | 40 | 2 | 1 | 23 | 0 | 1,155 | 0 |
| 2013 | 49 | 75 | 6 | 15 | 106 | 0 | 1,457 | 2 |

*Source* Robert Larson, USFS. Stikine River subsistence salmon fishery: 2013 season summary. United States Department of Agriculture Forest Service, unpublished report, 2013.

*Table L-3.–Stikine River coho salmon subsistence fishery, seasonal harvest by year.*

| Stikine River Coho Salmon Fishery Subsistence Harvest | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Coho Salmon Season (August 1 through October 1) | | | | | | | | |
| Year | Chinook | Chum | Coho | Dolly Varden | Pink | Trout | Sockeye | Steelhead |
| 2004 | No Coho salmon season in 2005 | | | | | | | |
| 2005 | 0 | 0 | 52 | 0 | 0 | 0 | 1 | 0 |
| 2006 | 0 | 0 | 21 | 0 | 0 | 0 | 5 | 0 |
| 2007 | 0 | 0 | 23 | 0 | 2 | 0 | 5 | 1 |
| 2008 | 0 | 7 | 42 | 0 | 18 | 0 | 0 | 0 |
| 2009 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 |
| 2010 | 3 | 4 | 122 | 0 | 22 | 0 | 34 | 0 |
| 2011 | 2 | 10 | 39 | 0 | 0 | 0 | 5 | 5 |
| 2012 | 3 | 7 | 110 | 0 | 9 | 0 | 10 | 0 |
| 2013 | 0 | 3 | 174 | 0 | 7 | 0 | 107 | 0 |

*Source* Robert Larson, USFS. Stikine River subsistence salmon fishery: 2013 season summary. United States Department of Agriculture Forest Service, unpublished report, 2013.

*Table L-4.–Stikine River subsistence fishery, total annual harvest.*

| Year | Permits | Chinook | Chum | Coho | Dolly Varden | Pink | Trout | Sockeye | Steelhead |
|---|---|---|---|---|---|---|---|---|---|
| 2004 | 40 | 12 | 11 | 0 | 1 | 22 | 0 | 243 | 1 |
| 2005 | 35 | 15 | 22 | 53 | 4 | 69 | 0 | 252 | 0 |
| 2006 | 48 | 37 | 20 | 21 | 3 | 23 | 0 | 390 | 0 |
| 2007 | 44 | 36 | 11 | 23 | 1 | 59 | 0 | 244 | 2 |
| 2008 | 50 | 25 | 12 | 42 | 5 | 18 | 0 | 428 | 0 |
| 2009 | 80 | 31 | 46 | 21 | 20 | 66 | 1 | 723 | 2 |
| 2010 | 107 | 61 | 37 | 135 | 12 | 60 | 0 | 1,653 | 7 |
| 2011 | 129 | 66 | 74 | 40 | 3 | 189 | 0 | 1,741 | 5 |
| 2012 | 130 | 53 | 47 | 112 | 1 | 32 | 0 | 1,302 | 0 |
| 2013 | 124 | 51 | 78 | 180 | 15 | 113 | 0 | 1,596 | 2 |

*Source* Robert Larson, USFS. Stikine River subsistence salmon fishery: 2013 season summary. United States Department of Agriculture Forest Service, unpublished report, 2013.

# APPENDIX M:
# STIKINE RIVER CHINOOK SALMON SURVEYS IN UNITED STATES TRIBUTARIES OVER TIME

*Table M-1.–Chinook salmon surveys in Andrew Creek, 1960–2014.*

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1960 | 108-40-020 | Andrews Creek | 7/17/1960 | Unknown | Chinook | 34 | AERIAL |
| 1960 | 108-40-020 | Andrews Creek | 7/19/1960 | Unknown | Chinook | 55 | FOOT |
| 1960 | 108-40-020 | Andrews Creek | 7/31/1960 | Unknown | Chinook | 75 | AERIAL |
| 1960 | 108-40-020 | Andrews Creek | 8/7/1960 | Unknown | Chinook | 287 | FOOT |
| 1960 | 108-40-020 | Andrews Creek | 8/7/1960 | Unknown | Chinook | 30 | FOOT |
| 1961 | 108-40-020 | Andrews Creek | 7/23/1961 | Unknown | Chinook | 17 | AERIAL |
| 1961 | 108-40-020 | Andrews Creek | 8/1/1961 | Unknown | Chinook | 103 | FOOT |
| 1962 | 108-40-020 | Andrews Creek | 7/24/1962 | Unknown | Chinook | 0 | AERIAL |
| 1962 | 108-40-020 | Andrews Creek | 7/25/1962 | Unknown | Chinook | 5 | AERIAL |
| 1962 | 108-40-020 | Andrews Creek | 7/30/1962 | Unknown | Chinook | 300 | AERIAL |
| 1962 | 108-40-020 | Andrews Creek | 8/30/1962 | Unknown | Chinook | 12 | AERIAL |
| 1963 | 108-40-020 | Andrews Creek | 8/16/1963 | Unknown | Chinook | 500 | HELICOPTER |
| 1963 | 108-40-020 | Andrews Creek | 8/16/1963 | Unknown | Chinook | 500 | AERIAL |
| 1963 | 108-40-020 | Andrews Creek | 8/17/1963 | Unknown | Chinook | 402 | FOOT |
| 1964 | 108-40-020 | Andrews Creek | 8/3/1964 | Unknown | Chinook | 10 | AERIAL |
| 1964 | 108-40-020 | Andrews Creek | 8/30/1964 | Unknown | Chinook | 400 | HELICOPTER |
| 1965 | 108-40-020 | Andrews Creek | 7/29/1965 | Unknown | Chinook | 100 | AERIAL |
| 1969 | 108-40-020 | Andrews Creek | 8/20/1969 | Unknown | Chinook | 12 | AERIAL |
| 1971 | 108-40-020 | Andrews Creek | 8/6/1971 | Unknown | Chinook | 305 | AERIAL |
| 1973 | 108-40-020 | Andrews Creek | 7/17/1973 | Unknown | Chinook | 40 | AERIAL |
| 1973 | 108-40-020 | Andrews Creek | 7/21/1973 | Unknown | Chinook | 1 | FOOT |
| 1973 | 108-40-020 | Andrews Creek | 7/24/1973 | Unknown | Chinook | 15 | HELICOPTER |
| 1973 | 108-40-020 | Andrews Creek | 8/1/1973 | Unknown | Chinook | 61 | AERIAL |
| 1974 | 108-40-020 | Andrews Creek | 8/13/1974 | Unknown | Chinook | 129 | AERIAL |
| 1975 | 108-40-020 | Andrews Creek | 8/12/1975 | Unknown | Chinook | 45 | AERIAL |
| 1975 | 108-40-020 | Andrews Creek | 8/14/1975 | Unknown | Chinook | 37 | AERIAL |
| 1975 | 108-40-020 | Andrews Creek | 8/19/1975 | Unknown | Chinook | 260 | FOOT |
| 1976 | 108-40-020 | Andrews Creek | 8/3/1976 | Unknown | Chinook | 50 | AERIAL |
| 1976 | 108-40-020 | Andrews Creek | 8/13/1976 | Unknown | Chinook | 60 | AERIAL |
| 1976 | 108-40-020 | Andrews Creek | 8/23/1976 | Unknown | Chinook | 46 | AERIAL |
| 1976 | 108-40-020 | Andrews Creek | 8/25/1976 | Unknown | Chinook | 46 | AERIAL |
| 1977 | 108-40-020 | Andrews Creek | 8/3/1977 | Unknown | Chinook | 87 | HELICOPTER |
| 1978 | 108-40-020 | Andrews Creek | 8/2/1978 | Unknown | Chinook | 110 | AERIAL |
| 1979 | 108-40-020 | Andrews Creek | 7/25/1979 | Unknown | Chinook | 47 | AERIAL |
| 1979 | 108-40-020 | Andrews Creek | 7/25/1979 | Unknown | Chinook | 0 | AERIAL |
| 1979 | 108-40-020 | Andrews Creek | 8/21/1979 | Unknown | Chinook | 221 | FOOT |
| 1980 | 108-40-020 | Andrews Creek | 8/5/1980 | Unknown | Chinook | 1 | FOOT |
| 1981 | 108-40-020 | Andrews Creek | 7/20/1981 | Unknown | Chinook | 19 | AERIAL |
| 1981 | 108-40-020 | Andrews Creek | 8/12/1981 | Unknown | Chinook | 75 | AERIAL |
| 1981 | 108-40-020 | Andrews Creek | 8/19/1981 | Unknown | Chinook | 275 | FOOT |
| 1981 | 108-40-020 | Andrews Creek | 9/1/1981 | Unknown | Chinook | 1 | FOOT |
| 1982 | 108-40-020 | Andrews Creek | 8/12/1982 | Unknown | Chinook | 340 | AERIAL |
| 1982 | 108-40-020 | Andrews Creek | 8/24/1982 | Unknown | Chinook | 37 | FOOT |
| 1982 | 108-40-020 | Andrews Creek | 8/25/1982 | Unknown | Chinook | 35 | FOOT |
| 1983 | 108-40-020 | Andrews Creek | 7/19/1983 | Unknown | Chinook | 5 | BOAT |
| 1983 | 108-40-020 | Andrews Creek | 7/31/1983 | Unknown | Chinook | 105 | BOAT |
| 1984 | 108-40-020 | Andrews Creek | 7/23/1984 | Unknown | Chinook | 39 | AERIAL |
| 1984 | 108-40-020 | Andrews Creek | 8/1/1984 | Unknown | Chinook | 128 | AERIAL |
| 1984 | 108-40-020 | Andrews Creek | 8/15/1984 | Unknown | Chinook | 28 | FOOT |
| 1984 | 108-40-020 | Andrews Creek | 8/23/1984 | Unknown | Chinook | 34 | FOOT |
| 1985 | 108-40-020 | Andrews Creek | 7/1/1985 | Unknown | Chinook | 0 | BOAT |
| 1985 | 108-40-020 | Andrews Creek | 7/31/1985 | Unknown | Chinook | 165 | AERIAL |

-continued-

Table M-1.–Page 2 of 4

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1985 | 108-40-020 | Andrews Creek | 8/8/1985 | Unknown | Chinook | 166 | AERIAL |
| 1985 | 108-40-020 | Andrews Creek | 8/11/1985 | Unknown | Chinook | 320 | FOOT |
| 1985 | 108-40-020 | Andrews Creek | 8/11/1985 | Unknown | Chinook | 319 | FOOT |
| 1985 | 108-40-020 | Andrews Creek | 8/13/1985 | Unknown | Chinook | 32 | AERIAL |
| 1986 | 108-40-020 | Andrews Creek | 8/8/1986 | Unknown | Chinook | 175 | AERIAL |
| 1986 | 108-40-020 | Andrews Creek | 8/14/1986 | Unknown | Chinook | 708 | FOOT |
| 1987 | 108-40-020 | Andrews Creek | 8/3/1987 | Unknown | Chinook | 751 | AERIAL |
| 1987 | 108-40-020 | Andrews Creek | 8/11/1987 | Unknown | Chinook | 137 | HELICOPTER |
| 1987 | 108-40-020 | Andrews Creek | 8/11/1987 | Unknown | Chinook | 651 | HELICOPTER |
| 1987 | 108-40-020 | Andrews Creek | 8/11/1987 | Unknown | Chinook | 788 | HELICOPTER |
| 1987 | 108-40-020 | Andrews Creek | 8/11/1987 | Unknown | Chinook | 580 | AERIAL |
| 1987 | 108-40-020 | Andrews Creek | 8/25/1987 | Unknown | Chinook | 300 | FOOT |
| 1988 | 108-40-020 | Andrews Creek | 7/28/1988 | Unknown | Chinook | 218 | AERIAL |
| 1988 | 108-40-020 | Andrews Creek | 8/11/1988 | Unknown | Chinook | 195 | AERIAL |
| 1988 | 108-40-020 | Andrews Creek | 8/12/1988 | Unknown | Chinook | 347 | HELICOPTER |
| 1988 | 108-40-020 | Andrews Creek | 8/12/1988 | Unknown | Chinook | 400 | HELICOPTER |
| 1988 | 108-40-020 | Andrews Creek | 8/16/1988 | Unknown | Chinook | 564 | FOOT |
| 1989 | 108-40-020 | Andrews Creek | 7/20/1989 | Unknown | Chinook | 320 | AERIAL |
| 1989 | 108-40-020 | Andrews Creek | 7/25/1989 | Unknown | Chinook | 900 | AERIAL |
| 1989 | 108-40-020 | Andrews Creek | 8/17/1989 | Unknown | Chinook | 530 | FOOT |
| 1989 | 108-40-020 | Andrews Creek | 8/28/1989 | Unknown | Chinook | 35 | AERIAL |
| 1990 | 108-40-020 | Andrews Creek | 7/25/1990 | Unknown | Chinook | 200 | AERIAL |
| 1990 | 108-40-020 | Andrews Creek | 8/13/1990 | Unknown | Chinook | 664 | FOOT |
| 1990 | 108-40-020 | Andrews Creek | 8/24/1990 | Unknown | Chinook | 360 | AERIAL |
| 1991 | 108-40-020 | Andrews Creek | 8/11/1991 | Unknown | Chinook | 303 | HELICOPTER |
| 1991 | 108-40-020 | Andrews Creek | 8/12/1991 | Unknown | Chinook | 400 | AERIAL |
| 1992 | 108-40-020 | Andrews Creek | 7/31/1992 | Unknown | Chinook | 90 | AERIAL |
| 1992 | 108-40-020 | Andrews Creek | 8/4/1992 | Unknown | Chinook | 750 | AERIAL |
| 1992 | 108-40-020 | Andrews Creek | 8/10/1992 | Unknown | Chinook | 670 | AERIAL |
| 1992 | 108-40-020 | Andrews Creek | 8/10/1992 | Unknown | Chinook | 663 | FOOT |
| 1992 | 108-40-020 | Andrews Creek | 8/12/1992 | Unknown | Chinook | 778 | HELICOPTER |
| 1993 | 108-40-020 | Andrews Creek | 8/4/1993 | Unknown | Chinook | 130 | AERIAL |
| 1993 | 108-40-020 | Andrews Creek | 8/12/1993 | Unknown | Chinook | 865 | HELICOPTER |
| 1993 | 108-40-020 | Andrews Creek | 8/16/1993 | Unknown | Chinook | 1060 | FOOT |
| 1994 | 108-40-020 | Andrews Creek | 8/11/1994 | Unknown | Chinook | 572 | HELICOPTER |
| 1994 | 108-40-020 | Andrews Creek | 8/11/1994 | Unknown | Chinook | 340 | FOOT |
| 1994 | 108-40-020 | Andrews Creek | 8/13/1994 | Unknown | Chinook | 355 | AERIAL |
| 1994 | 108-40-020 | Andrews Creek | 8/31/1994 | Unknown | Chinook | 27 | AERIAL |
| 1995 | 108-40-020 | Andrews Creek | 7/26/1995 | Unknown | Chinook | 215 | AERIAL |
| 1995 | 108-40-020 | Andrews Creek | 8/7/1995 | Unknown | Chinook | 240 | AERIAL |
| 1995 | 108-40-020 | Andrews Creek | 8/16/1995 | Unknown | Chinook | 288 | HELICOPTER |
| 1995 | 108-40-020 | Andrews Creek | 8/17/1995 | Unknown | Chinook | 355 | FOOT |
| 1996 | 108-40-020 | Andrews Creek | 7/19/1996 | Unknown | Chinook | 0 | AERIAL |
| 1996 | 108-40-020 | Andrews Creek | 8/8/1996 | Unknown | Chinook | 66 | FOOT |
| 1996 | 108-40-020 | Andrews Creek | 8/13/1996 | Unknown | Chinook | 335 | HELICOPTER |
| 1996 | 108-40-020 | Andrews Creek | 8/13/1996 | Unknown | Chinook | 300 | FOOT |
| 1996 | 108-40-020 | Andrews Creek | 8/19/1996 | Unknown | Chinook | 334 | FOOT |
| 1996 | 108-40-020 | Andrews Creek | 8/28/1996 | Unknown | Chinook | 37 | AERIAL |
| 1997 | 108-40-020 | Andrews Creek | 8/11/1997 | Unknown | Chinook | 162 | HELICOPTER |
| 1997 | 108-40-020 | Andrews Creek | 8/14/1997 | Unknown | Chinook | 293 | FOOT |
| 1998 | 108-40-020 | Andrews Creek | 7/28/1998 | Complete survey | Chinook | 310 | AERIAL |
| 1998 | 108-40-020 | Andrews Creek | 8/19/1998 | Complete survey | Chinook | 487 | FOOT |
| 1998 | 108-40-020 | Andrews Creek | 8/19/1998 | Complete survey | Chinook | 284 | HELICOPTER |
| 1998 | 108-40-020 | Andrews Creek | 8/21/1998 | Complete survey | Chinook | 280 | AERIAL |
| 1999 | 108-40-020 | Andrews Creek | 7/20/1999 | Complete survey | Chinook | 168 | AERIAL |

-continued-

Table M-1.–Page 3 of 4

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1999 | 108-40-020 | Andrews Creek | 7/23/1999 | Complete survey | Chinook | 160 | AERIAL |
| 1999 | 108-40-020 | Andrews Creek | 8/2/1999 | Complete survey | Chinook | 605 | AERIAL |
| 1999 | 108-40-020 | Andrews Creek | 8/11/1999 | Complete survey | Chinook | 434 | AERIAL |
| 1999 | 108-40-020 | Andrews Creek | 8/11/1999 | Complete survey | Chinook | 129 | HELICOPTER |
| 1999 | 108-40-020 | Andrews Creek | 8/19/1999 | Complete survey | Chinook | 526 | FOOT |
| 2000 | 108-40-020 | Andrews Creek | 8/3/2000 | Complete survey | Chinook | 840 | AERIAL |
| 2000 | 108-40-020 | Andrews Creek | 8/7/2000 | Unknown | Chinook | 583 | HELICOPTER |
| 2000 | 108-40-020 | Andrews Creek | 8/7/2000 | Partial stream survey | Chinook | 643 | FOOT |
| 2000 | 108-40-020 | Andrews Creek | 8/9/2000 | Complete survey | Chinook | 690 | AERIAL |
| 2000 | 108-40-020 | Andrews Creek | 8/18/2000 | Complete survey | Chinook | 367 | AERIAL |
| 2001 | 108-40-020 | Andrews Creek | 7/23/2001 | Complete survey | Chinook | 75 | AERIAL |
| 2001 | 108-40-020 | Andrews Creek | 8/6/2001 | Unknown | Chinook | 659 | HELICOPTER |
| 2001 | 108-40-020 | Andrews Creek | 8/10/2001 | Complete survey | Chinook | 1130 | AERIAL |
| 2001 | 108-40-020 | Andrews Creek | 8/15/2001 | Complete survey | Chinook | 661 | FOOT |
| 2001 | 108-40-020 | Andrews Creek | 8/16/2001 | Complete survey | Chinook | 1054 | FOOT |
| 2001 | 108-40-020 | Andrews Creek | 8/16/2001 | Partial stream survey | Chinook | 393 | FOOT |
| 2002 | 108-40-020 | Andrews Creek | 7/17/2002 | Partial stream survey | Chinook | 0 | AERIAL |
| 2002 | 108-40-020 | Andrews Creek | 8/8/2002 | Unknown | Chinook | 3 | HELICOPTER |
| 2002 | 108-40-020 | Andrews Creek | 8/14/2002 | Unknown | Chinook | 852 | HELICOPTER |
| 2002 | 108-40-020 | Andrews Creek | 8/15/2002 | Complete survey | Chinook | 735 | AERIAL |
| 2002 | 108-40-020 | Andrews Creek | 8/16/2002 | Complete survey | Chinook | 876 | FOOT |
| 2002 | 108-40-020 | Andrews Creek | 9/4/2002 | Complete survey | Chinook | 5 | AERIAL |
| 2003 | 108-40-020 | Andrews Creek | 7/24/2003 | Complete survey | Chinook | 63 | AERIAL |
| 2003 | 108-40-020 | Andrews Creek | 7/28/2003 | Mouth and Bay | Chinook | 37 | AERIAL |
| 2003 | 108-40-020 | Andrews Creek | 8/7/2003 | Complete survey | Chinook | 249 | HELICOPTER |
| 2003 | 108-40-020 | Andrews Creek | 8/7/2003 | Complete survey | Chinook | 56 | AERIAL |
| 2003 | 108-40-020 | Andrews Creek | 8/7/2003 | Unknown | Chinook | 198 | HELICOPTER |
| 2003 | 108-40-020 | Andrews Creek | 8/12/2003 | Partial stream survey | Chinook | 907 | FOOT |
| 2003 | 108-40-020 | Andrews Creek | 8/12/2003 | Complete survey | Chinook | 595 | HELICOPTER |
| 2004 | 108-40-020 | Andrews Creek | 7/16/2004 | Partial stream survey | Chinook | 140 | AERIAL |
| 2004 | 108-40-020 | Andrews Creek | 7/18/2004 | Partial stream survey | Chinook | 210 | AERIAL |
| 2004 | 108-40-020 | Andrews Creek | 7/21/2004 | Complete survey | Chinook | 830 | AERIAL |
| 2004 | 108-40-020 | Andrews Creek | 7/28/2004 | Partial stream survey | Chinook | 27 | BOAT |
| 2004 | 108-40-020 | Andrews Creek | 8/7/2004 | Unknown | Chinook | 1534 | HELICOPTER |
| 2004 | 108-40-020 | Andrews Creek | 8/12/2004 | Complete survey | Chinook | 1450 | AERIAL |
| 2004 | 108-40-020 | Andrews Creek | 8/13/2004 | Complete survey | Chinook | 920 | AERIAL |
| 2004 | 108-40-020 | Andrews Creek | 8/17/2004 | Complete survey | Chinook | 40 | FOOT |
| 2004 | 108-40-020 | Andrews Creek | 8/17/2004 | Complete survey | Chinook | 1844 | FOOT |
| 2005 | 108-40-020 | Andrews Creek | 7/18/2005 | Complete survey | Chinook | 411 | AERIAL |
| 2005 | 108-40-020 | Andrews Creek | 7/28/2005 | Partial stream survey | Chinook | 285 | FOOT |
| 2005 | 108-40-020 | Andrews Creek | 8/2/2005 | Complete survey | Chinook | 1050 | AERIAL |
| 2005 | 108-40-020 | Andrews Creek | 8/7/2005 | Complete survey | Chinook | 890 | AERIAL |
| 2005 | 108-40-020 | Andrews Creek | 8/9/2005 | Complete survey | Chinook | 1701 | FOOT |
| 2005 | 108-40-020 | Andrews Creek | 8/9/2005 | Unknown | Chinook | 797 | HELICOPTER |
| 2005 | 108-40-020 | Andrews Creek | 8/15/2005 | Unknown | Chinook | 1015 | HELICOPTER |
| 2006 | 108-40-020 | Andrews Creek | 8/2/2006 | Complete survey | Chinook | 150 | AERIAL |
| 2006 | 108-40-020 | Andrews Creek | 8/7/2006 | Unknown | Chinook | 1089 | HELICOPTER |
| 2006 | 108-40-020 | Andrews Creek | 8/11/2006 | Complete survey | Chinook | 810 | AERIAL |
| 2006 | 108-40-020 | Andrews Creek | 8/15/2006 | Complete survey | Chinook | 2212 | FOOT |
| 2006 | 108-40-020 | Andrews Creek | 8/15/2006 | Complete survey | Chinook | 131 | FOOT |
| 2007 | 108-40-020 | Andrews Creek | 7/26/2007 | Complete survey | Chinook | 430 | AERIAL |
| 2007 | 108-40-020 | Andrews Creek | 7/30/2007 | Complete survey | Chinook | 580 | AERIAL |
| 2007 | 108-40-020 | Andrews Creek | 8/6/2007 | Complete survey | Chinook | 680 | AERIAL |
| 2007 | 108-40-020 | Andrews Creek | 8/7/2007 | Complete survey | Chinook | 345 | HELICOPTER |
| 2007 | 108-40-020 | Andrews Creek | 8/7/2007 | Complete survey | Chinook | 495 | HELICOPTER |

-continued-

Table M-1.–Page 4 of 4

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 2007 | 108-40-020 | Andrews Creek | 8/8/2007 | Complete survey | Chinook | 860 | AERIAL |
| 2007 | 108-40-020 | Andrews Creek | 8/12/2007 | Complete survey | Chinook | 572 | HELICOPTER |
| 2007 | 108-40-020 | Andrews Creek | 8/14/2007 | Complete survey | Chinook | 890 | AERIAL |
| 2007 | 108-40-020 | Andrews Creek | 8/14/2007 | Complete survey | Chinook | 882 | FOOT |
| 2008 | 108-40-020 | Andrews Creek | 7/31/2008 | Complete survey | Chinook | 350 | AERIAL |
| 2008 | 108-40-020 | Andrews Creek | 8/7/2008 | Complete survey | Chinook | 503 | HELICOPTER |
| 2008 | 108-40-020 | Andrews Creek | 8/12/2008 | Complete survey | Chinook | 494 | FOOT |
| 2008 | 108-40-020 | Andrews Creek | 8/12/2008 | Complete survey | Chinook | 402 | HELICOPTER |
| 2008 | 108-40-020 | Andrews Creek | 8/12/2008 | Complete survey | Chinook | 240 | HELICOPTER |
| 2008 | 108-40-020 | Andrews Creek | 9/6/2008 | Complete survey | Chinook | 2 | AERIAL |
| 2009 | 108-40-020 | Andrews Creek | 7/31/2009 | Complete survey | Chinook | 120 | AERIAL |
| 2009 | 108-40-020 | Andrews Creek | 8/7/2009 | Complete survey | Chinook | 273 | HELICOPTER |
| 2009 | 108-40-020 | Andrews Creek | 8/11/2009 | Partial stream survey | Chinook | 409 | FOOT |
| 2009 | 108-40-020 | Andrews Creek | 8/13/2009 | Complete survey | Chinook | 322 | HELICOPTER |
| 2009 | 108-40-020 | Andrews Creek | 8/13/2009 | Complete survey | Chinook | 440 | AERIAL |
| 2009 | 108-40-020 | Andrews Creek | 8/13/2009 | Complete survey | Chinook | 290 | HELICOPTER |
| 2010 | 108-40-020 | Andrews Creek | 8/4/2010 | Complete survey | Chinook | 275 | AERIAL |
| 2010 | 108-40-020 | Andrews Creek | 8/8/2010 | Unknown | Chinook | 554 | HELICOPTER |
| 2010 | 108-40-020 | Andrews Creek | 8/12/2010 | Unknown | Chinook | 618 | HELICOPTER |
| 2010 | 108-40-020 | Andrews Creek | 8/17/2010 | Complete survey | Chinook | 518 | FOOT |
| 2010 | 108-40-020 | Andrews Creek | 8/18/2010 | Complete survey | Chinook | 290 | AERIAL |
| 2011 | 108-40-020 | Andrews Creek | 7/23/2011 | Complete survey | Chinook | 30 | AERIAL |
| 2011 | 108-40-020 | Andrews Creek | 8/1/2011 | Complete survey | Chinook | 480 | AERIAL |
| 2011 | 108-40-020 | Andrews Creek | 8/10/2011 | Complete survey | Chinook | 700 | AERIAL |
| 2011 | 108-40-020 | Andrews Creek | 8/25/2011 | Complete survey | Chinook | 47 | AERIAL |
| 2012 | 108-40-020 | Andrews Creek | 7/29/2012 | Complete survey | Chinook | 200 | AERIAL |
| 2012 | 108-40-020 | Andrews Creek | 8/8/2012 | | Chinook | 301 | HELICOPTER |
| 2012 | 108-40-020 | Andrews Creek | 8/15/2012 | Partial stream survey | Chinook | 90 | FOOT |
| 2012 | 108-40-020 | Andrews Creek | 8/21/2012 | Complete survey | Chinook | 40 | AERIAL |
| 2013 | 108-40-020 | Andrews Creek | 8/6/2013 | Complete survey | Chinook | 300 | AERIAL |
| 2013 | 108-40-020 | Andrews Creek | 8/13/2013 | | Chinook | 426 | HELICOPTER |
| 2013 | 108-40-020 | Andrews Creek | 8/13/2013 | Complete survey | Chinook | 538 | FOOT |
| 2013 | 108-40-020 | Andrews Creek | 8/16/2013 | Complete survey | Chinook | 200 | AERIAL |
| 2014 | 108-40-020 | Andrews Creek | 8/5/2014 | Complete survey | Chinook | 126 | AERIAL |
| 2014 | 108-40-020 | Andrews Creek | 8/5/2014 | | Chinook | 647 | FOOT |
| 2014 | 108-40-020 | Andrews Creek | 8/7/2014 | Partial stream survey | Chinook | 390 | AERIAL |
| 2014 | 108-40-020 | Andrews Creek | 8/13/2014 | Complete survey | Chinook | 340 | AERIAL |
| 2014 | 108-40-020 | Andrews Creek | 8/14/2014 | Complete survey | Chinook | 428 | FOOT |

*Source* ADF&G Division of Commercial Fisheries

*Note* Chinook salmon were not surveyed in all tributaries in all years. The data included here does not represent comprehensive spawning counts of Chinook salmon. Chinook salmon are frequently counted opportunistically during surveys targeting pink salmon and chum salmon in late summer. Helicopter surveys, however, did target Chinook salmon. In general, foot and boat surveys provide more reliable fish counts than aerial surveys.

*Table M-2.–Chinook salmon surveys in Goat Creek, 1975–2014.*

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1975 | 108-40-017 | Goat Creek | 8/18/1975 | Unknown | Chinook | 25 | FOOT |
| 1979 | 108-40-017 | Goat Creek | 8/22/1979 | Unknown | Chinook | 13 | FOOT |
| 1980 | 108-40-017 | Goat Creek | 8/6/1980 | Unknown | Chinook | 24 | FOOT |
| 1980 | 108-40-017 | Goat Creek | 8/14/1980 | Unknown | Chinook | 1 | FOOT |
| 1980 | 108-40-017 | Goat Creek | 8/26/1980 | Unknown | Chinook | 9 | FOOT |
| 1981 | 108-40-017 | Goat Creek | 8/11/1981 | Unknown | Chinook | 31 | FOOT |
| 1981 | 108-40-017 | Goat Creek | 8/14/1981 | Unknown | Chinook | 19 | FOOT |
| 1981 | 108-40-017 | Goat Creek | 8/18/1981 | Unknown | Chinook | 39 | FOOT |
| 1982 | 108-40-017 | Goat Creek | 8/16/1982 | Unknown | Chinook | 39 | FOOT |
| 1983 | 108-40-017 | Goat Creek | 8/10/1983 | Unknown | Chinook | 13 | BOAT |
| 1983 | 108-40-017 | Goat Creek | 9/9/1983 | Unknown | Chinook | 2 | FOOT |
| 1984 | 108-40-017 | Goat Creek | 8/29/1984 | Unknown | Chinook | 1 | FOOT |
| 1985 | 108-40-017 | Goat Creek | 8/13/1985 | Unknown | Chinook | 18 | AERIAL |
| 1986 | 108-40-017 | Goat Creek | 8/8/1986 | Unknown | Chinook | 7 | AERIAL |
| 1987 | 108-40-017 | Goat Creek | 8/3/1987 | Unknown | Chinook | 28 | AERIAL |
| 1987 | 108-40-017 | Goat Creek | 8/11/1987 | Unknown | Chinook | 18 | AERIAL |
| 1987 | 108-40-017 | Goat Creek | 8/25/1987 | Unknown | Chinook | 104 | FOOT |
| 1988 | 108-40-017 | Goat Creek | 8/11/1988 | Unknown | Chinook | 18 | AERIAL |
| 1989 | 108-40-017 | Goat Creek | 8/28/1989 | Unknown | Chinook | 16 | AERIAL |
| 1990 | 108-40-017 | Goat Creek | 7/25/1990 | Unknown | Chinook | 8 | AERIAL |
| 1990 | 108-40-017 | Goat Creek | 8/13/1990 | Unknown | Chinook | 14 | HELICOPTER |
| 1991 | 108-40-017 | Goat Creek | 8/12/1991 | Unknown | Chinook | 20 | AERIAL |
| 1992 | 108-40-017 | Goat Creek | 7/31/1992 | Unknown | Chinook | 5 | AERIAL |
| 1995 | 108-40-017 | Goat Creek | 8/17/1995 | Unknown | Chinook | 7 | AERIAL |
| 1999 | 108-40-017 | Goat Creek | 8/11/1999 | Complete survey | Chinook | 15 | AERIAL |
| 2001 | 108-40-017 | Goat Creek | 8/2/2001 | Partial stream survey | Chinook | 96 | FOOT |
| 2002 | 108-40-017 | Goat Creek | 7/31/2002 | Partial stream survey | Chinook | 49 | FOOT |
| 2002 | 108-40-017 | Goat Creek | 8/15/2002 | Partial stream survey | Chinook | 16 | FOOT |
| 2003 | 108-40-017 | Goat Creek | 7/24/2003 | Partial stream survey | Chinook | 16 | FOOT |
| 2003 | 108-40-017 | Goat Creek | 8/12/2003 | Complete survey | Chinook | 63 | FOOT |
| 2004 | 108-40-017 | Goat Creek | 7/28/2004 | Partial stream survey | Chinook | 25 | FOOT |
| 2004 | 108-40-017 | Goat Creek | 8/12/2004 | Complete survey | Chinook | 90 | AERIAL |
| 2004 | 108-40-017 | Goat Creek | 8/19/2004 | Complete survey | Chinook | 137 | FOOT |
| 2005 | 108-40-017 | Goat Creek | 7/27/2005 | Partial stream survey | Chinook | 7 | BOAT |
| 2005 | 108-40-017 | Goat Creek | 8/9/2005 | Complete survey | Chinook | 66 | FOOT |
| 2006 | 108-40-017 | Goat Creek | 8/16/2006 | Complete survey | Chinook | 57 | FOOT |
| 2007 | 108-40-017 | Goat Creek | 8/8/2007 | Complete survey | Chinook | 10 | AERIAL |
| 2007 | 108-40-017 | Goat Creek | 8/15/2007 | Complete survey | Chinook | 22 | FOOT |
| 2008 | 108-40-017 | Goat Creek | 8/13/2008 | Partial stream survey | Chinook | 16 | FOOT |
| 2009 | 108-40-017 | Goat Creek | 8/14/2009 | Complete survey | Chinook | 13 | FOOT |
| 2010 | 108-40-017 | Goat Creek | 8/17/2010 | Complete survey | Chinook | 16 | FOOT |
| 2012 | 108-40-017 | Goat Creek | 8/15/2012 | Partial stream survey | Chinook | 40 | FOOT |
| 2013 | 108-40-017 | Goat Creek | 8/14/2013 | Complete survey | Chinook | 78 | FOOT |
| 2014 | 108-40-017 | Goat Creek | 8/13/2014 | Complete survey | Chinook | 25 | AERIAL |
| 2014 | 108-40-017 | Goat Creek | 8/14/2014 | Complete survey | Chinook | 22 | FOOT |

*Source* ADF&G Division of Commercial Fisheries

*Note* Chinook salmon were not surveyed in all tributaries in all years. The data included here does not represent comprehensive spawning counts of Chinook salmon. Chinook salmon are frequently counted opportunistically during surveys targeting pink salmon and chum salmon in late summer. Helicopter surveys, however, did target Chinook salmon. In general, foot and boat surveys provide more reliable fish counts than aerial surveys.

*Table M-3.–Chinook salmon surveys in Goat Creek, 1975–1991.*

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1975 | 108-40-024 | Government Creek | 8/20/1975 | Unknown | Chinook | 15 | FOOT |
| 1977 | 108-40-024 | Government Creek | 8/10/1977 | Unknown | Chinook | 4 | AERIAL |
| 1978 | 108-40-024 | Government Creek | 7/21/1978 | Unknown | Chinook | 20 | BOAT |
| 1981 | 108-40-024 | Government Creek | 8/12/1981 | Unknown | Chinook | 20 | AERIAL |
| 1981 | 108-40-024 | Government Creek | 8/19/1981 | Unknown | Chinook | 35 | FOOT |
| 1982 | 108-40-024 | Government Creek | 8/27/1982 | Unknown | Chinook | 14 | FOOT |
| 1984 | 108-40-024 | Government Creek | 8/1/1984 | Unknown | Chinook | 0 | AERIAL |
| 1987 | 108-40-024 | Government Creek | 8/3/1987 | Unknown | Chinook | 2 | AERIAL |
| 1991 | 108-40-024 | Government Creek | 8/14/1991 | Unknown | Chinook | 0 | AERIAL |

*Source* ADF&G Division of Commercial Fisheries

*Note* Chinook salmon were not surveyed in all tributaries in all years. The data included here does not represent comprehensive spawning counts of Chinook salmon. Chinook salmon are frequently counted opportunistically during surveys targeting pink salmon and chum salmon in late summer. Helicopter surveys, however, did target Chinook salmon. In general, foot and boat surveys provide more reliable fish counts than aerial surveys.

*Table M-4.–Chinook salmon surveys in North Arm Creek, 1960–2014.*

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1960 | 108-41-010 | North Arm Creek | 8/7/1960 | Unknown | Chinook | 224 | FOOT |
| 1961 | 108-41-010 | North Arm Creek | 8/1/1961 | Unknown | Chinook | 138 | FOOT |
| 1962 | 108-41-010 | North Arm Creek | 7/24/1962 | Unknown | Chinook | 20 | FOOT |
| 1962 | 108-41-010 | North Arm Creek | 7/25/1962 | Unknown | Chinook | 800 | AERIAL |
| 1963 | 108-41-010 | North Arm Creek | 8/17/1963 | Unknown | Chinook | 187 | FOOT |
| 1969 | 108-41-010 | North Arm Creek | 8/16/1969 | Unknown | Chinook | 0 | AERIAL |
| 1975 | 108-41-010 | North Arm Creek | 8/12/1975 | Unknown | Chinook | 0 | AERIAL |
| 1978 | 108-41-010 | North Arm Creek | 7/31/1978 | Unknown | Chinook | 24 | FOOT |
| 1979 | 108-41-010 | North Arm Creek | 8/14/1979 | Unknown | Chinook | 16 | FOOT |
| 1980 | 108-41-010 | North Arm Creek | 8/6/1980 | Unknown | Chinook | 6 | FOOT |
| 1980 | 108-41-010 | North Arm Creek | 8/13/1980 | Unknown | Chinook | 68 | FOOT |
| 1980 | 108-41-010 | North Arm Creek | 8/27/1980 | Unknown | Chinook | 8 | FOOT |
| 1981 | 108-41-010 | North Arm Creek | 7/20/1981 | Unknown | Chinook | 10 | AERIAL |
| 1981 | 108-41-010 | North Arm Creek | 8/12/1981 | Unknown | Chinook | 84 | FOOT |
| 1981 | 108-41-010 | North Arm Creek | 8/16/1981 | Unknown | Chinook | 25 | FOOT |
| 1981 | 108-41-010 | North Arm Creek | 8/18/1981 | Unknown | Chinook | 76 | FOOT |
| 1981 | 108-41-010 | North Arm Creek | 8/19/1981 | Unknown | Chinook | 65 | FOOT |
| 1981 | 108-41-010 | North Arm Creek | 8/31/1981 | Unknown | Chinook | 3 | FOOT |
| 1982 | 108-41-010 | North Arm Creek | 8/4/1982 | Unknown | Chinook | 63 | FOOT |
| 1982 | 108-41-010 | North Arm Creek | 8/11/1982 | Unknown | Chinook | 138 | FOOT |
| 1982 | 108-41-010 | North Arm Creek | 8/12/1982 | Unknown | Chinook | 36 | AERIAL |
| 1982 | 108-41-010 | North Arm Creek | 8/17/1982 | Unknown | Chinook | 95 | FOOT |
| 1982 | 108-41-010 | North Arm Creek | 8/30/1982 | Unknown | Chinook | 16 | FOOT |
| 1982 | 108-41-010 | North Arm Creek | 9/9/1982 | Unknown | Chinook | 1 | FOOT |
| 1983 | 108-41-010 | North Arm Creek | 8/2/1983 | Unknown | Chinook | 15 | FOOT |
| 1984 | 108-41-010 | North Arm Creek | 7/23/1984 | Unknown | Chinook | 11 | AERIAL |
| 1984 | 108-41-010 | North Arm Creek | 7/26/1984 | Unknown | Chinook | 11 | AERIAL |
| 1984 | 108-41-010 | North Arm Creek | 8/1/1984 | Unknown | Chinook | 7 | AERIAL |
| 1984 | 108-41-010 | North Arm Creek | 8/7/1984 | Unknown | Chinook | 31 | FOOT |
| 1985 | 108-41-010 | North Arm Creek | 7/1/1985 | Unknown | Chinook | 0 | BOAT |
| 1985 | 108-41-010 | North Arm Creek | 7/31/1985 | Unknown | Chinook | 23 | AERIAL |
| 1985 | 108-41-010 | North Arm Creek | 8/8/1985 | Unknown | Chinook | 45 | AERIAL |
| 1985 | 108-41-010 | North Arm Creek | 8/11/1985 | Unknown | Chinook | 44 | FOOT |
| 1985 | 108-41-010 | North Arm Creek | 8/13/1985 | Unknown | Chinook | 40 | AERIAL |
| 1986 | 108-41-010 | North Arm Creek | 7/28/1986 | Unknown | Chinook | 30 | AERIAL |
| 1986 | 108-41-010 | North Arm Creek | 7/29/1986 | Unknown | Chinook | 7 | FOOT |
| 1986 | 108-41-010 | North Arm Creek | 8/5/1986 | Unknown | Chinook | 34 | BOAT |
| 1986 | 108-41-010 | North Arm Creek | 8/8/1986 | Unknown | Chinook | 35 | AERIAL |
| 1986 | 108-41-010 | North Arm Creek | 8/14/1986 | Unknown | Chinook | 35 | AERIAL |
| 1986 | 108-41-010 | North Arm Creek | 8/14/1986 | Unknown | Chinook | 73 | FOOT |
| 1986 | 108-41-010 | North Arm Creek | 9/10/1986 | Unknown | Chinook | 10 | FOOT |
| 1987 | 108-41-010 | North Arm Creek | 8/3/1987 | Unknown | Chinook | 45 | AERIAL |
| 1987 | 108-41-010 | North Arm Creek | 8/11/1987 | Unknown | Chinook | 54 | AERIAL |
| 1987 | 108-41-010 | North Arm Creek | 8/24/1987 | Unknown | Chinook | 71 | FOOT |
| 1988 | 108-41-010 | North Arm Creek | 6/29/1988 | Unknown | Chinook | 0 | AERIAL |
| 1988 | 108-41-010 | North Arm Creek | 7/28/1988 | Unknown | Chinook | 0 | AERIAL |
| 1988 | 108-41-010 | North Arm Creek | 8/5/1988 | Unknown | Chinook | 10 | AERIAL |
| 1988 | 108-41-010 | North Arm Creek | 8/11/1988 | Unknown | Chinook | 15 | AERIAL |
| 1988 | 108-41-010 | North Arm Creek | 8/12/1988 | Unknown | Chinook | 53 | HELICOPTER |
| 1988 | 108-41-010 | North Arm Creek | 8/16/1988 | Unknown | Chinook | 125 | FOOT |
| 1989 | 108-41-010 | North Arm Creek | 7/20/1989 | Unknown | Chinook | 35 | AERIAL |
| 1989 | 108-41-010 | North Arm Creek | 7/25/1989 | Unknown | Chinook | 150 | AERIAL |

-continued-

Table M-4.–Page 2 of 3

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1989 | 108-41-010 | North Arm Creek | 8/17/1989 | Unknown | Chinook | 72 | FOOT |
| 1989 | 108-41-010 | North Arm Creek | 8/28/1989 | Unknown | Chinook | 4 | AERIAL |
| 1990 | 108-41-010 | North Arm Creek | 7/25/1990 | Unknown | Chinook | 0 | AERIAL |
| 1990 | 108-41-010 | North Arm Creek | 8/13/1990 | Unknown | Chinook | 83 | FOOT |
| 1991 | 108-41-010 | North Arm Creek | 8/12/1991 | Unknown | Chinook | 38 | AERIAL |
| 1991 | 108-41-010 | North Arm Creek | 8/23/1991 | Unknown | Chinook | 23 | FOOT |
| 1992 | 108-41-010 | North Arm Creek | 8/4/1992 | Unknown | Chinook | 9 | AERIAL |
| 1992 | 108-41-010 | North Arm Creek | 8/10/1992 | Unknown | Chinook | 40 | FOOT |
| 1993 | 108-41-010 | North Arm Creek | 8/16/1993 | Unknown | Chinook | 53 | FOOT |
| 1994 | 108-41-010 | North Arm Creek | 8/11/1994 | Unknown | Chinook | 58 | FOOT |
| 1994 | 108-41-010 | North Arm Creek | 8/13/1994 | Unknown | Chinook | 35 | AERIAL |
| 1995 | 108-41-010 | North Arm Creek | 7/26/1995 | Unknown | Chinook | 23 | AERIAL |
| 1995 | 108-41-010 | North Arm Creek | 8/7/1995 | Unknown | Chinook | 28 | AERIAL |
| 1995 | 108-41-010 | North Arm Creek | 8/17/1995 | Unknown | Chinook | 6 | FOOT |
| 1996 | 108-41-010 | North Arm Creek | 7/19/1996 | Unknown | Chinook | 0 | AERIAL |
| 1996 | 108-41-010 | North Arm Creek | 8/8/1996 | Unknown | Chinook | 18 | FOOT |
| 1996 | 108-41-010 | North Arm Creek | 8/13/1996 | Unknown | Chinook | 35 | FOOT |
| 1996 | 108-41-010 | North Arm Creek | 8/20/1996 | Unknown | Chinook | 3 | FOOT |
| 1998 | 108-41-010 | North Arm Creek | 7/28/1998 | Complete survey | Chinook | 6 | AERIAL |
| 1998 | 108-41-010 | North Arm Creek | 8/21/1998 | Complete survey | Chinook | 35 | AERIAL |
| 1999 | 108-41-010 | North Arm Creek | 7/19/1999 | Partial stream survey | Chinook | 0 | AERIAL |
| 1999 | 108-41-010 | North Arm Creek | 7/20/1999 | Partial stream survey | Chinook | 0 | AERIAL |
| 1999 | 108-41-010 | North Arm Creek | 8/2/1999 | Complete survey | Chinook | 16 | AERIAL |
| 1999 | 108-41-010 | North Arm Creek | 8/11/1999 | Complete survey | Chinook | 22 | AERIAL |
| 2000 | 108-41-010 | North Arm Creek | 8/3/2000 | Complete survey | Chinook | 35 | AERIAL |
| 2000 | 108-41-010 | North Arm Creek | 8/9/2000 | Complete survey | Chinook | 30 | AERIAL |
| 2001 | 108-41-010 | North Arm Creek | 7/23/2001 | Complete survey | Chinook | 26 | AERIAL |
| 2001 | 108-41-010 | North Arm Creek | 8/2/2001 | Partial stream survey | Chinook | 28 | FOOT |
| 2001 | 108-41-010 | North Arm Creek | 8/10/2001 | Complete survey | Chinook | 23 | AERIAL |
| 2001 | 108-41-010 | North Arm Creek | 8/15/2001 | Partial stream survey | Chinook | 54 | FOOT |
| 2002 | 108-41-010 | North Arm Creek | 7/17/2002 | Partial stream survey | Chinook | 0 | AERIAL |
| 2002 | 108-41-010 | North Arm Creek | 7/31/2002 | Partial stream survey | Chinook | 16 | FOOT |
| 2002 | 108-41-010 | North Arm Creek | 8/15/2002 | Complete survey | Chinook | 34 | FOOT |
| 2003 | 108-41-010 | North Arm Creek | 7/24/2003 | Complete survey | Chinook | 35 | AERIAL |
| 2003 | 108-41-010 | North Arm Creek | 8/6/2003 | Complete survey | Chinook | 25 | AERIAL |
| 2003 | 108-41-010 | North Arm Creek | 8/7/2003 | Complete survey | Chinook | 24 | AERIAL |
| 2003 | 108-41-010 | North Arm Creek | 8/12/2003 | Partial stream survey | Chinook | 39 | FOOT |
| 2004 | 108-41-010 | North Arm Creek | 7/16/2004 | Complete survey | Chinook | 60 | AERIAL |
| 2004 | 108-41-010 | North Arm Creek | 7/21/2004 | Complete survey | Chinook | 21 | AERIAL |
| 2004 | 108-41-010 | North Arm Creek | 7/28/2004 | Partial stream survey | Chinook | 2 | FOOT |
| 2004 | 108-41-010 | North Arm Creek | 8/12/2004 | Complete survey | Chinook | 10 | AERIAL |
| 2004 | 108-41-010 | North Arm Creek | 8/16/2004 | Complete survey | Chinook | 57 | FOOT |
| 2005 | 108-41-010 | North Arm Creek | 7/18/2005 | Partial stream survey | Chinook | 15 | AERIAL |
| 2005 | 108-41-010 | North Arm Creek | 7/27/2005 | Partial stream survey | Chinook | 2 | BOAT |
| 2005 | 108-41-010 | North Arm Creek | 8/2/2005 | Complete survey | Chinook | 78 | AERIAL |
| 2005 | 108-41-010 | North Arm Creek | 8/9/2005 | Complete survey | Chinook | 50 | FOOT |
| 2006 | 108-41-010 | North Arm Creek | 8/2/2006 | Complete survey | Chinook | 27 | AERIAL |
| 2006 | 108-41-010 | North Arm Creek | 8/11/2006 | Complete survey | Chinook | 51 | AERIAL |
| 2006 | 108-41-010 | North Arm Creek | 8/16/2006 | Complete survey | Chinook | 12 | FOOT |
| 2007 | 108-41-010 | North Arm Creek | 7/26/2007 | Complete survey | Chinook | 25 | AERIAL |
| 2007 | 108-41-010 | North Arm Creek | 7/30/2007 | Complete survey | Chinook | 30 | AERIAL |
| 2007 | 108-41-010 | North Arm Creek | 8/6/2007 | Complete survey | Chinook | 30 | AERIAL |
| 2007 | 108-41-010 | North Arm Creek | 8/8/2007 | Complete survey | Chinook | 50 | AERIAL |
| 2007 | 108-41-010 | North Arm Creek | 8/14/2007 | Complete survey | Chinook | 19 | FOOT |
| 2007 | 108-41-010 | North Arm Creek | 8/14/2007 | Complete survey | Chinook | 38 | AERIAL |

-continued-

Table M-4.–Page 3 of 3

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 2008 | 108-41-010 | North Arm Creek | 7/31/2008 | Complete survey | Chinook | 14 | AERIAL |
| 2009 | 108-41-010 | North Arm Creek | 7/31/2009 | Complete survey | Chinook | 15 | AERIAL |
| 2009 | 108-41-010 | North Arm Creek | 8/11/2009 | Partial stream survey | Chinook | 5 | FOOT |
| 2009 | 108-41-010 | North Arm Creek | 8/13/2009 | Complete survey | Chinook | 10 | AERIAL |
| 2010 | 108-41-010 | North Arm Creek | 8/16/2010 | Complete survey | Chinook | 3 | FOOT |
| 2011 | 108-41-010 | North Arm Creek | 8/1/2011 | Complete survey | Chinook | 8 | AERIAL |
| 2011 | 108-41-010 | North Arm Creek | 8/10/2011 | Complete survey | Chinook | 5 | FOOT |
| 2012 | 108-41-010 | North Arm Creek | 7/29/2012 | Complete survey | Chinook | 30 | AERIAL |
| 2012 | 108-41-010 | North Arm Creek | 8/7/2012 | Complete survey | Chinook | 10 | FOOT |
| 2013 | 108-41-010 | North Arm Creek | 8/6/2013 | Complete survey | Chinook | 20 | AERIAL |
| 2013 | 108-41-010 | North Arm Creek | 8/13/2013 | Complete survey | Chinook | 25 | FOOT |
| 2014 | 108-41-010 | North Arm Creek | 8/14/2014 | Complete survey | Chinook | 6 | FOOT |

*Source* ADF&G Division of Commercial Fisheries

*Note* Chinook salmon were not surveyed in all tributaries in all years. The data included here does not represent comprehensive spawning counts of Chinook salmon. Chinook salmon are frequently counted opportunistically during surveys targeting pink salmon and chum salmon in late summer. Helicopter surveys, however, did target Chinook salmon. In general, foot and boat surveys provide more reliable fish counts than aerial surveys.

*Table M-5.–Chinook salmon surveys in Shakes Slough, 1980–2014.*

| Year | Stream No. | Stream | Obs_date | Area surveyed | Species | Total Fish | Survey type |
|---|---|---|---|---|---|---|---|
| 1980 | 108-40-013 | Shakes Slough | 8/6/1980 | Unknown | Chinook | 1 | FOOT |
| 1983 | 108-40-013 | Shakes Slough | 8/22/1983 | Unknown | Chinook | 5 | FOOT |
| 1999 | 108-40-013 | Shakes Slough | 8/11/1999 | Complete survey | Chinook | 14 | AERIAL |
| 2004 | 108-40-013 | Shakes Slough | 8/12/2004 | Complete survey | Chinook | 140 | AERIAL |
| 2006 | 108-40-013 | Shakes Slough | 8/17/2006 | Partial stream survey | Chinook | 7 | FOOT |
| 2009 | 108-40-013 | Shakes Slough | 8/12/2009 | Partial stream survey | Chinook | 5 | FOOT |
| 2014 | 108-40-013 | Shakes Slough | 8/5/2014 | Complete survey | Chinook | 60 | AERIAL |

*Source* ADF&G Division of Commercial Fisheries

*Note* Chinook salmon were not surveyed in all tributaries in all years. The data included here does not represent comprehensive spawning counts of Chinook salmon. Chinook salmon are frequently counted opportunistically during surveys targeting pink salmon and chum salmon in late summer. Helicopter surveys, however, did target Chinook salmon. In general, foot and boat surveys provide more reliable fish counts than aerial surveys.

# APPENDIX N:
# STIKINE RIVER CHINOOK SALMON COUNTS AT ANDREW CREEK WEIR, 1977–1998

*Table N-1.–Stikine River Chinook salmon counts at Andrew Creek weir, 1977–1998.*

| Weir | Stream | Year | Species | Maturity | Number |
|---|---|---|---|---|---|
| Andrews Creek | 108-40-020 | 1977 | Chinook | Adult | 471 |
| Andrews Creek | 108-40-020 | 1978 | Chinook | Adult | 430 |
| Andrews Creek | 108-40-020 | 1979 | Chinook | Adult | 433 |
| Andrews Creek | 108-40-020 | 1980 | Chinook | Adult | 593 |
| Andrews Creek | 108-40-020 | 1981 | Chinook | Adult | 677 |
| Andrews Creek | 108-40-020 | 1982 | Chinook | Adult | 1053 |
| Andrews Creek | 108-40-020 | 1983 | Chinook | Adult | 432 |
| Andrews Creek | 108-40-020 | 1984 | Chinook | Adult | 315 |
| Andrews Creek | 108-40-020 | 1984 | Chinook | Jack | 200 |
| Andrews Creek | 108-40-020 | 1997 | Chinook | Adult | 339 |
| Andrews Creek | 108-40-020 | 1997 | Chinook | Jack | 10 |
| Andrews Creek | 108-40-020 | 1998 | Chinook | Adult | 213 |
| Andrews Creek | 108-40-020 | 1998 | Chinook | Jack | 43 |

*Source* ADF&G Division of Commercial Fisheries