

**Northern Boundary and Transboundary Rivers
Restoration & Enhancement Fund**

**TAKU RIVER COHO ADULT AUGMENTATION
2015**

Final Report

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INTRODUCTION:

The Taku River (Figure 1) coho salmon stock assessment project is a cooperative effort between Canada and the United States, led by and the Department of Fisheries and Oceans Canada (DFO) and the Alaska Department of Fish and Game (ADF&G). This project was initiated in 1987 and has been operated primarily off of federal funding since that time. However, in 1999 the Pacific Salmon Commission identified the need to have an approved biological escapement goal for this major stock of coho salmon producing an estimated 65,000 to 440,000 adult coho salmon annually, many of which are caught in commercial, First Nation, and recreational fisheries in British Columbia and Southeast Alaska. Thus, additional funding was necessary to run the adult project through the majority of the adult run; moreover, it was agreed that smolt tagging numbers had to be increased in order to boost the coded wire tag (CWT) marked fractions in order to satisfy the sample sizes required for new stratified coho salmon smolt estimation analyses and to increase the accuracy and precision of not only the coho salmon harvest estimates but for Chinook salmon with the understanding that new directed Chinook fisheries were in the foreseeable future. The Northern Fund has provided assistance since 2006 that has augmented the program by permitting the use of three traplines during spring smolt tagging and ensured that the adult mark-recapture project would run through early October in each year.

Each spring since 1991, coho salmon smolt have been tagged with CWTs as they emigrate from the Taku River. In the following year, returning adults are sampled for these tags using fish wheels and set gillnets operated near Canyon Island in the lower Taku River in the U.S. At the same time, adults are tagged as part of a two-event mark-recapture study to estimate the inriver abundance and sampled for age, sex, and length composition data. A short distance upriver, in Canada, adults are inspected in the commercial gillnet fishery. Typically the commercial fishery ceases in early September and it is necessary to obtain tag ratio information by contract. Data gathered from these efforts have provided estimates of inriver abundance and escapement since 1987, estimates of harvest, exploitation, survival, smolt abundance, and total run since 1992, and run forecasts since 1996. These combined efforts inriver along with adult sampling programs in the various marine fisheries allow detailed stock assessment analyses.

OBJECTIVES:

The specific objectives expected to be achieved by this project are:

1. Estimate the escapement of adult coho salmon past Canyon Island such that the estimate is within 20% of the true value 95% of the time.
2. Estimate the age composition of adult coho salmon passing Canyon Island such that all estimated fractions are within 5 percentage points of their true values 95% of the time.
3. Boost both the recapture components of both the smolt mark-recapture study used to estimate the number of smolt which emigrated from the Taku River in 2014 and the joint Canada/U.S. adult mark-recapture study used to estimate the number of adults returning to the Taku River in 2015. This will be accomplished by capturing and sampling approximately 500 adult fish per week for marks (adipose clips and floy tags) after the Canadian commercial fishery has ceased (anticipated to be early September) through the first week in October.



Figure 1.-Taku River drainage, northwestern British Columbia, and Southeast Alaska.

METHODS:

Personnel from DFO, ADF&G, and TRTFN captured and tagged adult coho salmon using two fish wheels at Canyon Island as the first of two sampling events in a mark-recapture experiment to estimate escapement. When fish wheels were inoperative for more than two consecutive days, gillnets were used to capture coho salmon at Canyon Island during the hiatus. Coho salmon were carefully removed from the fish wheels or gillnets and placed into a trough filled with water. Every coho salmon at Canyon Island was inspected for a missing adipose fin as Event II of the mark-recapture experiment to estimate smolt abundance. All healthy coho salmon 350 mm mid-eye to fork of tail and larger caught in either fish wheels or gillnets had their length and sex recorded and was tagged with an individually numbered “spaghetti” tag sewn through the dorsal musculature just below the posterior portion of the dorsal fin. All fish were released at the site of capture. Past studies on coho salmon have shown that the loss of spaghetti tags between the marking site at Canyon Island and the recapture area located just upriver above the border is rare, so no secondary mark was added to tagged fish. Additionally, the loss of the primary spaghetti tag has been viewed as inconsequential as fish are normally recovered within three weeks of tagging and tagging scars are still visible and serve as a secondary mark.

For Event II of the adult coho salmon mark-recapture project to estimate escapement, fish were captured using gillnets and inspected for missing adipose fins and spaghetti tags (July through

early October) in the Canadian inriver commercial fishery and test fishery, both upstream of the U.S./Canada border. The marked fraction for adipose fins and spaghetti tags contributed to the estimation of the number of smolt that emigrated from the Taku River in 2014, and the number of adult coho returning in 2015.

RESULTS AND DISCUSSION:

In 2015, 1,931 adult coho salmon (Table 1) were tagged with spaghetti tags in the Event I efforts at Canyon Island. Upstream, a total of 9,875 fish were inspected in the commercial (7,877) and test (1,998) fisheries. Adult information was used to estimate an inriver run of 70,361 (SE=4,895) coho salmon, yielding an escapement estimate of 60,178 after subtracting all inriver harvest. The estimated age and length (FL) compositions of adult coho salmon sampled in 2015 is still pending age analysis.

Table 1.-Numbers of adult coho salmon tagged with spaghetti tags at Canyon Island in the lower Taku River as part of event 1 of a two-event mark-recapture experiment along with the estimated inriver run and associated marked fraction, 1987-2015.

| Year | Number tagged | Inriver run | Marked fraction |
|-------------|----------------------|--------------------|------------------------|
| 1987 | 2,240 | 61,976 | 0.036 |
| 1988 | 2,168 | 43,093 | 0.050 |
| 1989 | 2,243 | 60,841 | 0.037 |
| 1990 | 1,860 | 75,881 | 0.025 |
| 1991 | 4,922 | 132,923 | 0.037 |
| 1992 | 2,103 | 89,270 | 0.024 |
| 1993 | 2,552 | 123,964 | 0.021 |
| 1994 | 4,792 | 111,036 | 0.043 |
| 1995 | 2,531 | 69,448 | 0.036 |
| 1996 | 1,895 | 49,687 | 0.038 |
| 1997 | 1,663 | 35,035 | 0.047 |
| 1998 | 1,777 | 66,472 | 0.027 |
| 1999 | 1,848 | 66,343 | 0.028 |
| 2000 | 1,877 | 70,147 | 0.027 |
| 2001 | 2,380 | 107,493 | 0.022 |
| 2002 | 3,766 | 223,162 | 0.017 |
| 2003 | 3,003 | 186,755 | 0.016 |
| 2004 | 3,163 | 139,011 | 0.023 |
| 2005 | 1,476 | 143,817 | 0.010 |
| 2006 | 2,811 | 134,053 | 0.021 |
| 2007 | 2,117 | 82,319 | 0.026 |
| 2008 | 2,213 | 99,199 | 0.022 |
| 2009 | 2,769 | 113,716 | 0.024 |
| 2010 | 1,731 | 141,238 | 0.012 |
| 2011 | 1,762 | 83,349 | 0.021 |

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Table 1.-Page 2 of 2.

| Year | Number tagged | Inriver run | Marked fraction |
|------|---------------|-------------|-----------------|
| 2012 | 1,095 | 84,847 | 0.013 |
| 2013 | 1,383 | 78,492 | 0.018 |
| 2014 | 3,560 | 140,739 | 0.025 |
| 2015 | 1,931 | 70,299 | 0.027 |

CONCLUSION:

In the fall of 2015, the Northern Fund was used to operate the adult coho salmon tagging project from September through the first week of October. The funds also allowed for additional mark examination of 1,998 coho salmon in the test fishery. Extending the tagging and recapture projects through the first week of October maintained consistency in project duration since these efforts began in 1999. The results were at or above expectation and have further emphasized the importance to continue these efforts to support abundance-based management of coho salmon on the Taku River as implemented by the Pacific Salmon Commission ((PSC 1999, p. 26, Chapter 1, Paragraph 3(b)(2)(i)).

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DETAILED BUDGET SUMMARY:

Table 2.- Allocated and expended costs for major spending categories see in the Northern Fund project Taku River Coho Adult Augmentation, 2015.

| Line Item | Allocations | Expenditures | Balance |
|-------------------------|-------------|--------------|------------|
| Personnel | \$43,000.00 | \$39,213.31 | \$3,786.69 |
| Travel | \$0.00 | \$0.00 | \$0.00 |
| Contractual | \$8,300.00 | \$7,672.27 | \$627.73 |
| Commodities | \$11,466.00 | \$11,962.36 | (\$496.36) |
| Equipment | \$0.00 | \$0.00 | \$0.00 |
| Administrative Overhead | \$9,234.00 | \$9,234.00 | \$0.00 |
| All Lines | \$62,766.00 | \$71,369.92 | \$3,918.06 |