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ADULT CHINOOK SALMON MONITORING IN THE SOUTH FORK MCKENZIE RIVER  
RELATIVE TO WATER TEMPERATURE CONTROL AND UPSTREAM PASSAGE  
FACILITIES AT COUGAR DAM

Prepared for

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## Executive Summary

Construction of Cougar Dam in 1963 eliminated Chinook salmon *Oncorhynchus tshawytscha* from more than 85% of former habitat in the South Fork McKenzie River (SFMR) and reduced the productivity of river reaches downstream of the dam. Resource management agencies have since made several changes to fisheries management practices and modifications to Cougar Dam, including out-planting of adult hatchery-origin Chinook salmon upstream of the dam (beginning in 1993), extreme reservoir drawdown during construction of a water temperature control facility and concurrent use of the diversion tunnel (2002–2004), temperature control operations (2005), and operation of an upstream fish passage facility (2010–2012). Downstream passage modifications for juvenile salmon are being planned.

## Introduction

The McKenzie River basin historically produced substantial runs of Chinook salmon *Oncorhynchus tshawytscha*, with the South Fork McKenzie River (SFMR) perhaps supporting the greatest production among streams in the basin (Mattson 1948). Redd counts in the South Fork McKenzie River were as high as 805 in 1956 and 686 in 1958, and the estimated run size was 4,300 adult salmon in 1958 (USFWS 1959; Willis et al. 1960). Within the South Fork McKenzie River drainage, the majority of Chinook salmon spawning historically occurred upstream of the present site of Cougar Dam (USDI 1960; Willis et al. 1960; Ingram and Korn 1969).

## Methods

**Task 1.1 Cooperatively assist with collection of biological data (species, length, weight, condition, presence of marks or tags, insertion of new tags, collection of genetics tissue samples) and disposition of fish captured at the Cougar Dam fish passage facility during the scheduled period of operation (March – October).**

We assisted in processing fish collected at the Cougar Dam upstream fish passage facility in coordination with USACE staff. We conducted daily site visits to visually assess presence, abundance, and species of fish in the pre-sort holding pool located at the top of the fish ladder, and we notified USACE staff of our observations. Surface flow into the holding pool was nonexistent except during fish processing events (flow normally entered at the bottom of the pool), and a finger weir discouraged fish from returning downstream into the ladder. Fish processing and transfer events were typically conducted when at least ten adult salmon or one bull trout *Salvelinus confluentus* were present in the holding pool, and sometimes more often during the salmon run (May–September). An automated crowding gate moved fish to the upstream end of the holding pool, where inflowing spill attracted fish to jump over a false weir into a flume that terminated in an anesthesia tank. We hand-netted any fish that were confined by the crowder but did not volitionally exit the holding pool. Fish were transferred into the tank in small groups and anesthetized using clove oil (9:1 mixture with 95% ethanol). Inflowing fresh

water maintained sufficiently cool water temperature in the anesthesia tank, and additional anesthetic was added if necessary to maintain proper concentration.

## Results and Discussion

**Task 1.1** Cooperatively assist with collection of biological data (species, length, weight, condition, presence of marks or tags, insertion of new tags, collection of genetics tissue samples) and disposition of fish captured at the Cougar Dam fish passage facility during the scheduled period of operation (March – October).

The upstream fish passage facility collected 671 fish representing five species during the period of operation from 29 March – 24 October 2011 (Table 1).

Table 1. Counts of fish collected in the upstream fish passage facility in 2011, by species, life stage, sex, and hatchery mark (adipose fin removed). Bull trout varied from 485–614 mm FL. Count of male salmon includes two jacks. Steelhead were recaptured on three additional occasions.

| Species            | Life stage | Female | Male | Marked | Unmarked | Total |
|--------------------|------------|--------|------|--------|----------|-------|
| Bull trout         | Adult      | -      | -    | 0      | 5        | 5     |
| Chinook salmon     | Adult      | 163    | 225  | 30     | 358      | 388   |
|                    | Juv.       | -      | -    | 0      | 1        | 1     |
| Cutthroat trout    | -          | -      | -    | 0      | 109      | 109   |
| Mountain whitefish | -          | -      | -    | 0      | 5        | 5     |
| Rainbow trout      | -          | -      | -    | 2      | 156      | 158   |
| Steelhead          | Adult      | 4      | 1    | 4      | 1        | 5     |

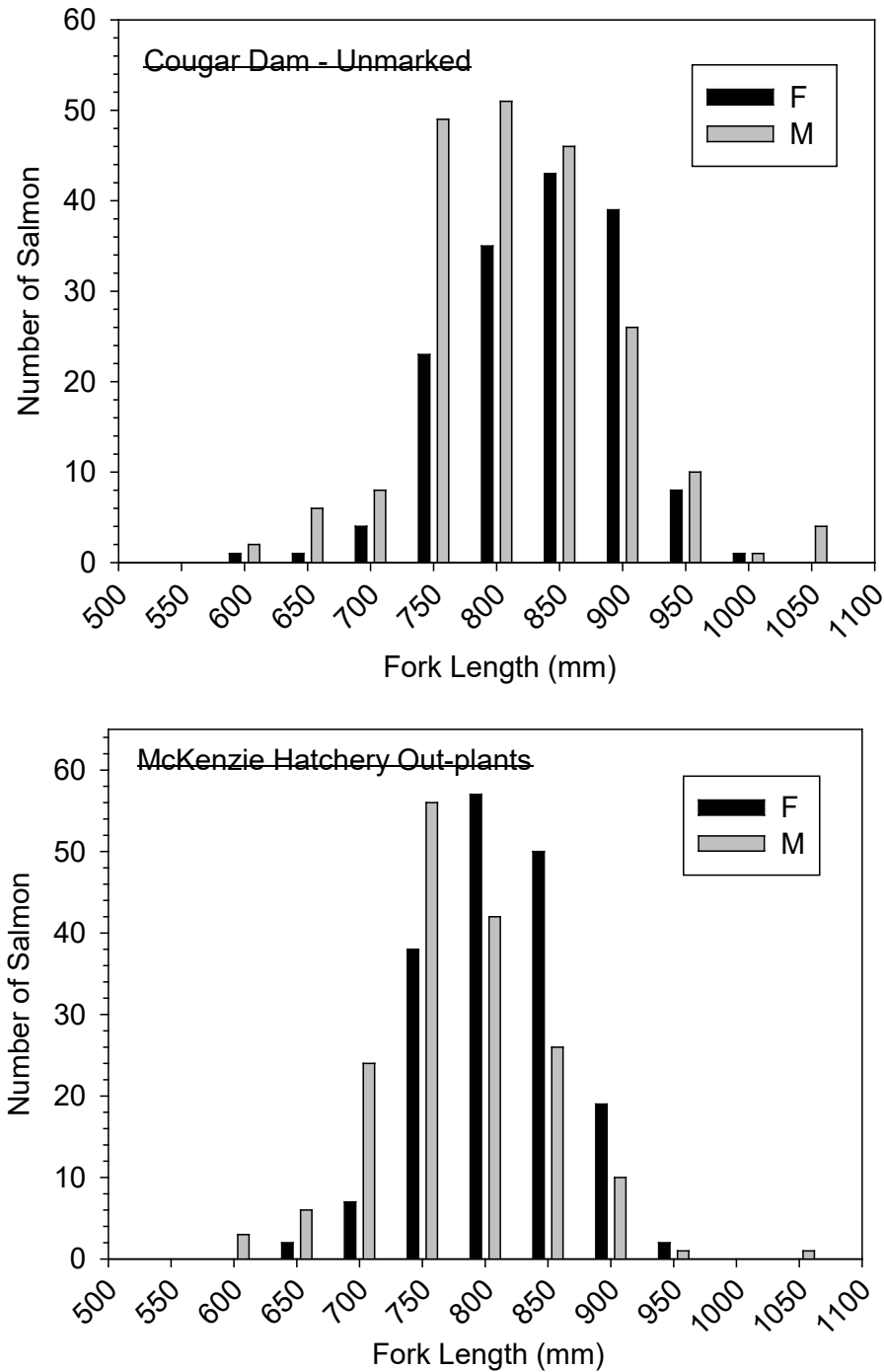


Figure 1. Length–frequency histogram for unmarked adult Chinook salmon (intact adipose fin) collected at the Cougar Dam upstream fish passage facility (top) and adult Chinook salmon from McKenzie Hatchery out-planted in the upper SFMR in 2011 (bottom). One additional 330-mm male (omitted here) was out-planted.

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