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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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# Table of Contents

Table of Contents i

List of Figures ii

List of Tables iii

Executive Summary 1

Introduction 4

Methods 5

Task 1.1 Cooperatively assist with collection of biological data and disposition of fish captured at the Cougar Dam fish passage facility. 5

Task 2.1 Conduct redd count surveys 6

Task 2.2 Conduct complete carcass surveys. 8

Results and Discussion 9

Task 1.1 Cooperatively assist with collection of biological data and disposition of fish captured at the Cougar Dam fish passage facility. 9

Task 2.1 Conduct redd count surveys. 19

Task 2.2 Conduct complete carcass surveys. 32

Literature Cited 40

# List of Figures

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).. 14

Figure 2. Age frequencies for unmarked (top) and marked (bottom) adult salmon collected at the Cougar Dam upstream fish passage facility in 2011.. 15

Figure 3. Median length of unmarked (top) and marked (bottom) adult salmon collected at the Cougar Dam upstream fish passage facility in 2011.. 16

Figure 4. Weekly count of marked and unmarked female and male salmon collected at the Cougar Dam upstream fish passage facility in 2011. 17

Figure 5. Weekly number of salmon from the upstream passage facility and McKenzie Hatchery transported and released upstream of Cougar Reservoir in 2011. 17

Figure 6. Peak count of redds in the entire SFMR, number of adult salmon passing Cougar Dam, and number of female salmon from McKenzie Hatchery and the Cougar Dam upstream fish passage facility released in the upper SFMR in 2005–2011. 21

Figure 7. Bivariate relationships of annual peak redd counts for the entire SFMR with variables pertaining to abundance, origin, and distribution of Chinook salmon. 23

Figure 8. Bivariate relationships of SFMR proportion of upper McKenzie Basin redds with variables pertaining to abundance, origin, and distribution of Chinook salmon. 24

Figure 9. Number of Chinook salmon redds at sites of redd concentrations in the lower SFMR in 2011. 27

Figure 10. Chinook salmon redd distribution by designated survey reach in the upper SFMR in 2011. 30

Figure 11. Linear density of Chinook salmon redds in the upper SFMR in 2007–2011.. 31

Figure 12. Distribution of adult salmon among three release sites in the upper SFMR in 2007–2011.. 31

Figure 13. Annual peak redd counts and numbers of female salmon (both hatchery and wild origin) released in the upper SFMR, 2005–2011. 32

Figure 14. Age frequencies for unmarked adult salmon collected as carcasses in the lower SFMR in 2011. 37

Figure 15. Median length (mm FL; bars = 25th – 75th percentiles) of unmarked adult salmon collected as carcasses in the lower SFMR in 2011.. 38

Figure 16. Proportions of adult salmon passing Leaburg Dam and carcasses in the lower SFMR consisting of wild-origin fish, and abundance of adult salmon passing Leaburg Dam in 2001–2011. 38

# List of Tables

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). 10

Table 2. Numbers of adult Chinook salmon transported upstream of Cougar Dam in 2010 and 2011, by hatchery or wild origin, sex, and collection site.. 11

Table 3. Adult Chinook salmon released upstream of Cougar Dam, peak redd counts, and carcass counts in 1993–2011.. 18

Table 4. Weekly number of redds counted in designated survey reaches of the SFMR and tributaries in 2011.. 20

Table 5. Correlation matrix (*r* and *P*) for variables potentially related to entire SFMR spawning abundance in 2005–2011.. 22

Table 6. Results of linear regression analyses using entire SFMR redd count, proportion of the entire Upper McKenzie basin redd count, and proportion SFMR adult salmon of wild-origin as response variables.. 25

Table 7. Counts of adult Chinook salmon at Willamette Falls (adults and jacks) and Leaburg Dam, and peak redd counts in the lower South Fork McKenzie River in 2001–2011.. 26

Table 8. Correlation matrix (*r* and *P*) for variables potentially related to lower SFMR spawning abundance in 2001–2011.. 28

Table 9. Number of salmon carcasses recovered in the SFMR in 2011, by reach, adipose-fin mark, sex, and spawning status (females). 34

Table 10. Age frequencies for all salmon collected in the upstream passage facility or encountered as carcasses downstream of Cougar Dam in 2011. 35

Table 11. Attributes of salmon carcasses in the SFMR downstream from Cougar Dam in 2001–2011.. 37

Table 12. Attributes of salmon carcasses in the SFMR upstream from Cougar Dam in 2011. . 40

# 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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