December 2022 Report

EVALUATING SPRING CHINOOK SALMON RELEASES ABOVE COUGAR DAM, ON THE SOUTH FORK MCKENZIE RIVER, USING GENETIC PARENTAGE ANALYSIS

Prepared for:

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**Glossary**

* Assignment – potential offspring are assigned TO candidate parents.
* Candidate Parent – Individual released above Cougar Dam included in our parentage analysis as a potential parent
* Carcass
* Cohort – Set of individuals that could potentially spawn together, or set of offspring descended from a set of parents that spawned together?
* CRR (Cohort Replacement Rate) – sample text
* Fitness – sample text
* Hatchery Outplant / Source
* HOR (hatchery origin) – sample text
* LSDR (late season downstream release)
* *Nb* (Effective Number of Breeders)
* NOR (natural origin) – sample text
* Offspring Year – Calendar year an individual returns the South Fork McKenzie River to spawn
* Origin – sample text
* Outplant – release HOR individual into inaccessible habitat (use as verb, not noun)
* Parent Year – Calendar year an individual returns the South Fork McKenzie River to spawn
* Potential Offspring –
* Progeny – sometimes used in place of offspring in NSNT report, avoid
* Recycle
* Reintroduce – release NOR individual into inaccessible habitat (use as verb, not noun)
* Release
* TLF (Total Lifetime Fitness) – sample text
* Marked/Unmarked – avoid in favor of HOR/NOR

**Summary**

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**Objectives**

1. Determine the number and proportion of unmarked adult Chinook salmon sampled at various locations in the South Fork McKenzie River (e.g. Cougar Trap and spawning grounds below Cougar dam) in 2016 - 2020 that can be assigned as progeny of Chinook salmon previously released above Cougar Dam, South Fork McKenzie River in 2011 - 2017.
2. Estimate the TLF for Chinook salmon reintroduced above Cougar Dam in 2011-2015. These estimates include unmarked adult offspring sampled at Cougar Dam, as well as unmarked spawners encountered on spawning grounds below the dam in 2014 - 2019.
3. Estimate the effects of release date and release site on the total lifetime fitness of adult spring Chinook salmon released above Cougar Dam in 2011 - 2015.
4. Estimate cohort replacement rate (CRR), or “the number of future spawners produced by a spawner” for spring Chinook salmon released above Cougar Dam in 2011 - 2015.
5. Estimate the effective number of breeders (Nb) for the adult salmon population reintroduced above Cougar Dam in 2011-2015.
6. Estimate and report the annual abundance and age structure of adult Chinook salmon that return to the South Fork McKenzie River that can be confidently assigned to parents through genetic pedigree in 2016-2020.
7. Evaluate fitness differences between HOR and NOR Chinook salmon released above Cougar Dam in 2011-2015 through assignment of adult offspring returns in 2014-2020.

**Introduction**

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**Methods**

*Study System and Sample Collection*

Sample text. Adult hatchery origin (HOR) Chinook salmon from the McKenzie River Hatchery (44°6ʹ26″N 122°40ʹ37″W) have been reintroduced above Cougar Dam annually since 1996. The construction of a trap and transport facility, hereafter referred to as the trap at the base of Cougar Dam was completed in July 2010. Since that time, this facility has collected sexually mature, natural origin (NOR) Chinook salmon for reintroduction above Cougar Dam, while the population has continued to be supplemented with HOR salmon. Since its construction, the trap has been operational throughout the spawning migration each year, with the exception of 19 July–6 August 2011, due to repairs. At both the hatchery and the trap, adults were collected using small fish ladders that end in holding tanks. Adults are placed in fish transportation trucks, driven above the dam and released into the river to spawn. To date, there is no assisted downstream passage for juveniles produced above the dam. Instead, juvenile fish can exit the reservoir volitionally, either by passage through hydroelectric turbines or over a steep, 73 m ‘regulating outlet’ spillway (Duncan, 2011).

After describing the system, describe how fin clips are sampled and refer to sample sizes before filtering (Table 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** |  |  | **Source** |  | **Total** |
|  | **Cougar Trap** | | **Hatchery** | **SGS** |  |
|  | **NOR** | **HOR** |  |  |  |
| 2007 | 0 |  | 746 | 0 | 555 |
| 2008 | 0 |  | 873 | 0 | 555 |
| 2009 | 0 |  | 1,386 | 0 | 5 |
| 2010 | 251 | 111 | 497 | 0 | 55 |
| 2011 | 386 | 111 | 345 | 60 | 555 |
| 2012 | 518 | 111 | 430 | 14 | 55 |
| 2013 | 245 | 111 | 442 | 8 | 5,555 |
| 2014\* | 214 | 111 | 491 | 27 | 55 |
| 2015 | 260 | 11 | 600 | 57 | 1,355 |
| 2016 | 374 | 111 | 475 | 42 | 5 |
| 2017 | 250 | 111 | 450 | 18 | 5 |
| 2018 | 120 | 111 | 0 | 36 | 5 |
| 2019 | 175 | 111 | 0 | 18 | 5 |
| 2020 | 168 | 111 | 0 | 0 | 55 |

Table 1: Sample sizes for the unfiltered dataset. Individuals are sampled from one of three sources: the Cougar Trap, Leaburg/McKenzie Hatchery and spawning ground surveys. Note that Cougar Trap individuals include NOR and HOR origin, Hatchery are all HOR and SGS are all NOR. \* 2014 also includes 12 NOR precocial males.