

Cougar Dam Downstream Passage Alternative Study (EDR)

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Meeting Purpose

- Summary of Alternative Study (EDR) history to date
- Status and path forward to complete Alternatives Study (EDR)



Cougar Dam Downstream Passage Alternative Study History

- Began in 2010
- Objectives:
 - ▶ Develop and evaluate concepts for downstream passage at Cougar Dam (RPA 4.12.1)
 - ▶ Provide information for a Dec 2010 go/no go decision on feasibility of downstream passage
 - ▶ Identify a preferred alternative



Cougar Dam Downstream Passage Alternative Study History, continued

- Study included three structural alternatives:
 - ▶ Weir box/collection channel in Water Temperature Control (WTC) tower
 - ▶ Floating screen structure (FSS) upstream of WTC weirs
 - ▶ Floating surface collector (FSC) with guide nets



Cougar Dam Downstream Passage Alternative Study History, continued

- Study included five operational alternatives
 - ▶ Use Preferential outlets (RO) within TDG cap
 - ▶ Use Preferential outlets (RO)
 - ▶ Pulsing Flow Releases
 - ▶ Below Minimum Conservation Pool
 - ▶ Delay Refill
 - ▶ Additional Operational alts. Considered by OMET (Operational Measures Evaluation Team)



Cougar Dam Downstream Passage Alternative Study History, continued

- “Go/No go Decision” (60% Alternative Study)
Position Summary:
 - ▶ Study identified several potentially feasible structural alternatives
 - ▶ Structural alternatives not feasible within BiOp timeframe (Dec 2014)
 - ▶ Recommended data needs
 - ▶ Need for life-cycle modeling and performance criteria



Cougar Dam Downstream Passage Alternative Study History, continued

- Prioritized Alternatives at 75% included:
 - ▶ Floating screen structure (FSS)
 - Floating screen structure at tower operating through full pool range with gravity flow
 - ▶ Structural/Operational combination (Hybrid)
 - Floating screen structure at tower, operational ~ Feb – Nov (above 1571 ft)
 - Outflows prioritized to the regulating outlet (RO) for pools below 1571 ft
 - ▶ Floating Surface Collector (FSC)
 - Floating surface collector at tower operating through full pool range with pumped flow



Cougar Dam Downstream Passage Alternative Study History, continued

- Study work suspended at 75% until the following was accomplished:
 - ▶ Research studies conducted to provide data
 - ▶ Modeling performed to inform decisions
 - ▶ COP report completed evaluating a range of alternatives to address NMFS RPA
 - ▶ Performance criteria for EDR and DDR completion
- Study restarted in FY16



Cougar Dam Downstream Passage Path Forward

- Schedule for Completion of EDR
 - ▶ May 2016 ~ 80% EDR Includes new information (i.e. RM&E) since 2011
 - ▶ August 2016 ~ 90% EDR Includes further refinement and justification for selection of preferred alternative
 - ▶ October 2016 ~ EDR Complete/DDR Start

- Construction ~ Award FY 2020 (Q1)
- Construction Complete ~ End 2022



Cougar Downstream Passage EDR Path Forward

Team to Focus on:

- ▶ FSS (Floating Screen Structure) at tower operating through full pool range



Cougar Downstream Passage EDR

Rationale for FSS focus

FSS with Full pool operation most likely to succeed

- ▶ Highest potential fish collection efficiency at dam
- ▶ Potential for flexibility to improve performance over time (graduated collection efficiency approach)
- ▶ Fish are not able to sound to outlets during spring and currently 'mill' in and out of tower
- ▶ Significant number of juveniles pass during winter when below lowest tower operation (1571)



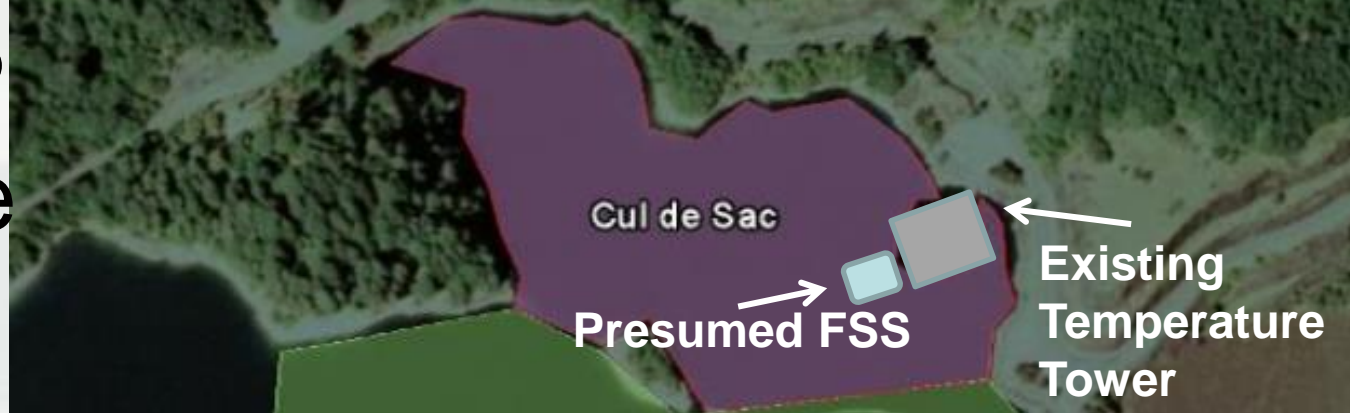
Cougar Downstream Passage EDR Path Forward

- Performance criteria:
 - ▶ 95% Fish Collection Efficiency (FCE) from Cul De Sac
 - ▶ $\leq 2\%$ Mortality or Injury
- Designed in accordance with NMFS Passage Design Guidelines (NMFS 2011).
 - ▶ If alternative materials, designs and specifications are used, the AAs will evaluate and ensure the completed facility achieves design objectives.



Cougar DSP Performance

Fish Collection Efficiency



$$\text{FCE} = \frac{\text{Portion of juvenile fish collected by the FSS}}{\text{Total number of fish in the Cul de Sac}}$$

- Test fish: Juvenile Chinook outfitted with active tags representative of active downstream migrants seeking to exit the reservoir.
- Test periods: at times of the year representative of when most juvenile Chinook migrants are actively moving downstream; could be one longer test period or two separate seasonal periods within a year.
- FCE studies will be conducted beginning the first year after completion of the presumed FSS. If hydrologic conditions are unusual, the AA's and NMFS will discuss if any aspect of the testing should be redone.



Cougar DSP Performance

Fish Collection Efficiency and Adaptive Management



Design objective FCE \geq 95%	If met, no further actions required.
FCE > 85%, but < 95%	Minor changes: structural or operational changes that can be made within existing FSS or operational requirements. If NMFS and the AA's agree that further actions are not necessary or that efforts should be focused on other RPA measures, then no further actions will be taken.
FCE > 70% but < 85%	Adjustment(s): additions that were part of the original design. Operational changes within specifications or operational requirements Modification(s): as defined below, unless NMFS and AA's agree no further action needed.
FCE < 70%	Adjustments as defined above, and then Modification(s) as authorized and funded: alterations or additions that require new design; operational changes requiring new designs or changes in the rule curve or flow management requirements

Cougar DSP Performance

Mortality and Injury

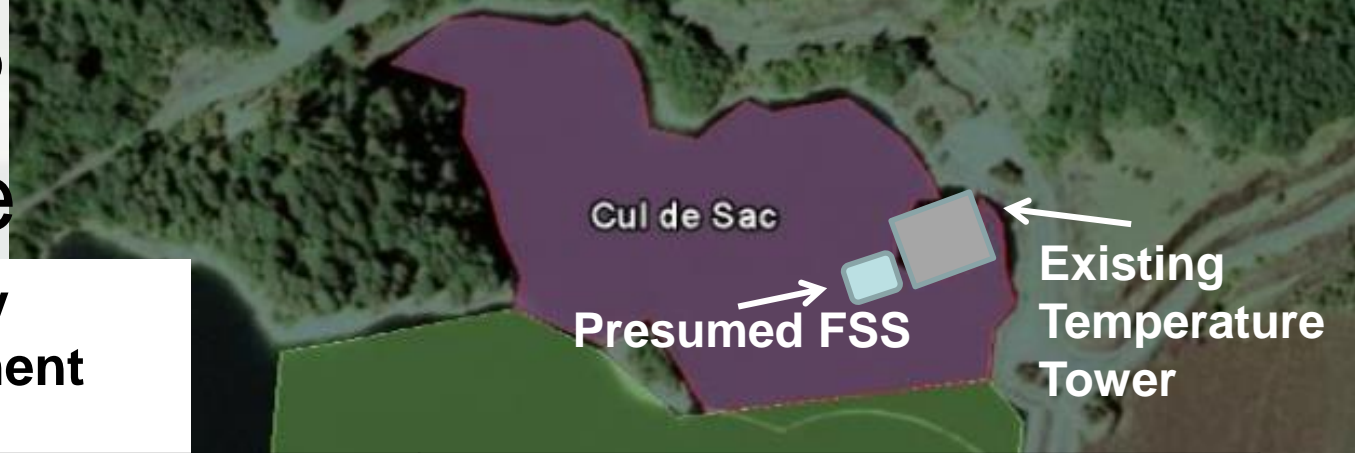


- Mortality: % of fish entering facility that don't survive to point of collection or holding
- Injury: visible trauma, loss of equilibrium, or greater than 20% descaling.
- Test in good conditions – system clean of debris, flows are within typical operating range.
- Fry (smaller than taggable for FCE testing): release directly in front of collection system; only those collected in holding facility will be used to assess mortality.
- Larger sub yearling/smolts: active tagged fish used in FCE testing that enter the presumed FSS (this could include fish lost once they enter the facility but are not recovered in holding tank).



Cougar DSP Performance

Mortality and Injury Adaptive Management



Smolts	Fry	Actions; include both improvement actions and monitoring
Mortality or Injury*	Mortality	
Design performance objective $\leq 2\%$.	Design performance objective $\leq 2\%$.	Objective met. No further actions required.
If either mortality or injury is $> 2\%$ but $\leq 4\%$, then minor changes are required.	If mortality is $> 2\%$ but $\leq 4\%$ then minor changes are required.	Minor changes to facility structure or operations such as adjusting baffles, improving hydraulics, more frequent cleaning and trap checking.
If either mortality or injury is $> 4\%$, then operational or structural changes are required.	If mortality $> 4\%$, then operational or structural changes are required.	Operational or structural changes.

Cougar Downstream Passage EDR Additional Considerations

- Space Constraints in cul-de-sac needs to be considered (structures at tower and topography)
- Design of hydraulic connection from FSS to tower is complex (in seismic zone and tracking with pool)
- If constant flow and/or year-round operation is desired, pumps would be needed
 - ▶ Temperature effects need to be evaluated



Cougar Downstream Passage EDR Considerations

- Team To Evaluate
 - ▶ Pumps on FSS – evaluating with CFD
 - ▶ Debris Control – learning from other facilities
 - Boom anticipated; also need management plan
 - ▶ Nets (guidance and exclusion) – learning from other facilities & desktop analysis of tagged fish behavior
 - Will likely continue evaluation during DDR
 - ▶ Volitional or truck transport
 - Assuming truck transport at this time
 - Preliminary investigation of release sites for truck transport
 - More information needed to consider volitional
 - ▷ High head bypass study

