Lower Columbia River Tule Fall Chinook Life-Cycle Analysis
NOAA Fisheries
DRAFT
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Purposes:

- Further inform the existing recovery plans for Lower Columbia River tule fall Chinook salmon.
- Use life-cycle modeling to explore all-H scenarios evaluating how recovery responds to projected habitat and hatchery improvements and a full range of alternative harvest strategies.
- Evaluate feasibility of achieving recovery plan survival improvement targets.
- Provide a basis for refining recovery actions.
- Provide benchmarks and metrics for implementation over time.
- Support a multi-year harvest BiOp for tule fall Chinook.

Background:

The 2009 PFMC guidance letter noted that during calendar year 2009, we would

- Work with co-managers and recovery planners to identify and/or clarify multi-year expectations related to all factors affecting listed LCR Chinook salmon.
- Augment existing analyses to compare projected outcomes across a range of habitat productivity and capacity, hatchery reform, and harvest expectations so that decision makers can weigh the benefits at the ESU scale of a particular harvest approach against the costs across all sectors.
- Establish near term and medium term milestones for the LCR recovery strategy to support multi-year BiOp for those fisheries.

Key Questions to be Addressed:

- Recovery plans identify *types* of freshwater habitat actions. At what level do these actions need to be implemented to provide the anticipated habitat improvement? What is the time frame for the improvement?
- What effect on population extinction risk would we expect to see from the set of hatchery actions that WDFW and ODFW plan to implement? What is the time frame for the improvement?
- What are the changes to projected population extinction risk levels caused by different harvest scenarios under reasonable assumptions about when habitat and hatchery benefits would be realized?

- A relatively high proportion of spawners in some tule populations have been out-of-ESU hatchery-origin fish in recent years. The impact on the genetic composition of naturally produced fish in these populations is uncertain. How can that uncertainty be reduced? What are the implications for risk assessments and restoration strategies? How would genetic composition of the current natural production from a population affect the choice of an appropriate broodstock for a supplementation program?

Populations to be Evaluated:

- All Lower Columbia River tule fall Chinook populations targeted for high viability (i.e., the "primary" populations--Elochoman, Mill/Germany/Abernathy, Clatskanie, Scappoose, Coweeman, Toutle, Lewis, Washougal, Hood).

Analysis:

Evaluating expected effects from actions in each H, and the level of effort required to achieve targeted survival improvements, and incorporating that information into a life-cycle model to evaluate alternative scenarios will allow us to (1) translate recovery plan survival improvement targets into measurable terms (e.g., general level of habitat restoration actions required to improve habitat productivity by a particular amount), (2) establish near- and medium-term milestones for implementation in each H and metrics for measuring progress toward recovery, (3) evaluate trade-offs, in terms of relative risks and benefits, among a full range of alternative harvest scenarios, and (4) validate or refine the survival improvement targets in recovery plans.

The life-cycle analysis will be iterative, but the basic sequence will be to 1) determine life-cycle structure, 2) develop a current conditions scenario, 3) develop scenarios based on recovery plan survival and capacity improvement assumptions, 4a) develop scenarios based on actions in recovery plan, 4b) develop plausible scenarios based on actions not necessarily in the recovery plan (e.g. like Lewis Case Study), 5) develop alternative harvest strategies 6) evaluate results. Steps 3 and 4a differ in that step 3 uses the plan's modeled improvements, which are derived from allocation of morality burden, whereas step 4a would be a new analysis where the habitat and other actions in the plan are translated directly into estimates of changes in survival and capacity.

To develop inputs for the life-cycle analysis, the following teams have been formed and asked to create work plans identifying deliverables in a time frame that allows for an initial product by the end of November 2009, along with and any future deliverables that will contribute to the goals of informing recovery plan implementation and harvest/hatchery policy (i.e., deliverables after November 2009):

1) Hatchery Actions and Effects (Co-leads: Mike Ford/Rob Jones; WDFW: Pat Frazier, Andy Appleby, Craig Busack; ODFW: Mark Chilcote, John North)

- Identify specific hatchery actions, a schedule for implementation, and a method for estimating effects that can be input as parameters to the life-cycle model.

2) Harvest Scenarios (Lead: Peter Dygert; WDFW: Pat Frazier, Cindy LeFleur, Larrie LaVoy, Kris Ryding; ODFW: Mark Chilcote, John North; NOAA: Paul McElhany)

- Develop a range of alternative harvest scenarios, including potential abundance-based scenario.
- Preliminary thinking is to explore the following scenarios: (1) 20% fixed rate (presumes AK/CAN harvest and some treaty troll harvest, little or no non-Indian US ocean or mainstem harvest); (2) 32% fixed rate (HSRG); (3) 35% fixed rate (OR); (4) 44% fixed rate (LCFRB); (5) 50% fixed rate (plausible upper bound); (6) abundance-based scenario; (7) mark-selective scenario; (8) possibly, a zero percent harvest scenario so we can fully describe how risk changes with incremental changes in harvest and other parameters.

3) Habitat (including a freshwater team and an estuary sub-group) (Co-leads: Ashley Steel/Tom Cooney; WDFW: David Price, Dan Rawding, ODFW: Mark Chilcote, John North?)

- Spatial and statistical analyses to answer the following two interrelated questions:
    1) Given the types of freshwater habitat actions listed in the recovery plans for fall Chinook salmon, what is the general level of habitat restoration actions that would be required to improve freshwater habitat productivity by a particular amount and over what time frame?
    2) What are the distributions of adult capacity, juvenile capacity, egg-to-fry survival, and early juvenile survival parameters under (a) current conditions and (b) various alternative levels of freshwater habitat restoration?

4) Life-Cycle Modeling (SLAM) (Lead: Paul McElhany; WDFW: Dan Rawding, Kris Ryding; ODFW: Mark Chilcote, John North; NOAA: Tom Cooney)

- Using the scenarios developed as described above for harvest, hatcheries, and habitat, use SLAM to inform understanding of impacts in terms of projected risk levels for each primary population.

Timeline:

- Initial life-cycle analysis products: November 2009
- Draft 2010 PFMC Guidance Letter: January 2010*
- 2010 PFMC Guidance Letter: March 2010
- 2010 PFMC BiOp: April 2010
- FR notice for proposed Lower Columbia River recovery plan: April 2010

*NOAA will need citable documents for the BiOp in December 2009. (These could include the draft recovery plan documents, letters from states, results of analysis, etc.) It is possible that additional technical work could continue in the future. Final documentation of "multiyear plan" requires further discussion but will address all Hs and will provide actions and some way to evaluate success and take corrective measures if benchmarks are not being met.