TRRP and Cramer Fish Sciences – Life Cycle Model (LCM) workshop in support of the Limiting Factors Analysis

2026-06-23 (Tuesday) 1300 – 1700

Location: TRRP Conference Room, Weaverville

Note Takers:

1. Microsoft Teams transcript processed by AI and edited by Eric Peterson.

Attendance:

Workshop was open to all TRRP participants and close associates. The calendar invite was sent specifically to the IDT and Fish Workgroup, then shared to those who expressed interest. An option to participate virtually for the first half of the workshop (presentations) was available, though discouraged for anyone in the TRRP area.

In Person:

1. CFS Kai Ross,
2. CFS Joe Merz
3. TRRP/USBR Eric Peterson,
4. TRRP/USBR James Lee
5. TRRP/USBR Jeanne McSloy
6. TRRP/USBR Mike Dixon
7. TRRP/USBR Oliver Rogers
8. TRRP/HVT Simone Groves
9. TRRP/YT Chris Laskodi
10. CDFW Ken Lindke
11. CDFW Catherine Masatani
12. CDFW Hannah Richter
13. HVT George Kautsky
14. HVT Justin Alvarez
15. TC Patrick Flynn
16. SAB Kurt Fausch
17. USBR Derek Rupert
18. USFWS Taylor Daley
19. YT Kyle De Juilio

Online-only:

20. CFS Jason Hall
21. CFS Kiera McNeely
22. NFWF Erica Engstrom
23. NFWF Femke Freiberg
24. SAB Andy Paul
25. HVT/ARS Scott McBain
26. USBR Emily Brenton
27. USBR Elliot Sarnacki
28. USFS Amelia Fleitz
29. USFWS Reuben Smit
30. USFWS Steve Gough
31. USFWS Jacque Bridegum
32. YT Shane Quinn

AI Meeting Summary

Limiting Factors Analysis Model Overview: Kai Ross, Joe Murz, Kira McNeely, and Jason Hall from Cramer Fish Sciences, along with Eric Peterson and the Trinity River Restoration Program team, introduced the purpose and scope of the Limiting Factors Analysis (LFA) model, emphasizing its role in identifying constraints on Chinook salmon populations and supporting management decisions, while clarifying its limitations and intended use.

Graphical User Interface Structure and Functionality: Kai Ross provided a detailed walk-through of the LFA model's graphical user interface (GUI), explaining its organization, key features, input methods, and output visualization, with support from Kira McNeely and Jason Hall for technical questions and clarifications.

Scenario Testing and Model Demonstrations: Kai Ross led participants through several example scenarios using the LFA model, demonstrating how parameter adjustments affect population outcomes, with active discussion and questions from Eric Peterson, Kira McNeely, and other stakeholders regarding model mechanics, scenario setup, and interpretation of results.

Baseline and Optimized Scenarios: The team compared baseline conditions to optimized downstream scenarios, showing that improving Klamath and ocean survival rates led to population increases, but also revealed density-dependent effects where increased smolt production reduced smolt-to-adult ratios due to limited rearing capacity.

Trinity River Restoration Scenarios: Adjusting Trinity River incubation and rearing conditions demonstrated that local improvements could double escapement, with discussions on the importance of holding other parameters constant to isolate effects and the use of LFA-optimized values for scenario testing.

Rearing Capacity and Emigrant Size: Reducing rearing capacity forced more fry migrants, increasing out-migrant numbers but decreasing average size and overall survival, illustrating the trade-off between quantity and quality of emigrants and the importance of habitat availability.

Harvest Impact and Productivity Recovery: Increasing ocean and river harvest rates significantly reduced population abundance, but subsequent productivity gains through parameter adjustments could restore populations near baseline levels, with the input diff tool used to identify specific changes between scenarios.

Model Mechanics, Limitations, and Future Extensions: Participants, including Andrew Paul and Kira McNeely, discussed the deterministic nature of the LFA model, its handling of transient dynamics, rare event modeling, and the potential for future enhancements such as initializing runs from equilibrium and incorporating stochasticity or rare event perturbations.

Technical Implementation and User Access: Kai Ross and Kira McNeely explained the technical setup of the LFA model, including R, RStudio, and R Shiny, provided instructions for running the model locally or via web app, and discussed code structure, package dependencies, and user customization options.

Stakeholder Collaboration and Workshop Process: Eric Peterson, Kai Ross, and Joe Murz emphasized the collaborative nature of the model development, involving input from the Interdisciplinary Team (IDT) and broader stakeholders, and outlined the workshop process for hands-on practice, feedback, and next steps.

Model Exploration: CFS provided both the link to the R-Shiny online implementation of the model, plus the R-code to run the model in R, or R-Shiny from our own computers. The group was set free to test parameters, explore the code, etc. with CFS answering questions.

Possible Feature Enhancements

Process: Eric Peterson will funnel any future feature requests from TRRP to CFS. This will enable collation of requests to reduce CFS from needing to sift through too many emails. (all, Eric Peterson)

Reuse End state: Evaluate and implement the addition of a radio button or option in the model to initialize population using the end state of a previous run, as suggested for improved scenario analysis. (Kai Ross, Kiera)

Rare Event Modeling Capability: Consider adapting the model to include rare event functionality (e.g., one-off perturbations like warm water releases or landslides) for future analyses as discussed. (Kai Ross, Kiera)

Documentation and User Guide: Ensure the draft user guide and relevant documentation are uploaded to the resources tab and distributed to participants. (Kai Ross)

Model Parameter Logic Tracking: Update and maintain appendices or documentation to record the logic behind parameter changes and new information used in the model, as recommended for future adjustments. (Kai Ross, Joe Murz)

Adjourned 5:00 PM