Trinity River Hatchery Coho HGMP and Integrated Population Management

Photo: NOAA Fisheries

Trinity Management Council

December 4-5, 2024

Redding, CA and Virtual

Seth Naman

TMC September 18-19 Notes

TH: I have a clarification question for MO's suggestion. Earlier you said that the hatchery genetic team works with the dam, are you talking about in the work group?

MO: Unsure if I said that, but I was referring to the Trinity program and the integration of hatchery management. I'm requesting that Reclamation define and state who the appropriate group is.

TMC September 18-19 Notes (Life Cycle Model)

MO: How are hatchery integrated management principles or mitigation functions built into this?

MD: We may be able to parameterize competition between hatchery fish in the river and the ocean. We can't deny hatchery fish exist in the river, but we aren't modeling what happens to hatchery fish as part of this.

MO: My point is that when there is a natural number in this table, it could be of hatchery fish. There is no genetic analysis to distinguish the fish, because what is being called natural is fish spawning outside of the hatchery and there is no differentiation between the natural population and fish originating from the hatchery.

EP: There may be ways to address the questions of hatchery fish, but this is a model focusing on the natural populations. To return to the discussion of life histories and other species, there may be some data to assist in parameterizing how things might change if we did have Chinook staying in the river for a year. Through the other species we may be able to gain some information on that.

???

- Integration of the management of TRH and TRRP is different than the integration of hatchery fish and wild fish
- Do not plan to discuss the integration of the management of TRH and TRRP
- The following slides discuss integration of hatchery fish and wild fish

Integration of Coho Salmon at TRH

Hatchery and Genetics Management Plan for Trinity River Hatchery Coho Salmon

Prepared for:

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Arcata, California

Prepared in coordination with:

U.S. Department of the Interior
Bureau of Reclamation
Northern California Area Office
Shasta Lake, California

California Department of Fish and Wildlife
Northern Region, Redding, California

December 2017

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response

4d Limit for the Trinity River Coho Salmon Hatchery and Genetic Management Plan

NMFS Consultation Number: WCRO-2019-03414

Action Agency: NOAA's National Marine Fisheries Service

Table 1. Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Southern Oregon Northern California Coast coho salmon ESU	Threatened May 6, 1997 (62 FR 24588)	Yes	No	Yes	No
Southern Resident Killer Whale DPS	Endangered November 18, 2005 (70 FR 69903)	No	No	No	No
Southern DPS of Eulachon	Threatened March 18, 2010 (75 FR 13012)	No	No	No	No
Southern DPS of Green Sturgeon	Threatened April 6, 2006 (71 FR 17757)	No	No	No	No

Table 2. Essential Fish Habitat and NMFS' Determinations:

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By:
Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: June 11, 2020

Proportionate Natural Influence

$$PNI = pNOB/(pNOB + pHOS)$$

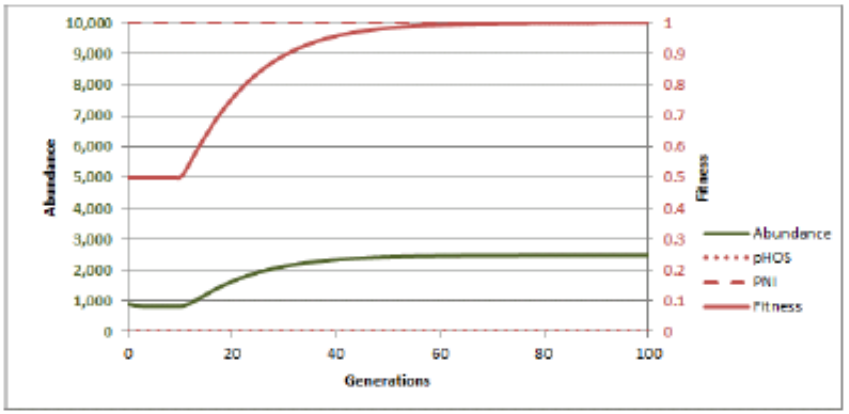
Where

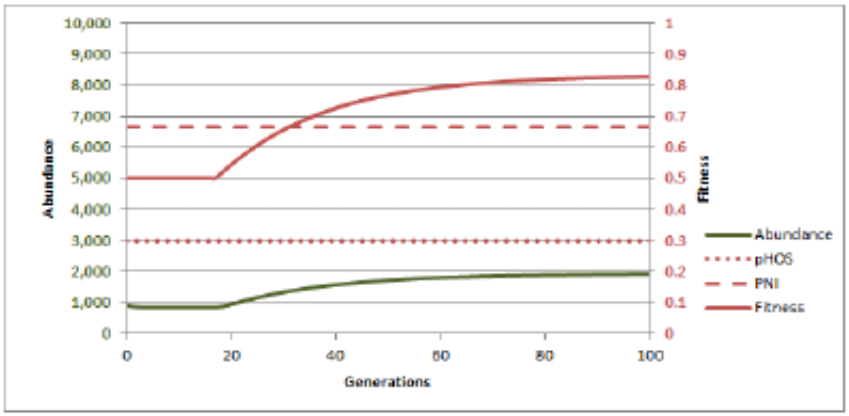
pNOB = proportion of natural origin fish spawned at the hatchery, and
pHOS = proportion of hatchery origin fish spawning in the river

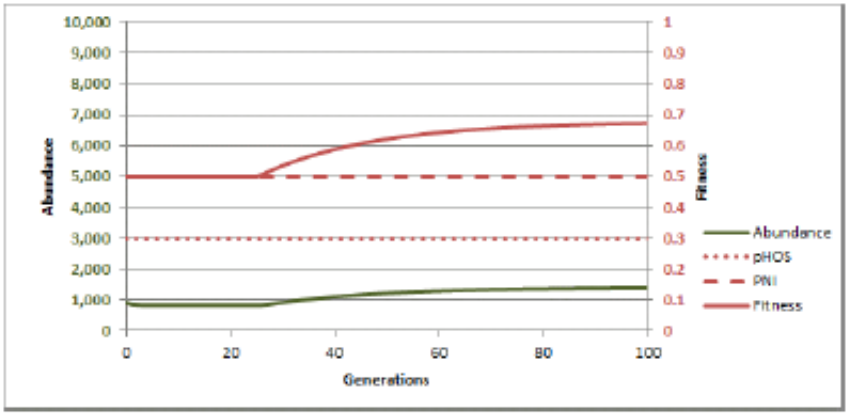
Proportionate Natural Influence

- A measure of gene flow between hatchery fish and wild fish in the combined hatchery and river environments
- PNI less than 0.5 indicates the hatchery is driving selection (domestication selection)
- PNI greater than 0.5 indicates the river is driving selection

Modeled PNI, Fitness, and Abundance



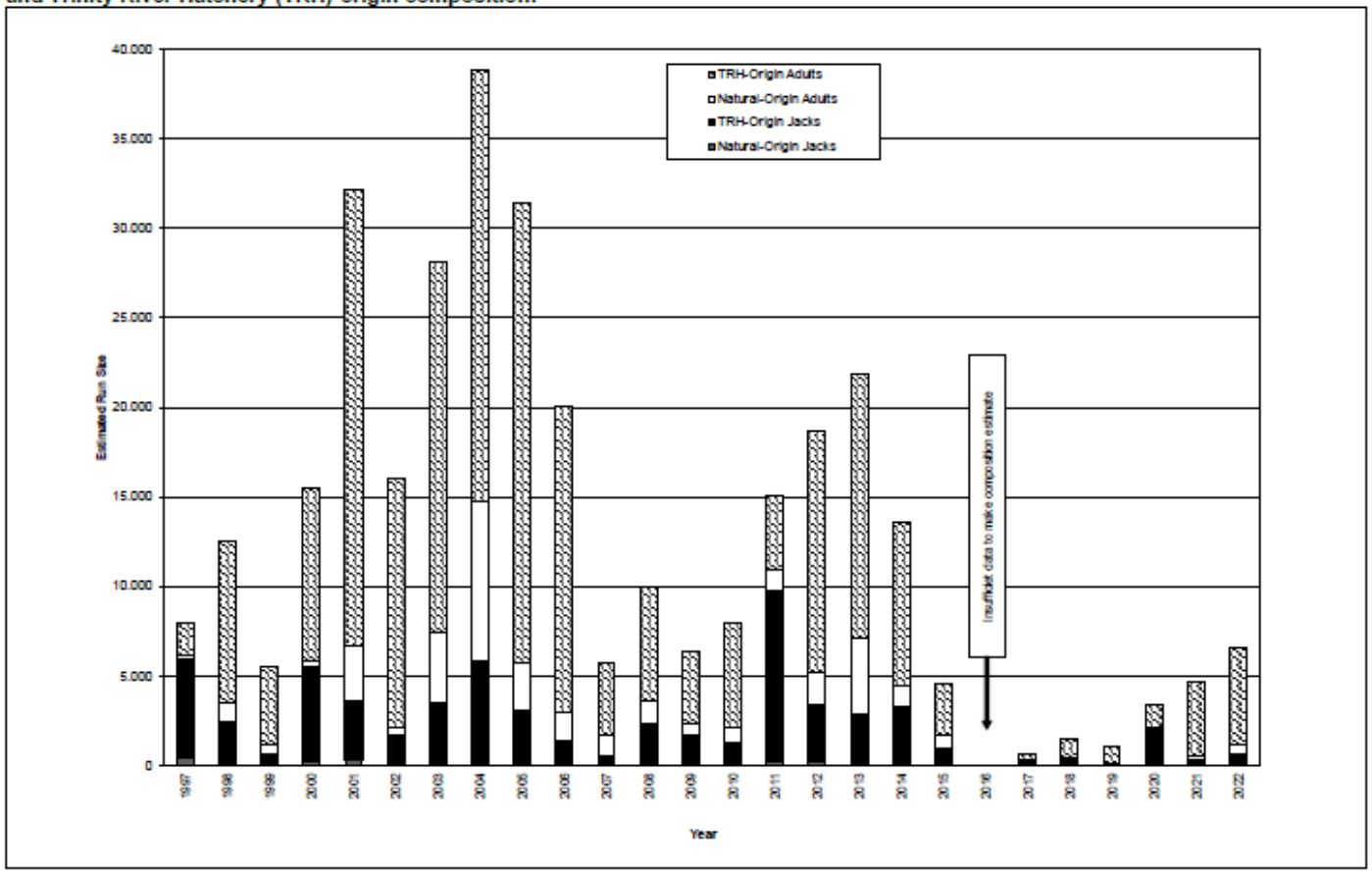




Reclamation and CDFW 2017

In practice, PNI, Fitness, and Abundance

Appendix 14. Coho Salmon estimated run size for the Trinity River upstream of Willow Creek weir, 1997 - 2022, showing natural-origin and Trinity River Hatchery (TRH)-origin composition.



Kier et al 2023

In practice, PNI, Fitness, and Abundance

- Very difficult in practice
- Low productivity in the river makes obtaining pNOB very difficult
- Requires capturing wild fish downstream with a weir or other means
- Holding wild fish is difficult with mortality risks
- Still risk that wild fish returning to the hatchery are mismarked TRH Coho Salmon
- Progeny of wild fish can have lower survival in the hatchery (e.g. slower growth rates)

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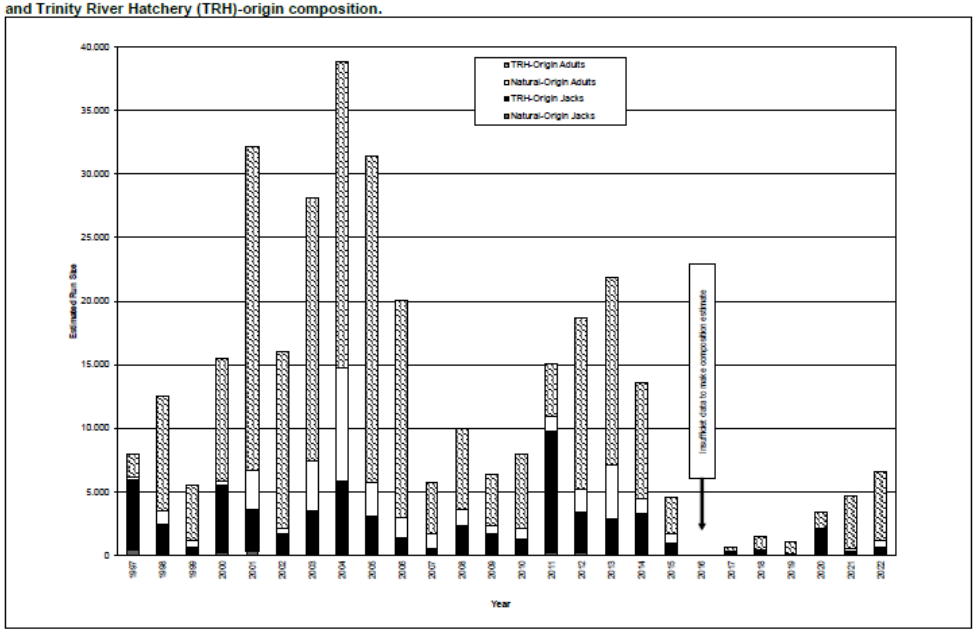

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Integration of Chinook Salmon and Steelhead

2.11 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. NMFS recommends that Reclamation integrate both the TRH Chinook Salmon and Steelhead programs in accordance with the recommendations of the CAHSRG (2012). Properly integrating the wild and hatchery populations for these two species would entail setting metrics for the Proportionate Natural Influence (PNI) and successfully monitoring and maintaining these metrics. Because population boundaries for Upper Klamath and Trinity Rivers Chinook Salmon and Klamath Mountain Province Steelhead have not been described by NOAA, the Chinook Salmon and Steelhead programs could use the same geographical boundaries for integration as the upper Trinity River population unit of SONCC coho salmon, in accordance with CAHSRG (2012).

Integration of TRH Chinook Salmon

- Almost impossible without a 100% mark
  - Without a 100% mark, would require some real time ability to differentiate hatchery and wild fish and/or holding and tracking prior to spawning
- Differentiation of spring- and fall-runs required in addition to hatchery versus natural
- Becomes increasingly difficult with greater numbers of juveniles released

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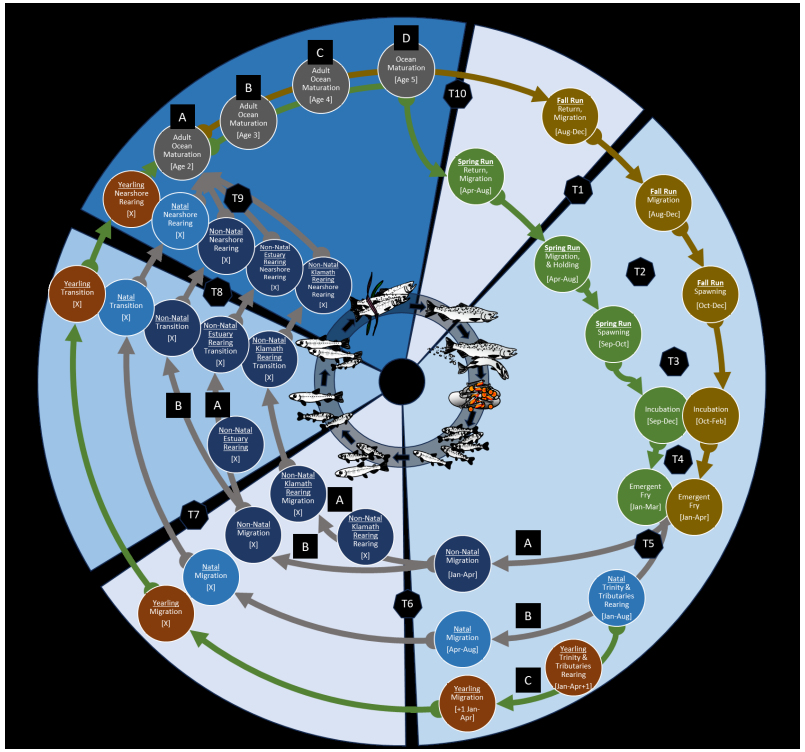
Integration of TRH Steelhead

- Could be implemented
- Would require additional funding and staff
- Would need to adhere to run of Steelhead being produced
    - Could not use wild winter-run Steelhead as pNOB for the TRH fall-run Steelhead program
- Any pNOB recovered at TRH should be tested to ensure they are not mis-marked hatchery fish

NOAA Fisheries

Use in Life Cycle Model

- Life cycle model is only for Chinook Salmon because that is the only species for which we have sufficient data
  - Example: Juvenile population estimates are not made for Coho Salmon or Steelhead
- S3 does track wild and hatchery fish separately
- Life Cycle Model is a heavy enough lift as it is, and should be developed and refined for Chinook Salmon first
- Other species could be modeled after using literature values for parameters, but no information for model calibration



Questions?