Trade-offs in multi-objective hatchery mitigation programs:
You can have your fish and eat them too (but not as many as you may want)

Peter Graf, Grant County PUD
AFS WA/BC
Kelowna, BC
1. Hatcheries can serve multiple purposes
2. ‘Multiple Use’ is not unique to hatchery management
3. Economics has a tool to help
4. Multiple objectives can be complimentary, but ultimately involve trade-offs
5. Choices and trade-offs occur at all levels of decision-making
6. We need to acknowledge trade-offs
“The goal of the program is the restoration of naturally reproducing populations of spring Chinook in their native habitats using locally adapted broodstock, while maintaining genetic and ecologic integrity, and supporting harvest. The purpose is to meet No Net Impact (NNI) mitigation goals...in a manner consistent with overall objectives of rebuilding natural populations.”

-Upper Columbia Spring Chinook HGMP
Production Possibility Frontier (PPF)
Production Possibility Frontier (PPF)

Timber

Biodiversity

A
Production Possibility Frontier (PPF)
Production Possibility Frontier (PPF)

'Thor-win' solutions
Production Possibility Frontier (PPF)

Timber vs. Biodiversity

The Frontier

Point A
Trade-offs at multiple scales:

1. Policy (conservation, harvest, mitigation)

2. Regional (hatchery program size and escapement)

3. Program (fish growth and size)
Wenatchee Spring Chinook

Natural-origin escapement vs. Harvest (1000s)

Current

HSRG Solution
The graph shows the relationship between natural-origin escapement and harvest for Wenatchee Spring Chinook. The curve indicates the sustainable harvest levels based on the escapement. The points labeled 'Current', 'HSRG Solution', and 'No Hatchery' represent different scenarios or policies. The graph suggests that increasing the escapement decreases the allowable harvest to maintain sustainability.
Hanford Reach Fall Chinook

Baseline Harvest (1000s)

NOR Escapement

Hanford Reach Fall Chinook Chinook

Natural-origin escapement
Regional Scale
Nason Creek Spring Chinook Conservation Program:

1. Smolt Requirement = 125,000

2. Natural-origin Adults Required = 78

3. Brood collection cannot exceed 33% of natural-origin adult return
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Program Scale
Smolt size, survival, and age at return

![Graphs showing the relationship between survival and early-age returns with increasing smolt size.](image)
Natural age class distribution

Survival / Smolt Size

A
B
C
Natural age class distribution

Survival / Smolt Size

'Natural' growth
Circulars
Better feed
1. Hatcheries have limits.

2. Are we at the frontier?

3. ‘Win-wins’ are hard, reality is often ‘win-lose’.

4. Trade-offs need not imply conflict.

5. Evaluate performance based on the choices that have we’ve made.
Acknowledging Conservation Trade-Offs and Embracing Complexity

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