Snake Basin Steelhead Run Reconstruction:
genetic foundations & management

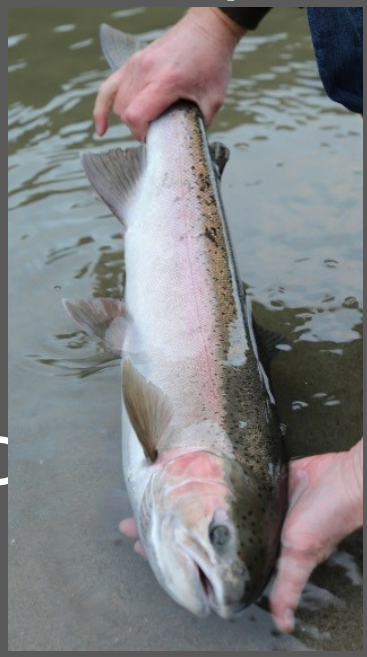
Pacific Coast Steelhead Management Meeting

March 16, 2021

OUTLINE

- background and history
- development (how it has been used)
- implementation (how it will be used)

- examples of results
- improvements and future direc



Background

- 2009 - Anadromous Salmonid Monitoring Strategy
- 2010 - fast-track proposal by NPT & IDFG
- 2011 - funding by Bonneville Power

Goal: estimate spatial disposition & fate (harvest, brood, escape

History

Convened technical work group of Snake Basin Steelhead Managers in 2011:

- states (ID, WA, OR)
- tribes (NPT, SBT, & CTUIR)
- USFWS (LSRCP & Dworshak)
- Idaho Power (Rapid River FH, Pahsimeroi FH)

History

Identified relevant existing data

- hydrosystem PIT detections (BON, MCN, ICH, LGR)
- LGR sampling (PBT & GSI)
- fishery surveys (catch, release, harvest)
- tributary abundance estimates
  - hatchery traps & weirs
  - PIT array estimates

History

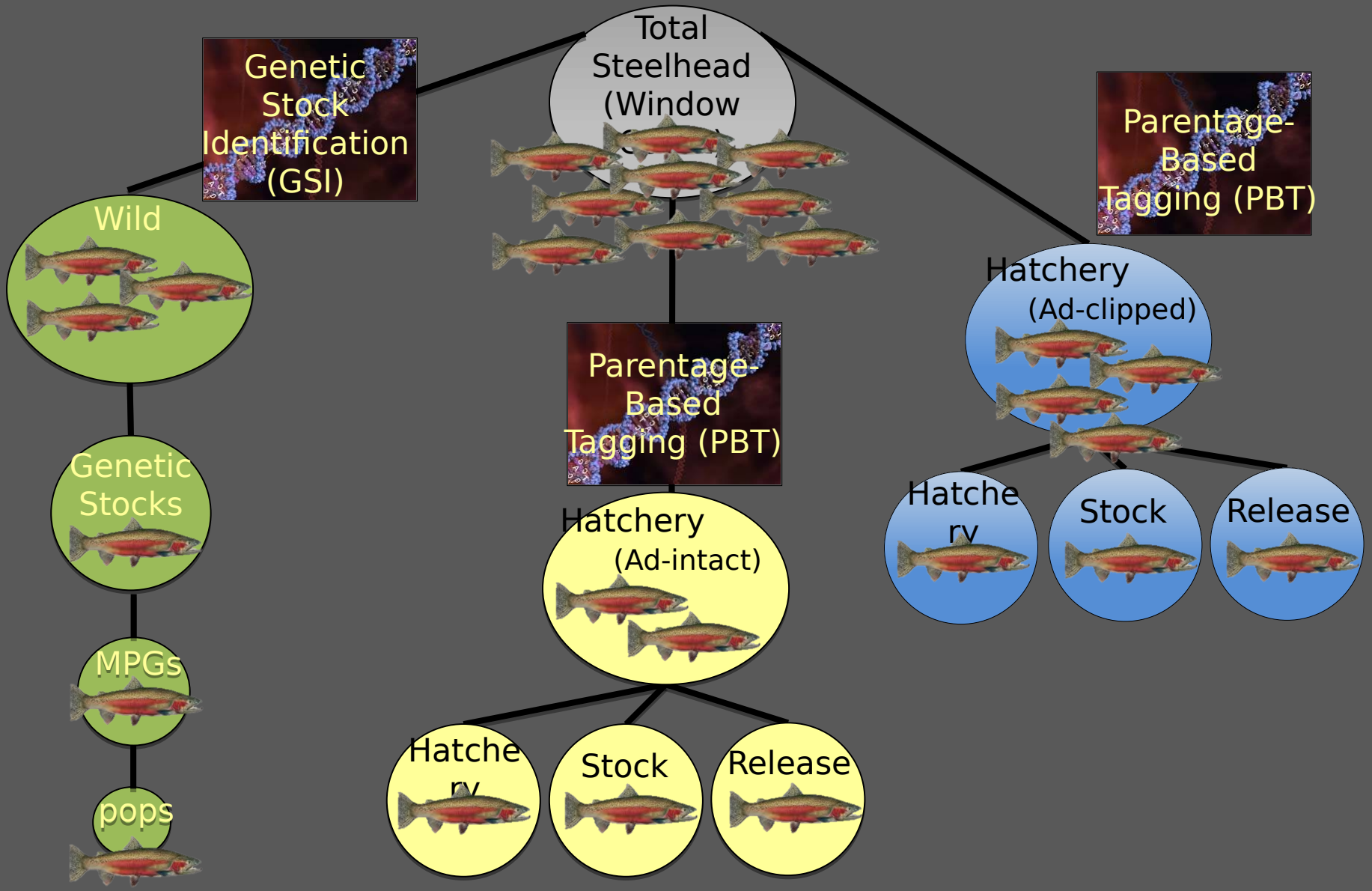
Developed analytical framework:

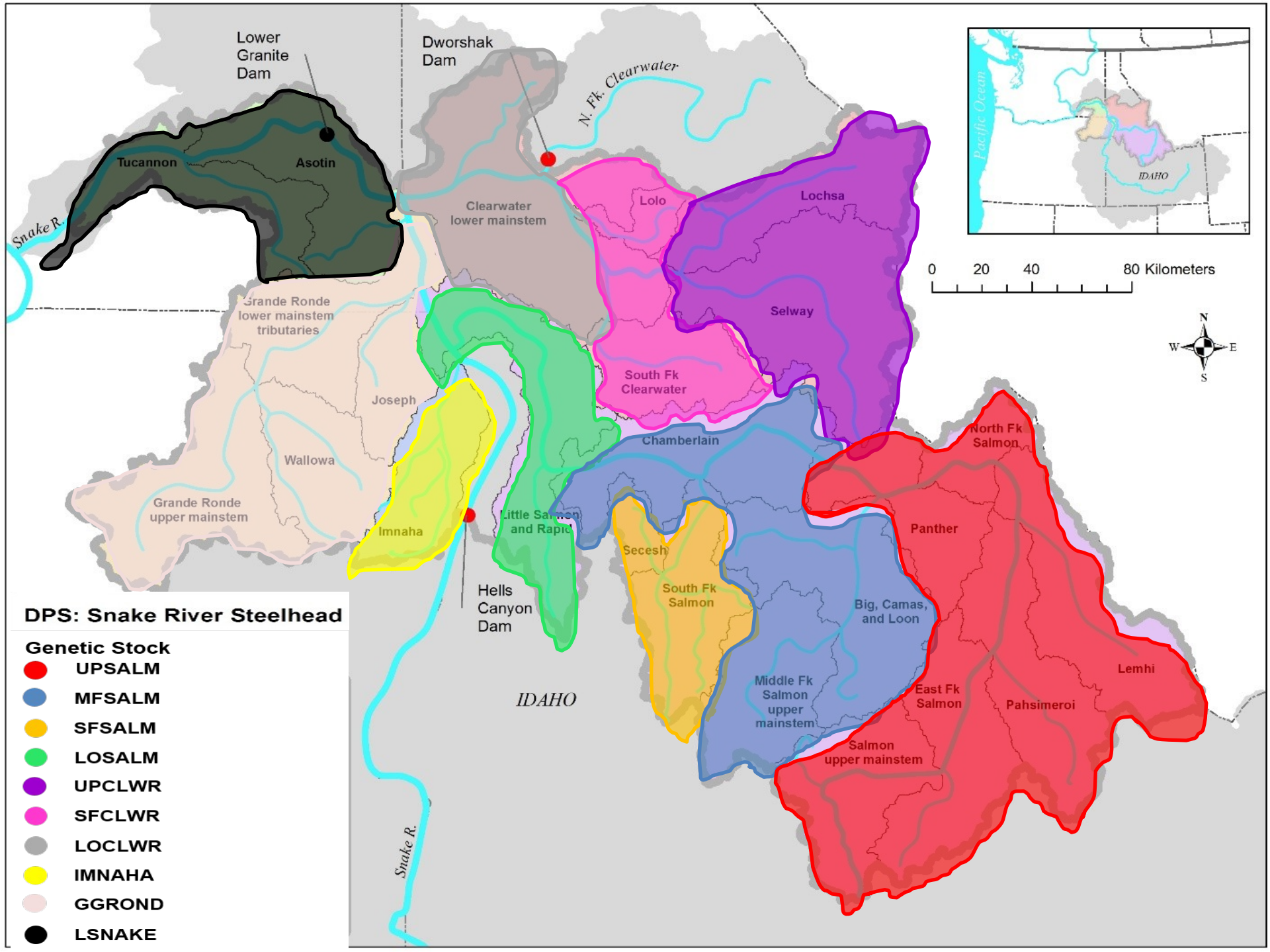
- Spatial box-car model:
- Fish arrive and encounter fishery
- Survivors stay or move upstream

Core Starting Point of RR Model

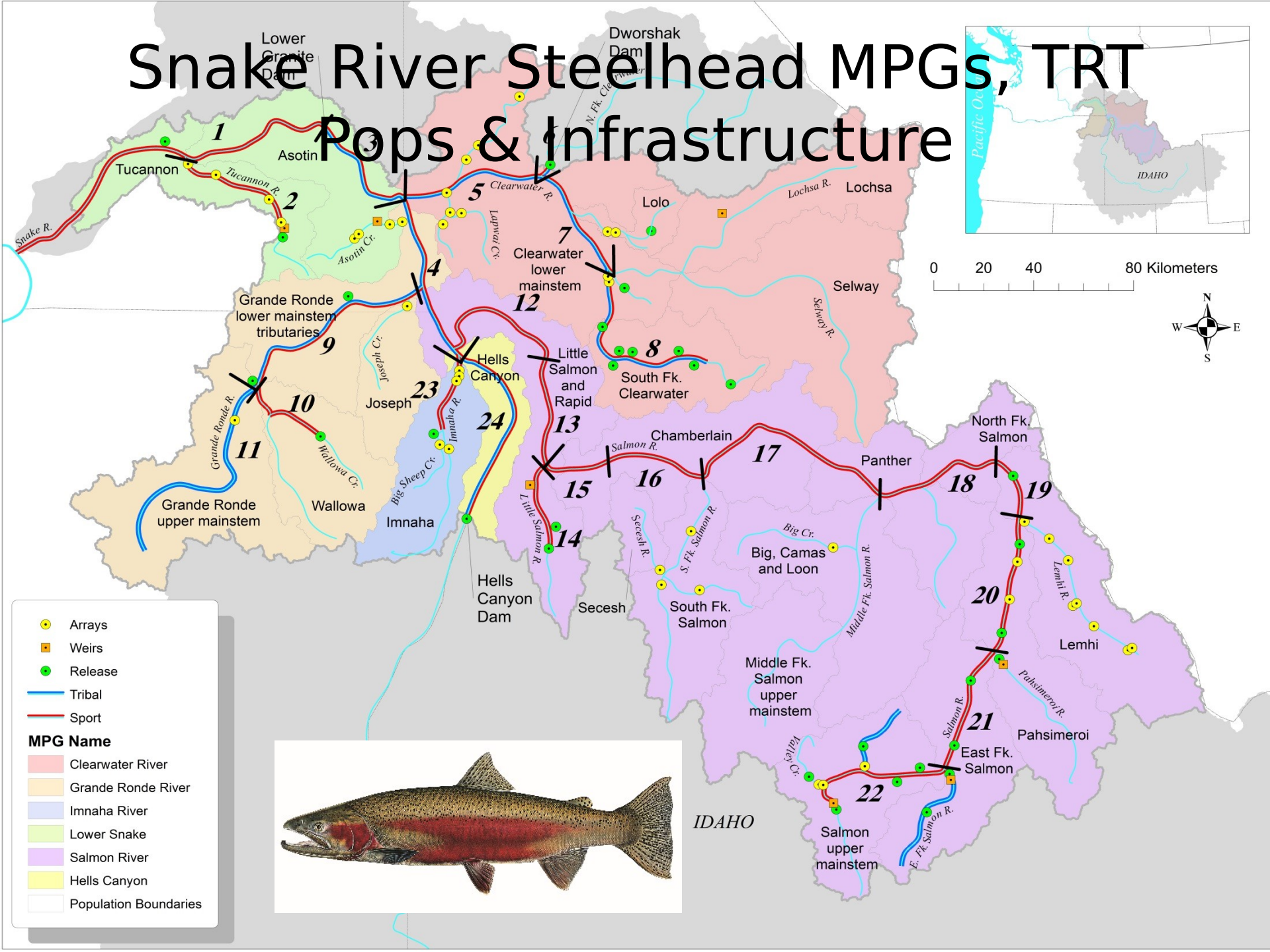
Abundance at Lower Granite Dam (LGR)

Lower Granite




Lower Granite Dam
Dworshak Dam
N. Fk. Clearwater
Tucannon
Asotin
Snake R.
Clearwater lower mainstem
Lolo
Lochsa
Selway
South Fk Clearwater
Grande Ronde lower mainstem tributaries
Joseph
Wallowa
Grande Ronde upper mainstem
Imnaha
Chamberlain
North Fk Salmon
Panther
Secesh
South Fk Salmon
Big, Camas, and Loon
Middle Fk Salmon upper mainstem
East Fk Salmon
Pahsimeroi
Lemhi
Salmon upper mainstem
Hells Canyon Dam
IDAHO
Snake R.
Pacific Ocean
IDAHO
0 20 40 80 Kilometers
N
W
E
S
DPS: Snake River Steelhead
Genetic Stock
UPSALM
MFSALM
SFSALM
LOSALM
UPCLWR
SFCLWR
LOCLWR
IMNAHA
GGROND
LSNAKE

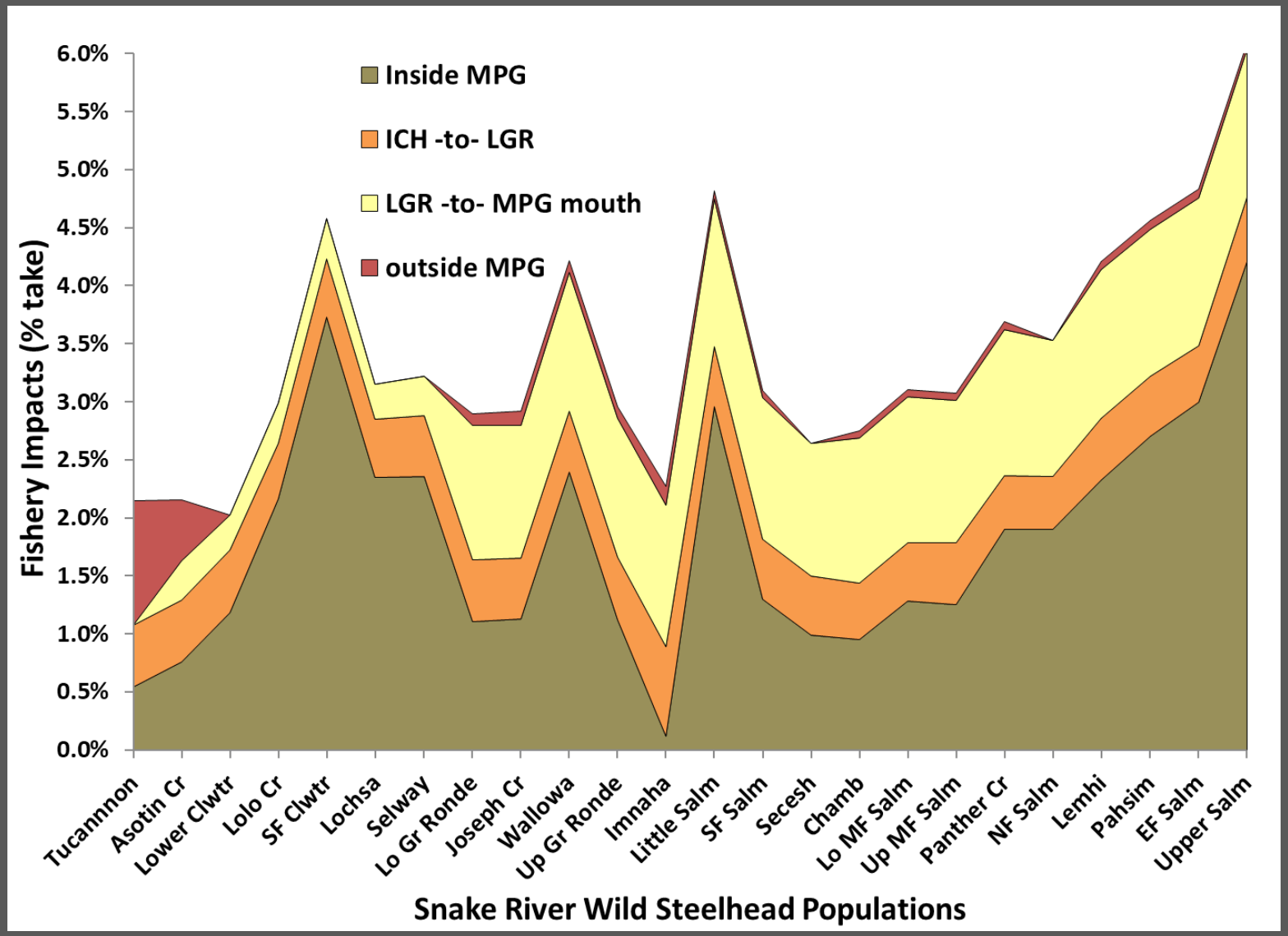
Snake River Steelhead MPGs, TRT Pops & Infrastructure



Model Inputs

- PIT conversions (BON□LGR)
- Fallback, Reascension, & Night Passage
- Fishery harvest, and catch & release
  - harvest genetic samples in Lower & NF Clearwater
    - use PBT to estimate stock comp of harvest
    - released fish assumed at same proporti
    - informs movement probabilities (i.e. – c
- Movement probabilities

Mean Model Results (spawn years 2015-2019



Mean Model Results
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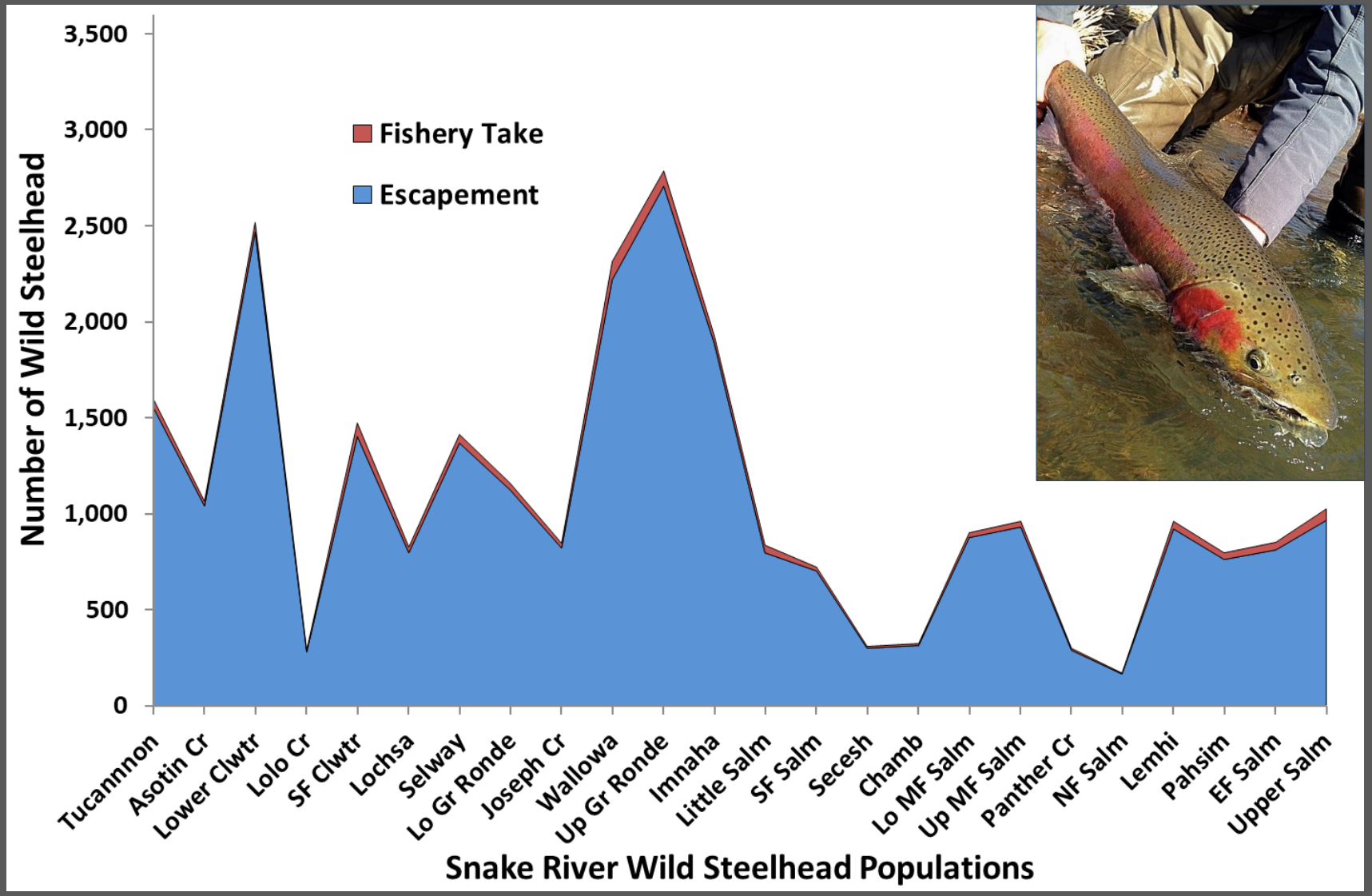
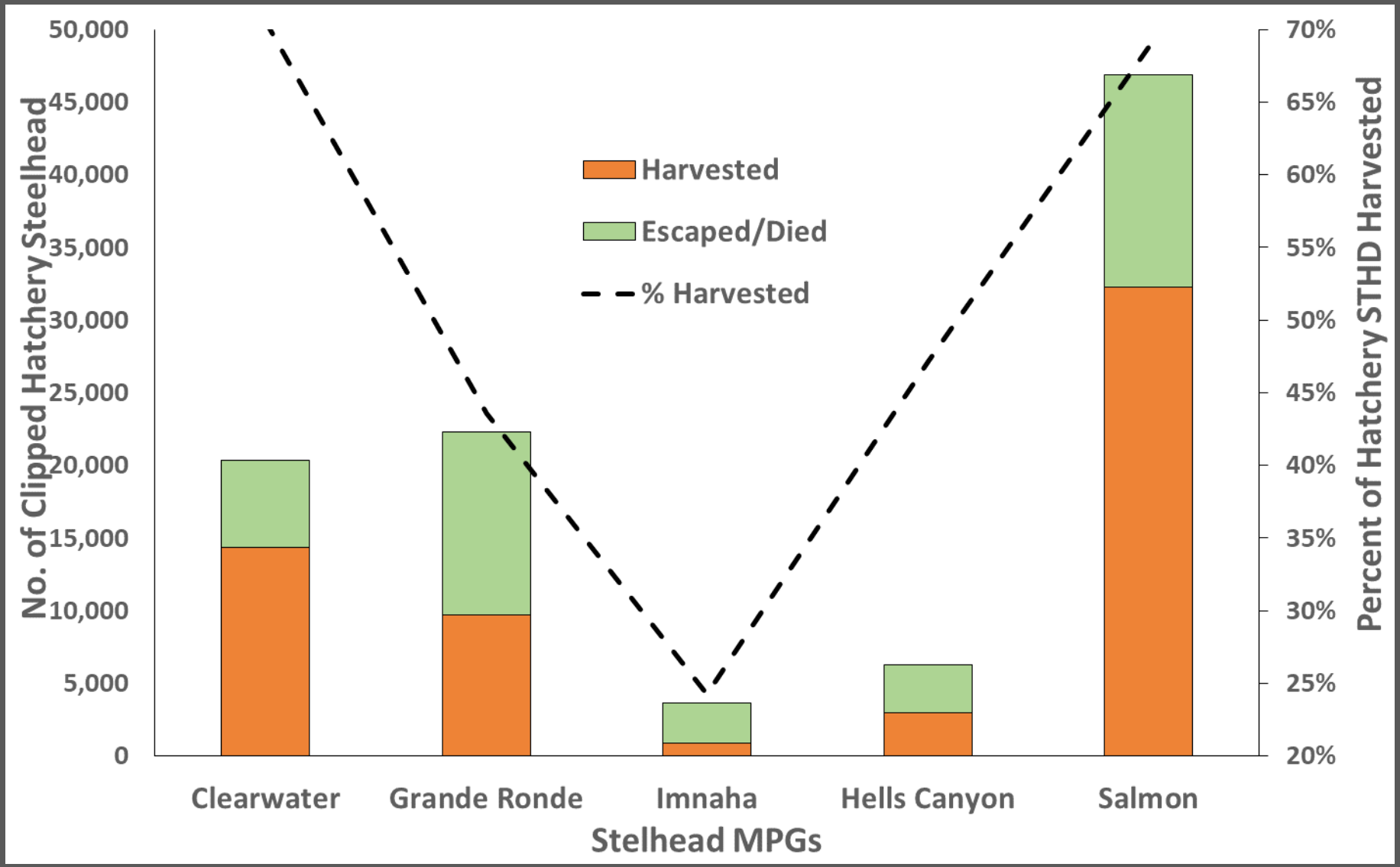


Wild Steelhead

- annual estimates of wild Snake R stock status, in many places not available by other means
  - compare to independent estimates (ex: arrays)
  - informs ESA Status Reviews
- clearer picture of fishery impacts on wild stocks
  - SY11-15 ta deboards for permitting
  - preliminary nual fishery permitting

Mean Model Results
(spawn years 2015-2019



Hatchery Steelhead

- clearer picture of fish available for harvest (stocks, time, location)
  - Potential to focus/maximize harvest
- many hatchery fish escape fishery and potentially spawn in release reaches
  - lessen hatchery spawning in the wild, where not intentionally supplemented

Model Caveats

- abundance better for hatchery fish
- greatly simplifies fisheries
- assumes zero natural mortality
- conclusions are general & comparative

Statistics Lesson of the Day

"Essentially, all models are wrong, but some are useful."

– G. E. P. Box, 1987

Potential Model Improvements

- transition model into ‘R’ environment

- constrain tributary escapement estimates by independent terminal estimates

  (weirs & PIT arrays)

Potential Model Improvements

- use PBT stock-specific harvest data within given reaches
  - could provide surrogate for catch-n-release mortality on adjacent wild stocks
- inform movement probabilities w/ PIT detections &/or telemetry studies
  - fish don’t always do what you expect they should do

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Funded by
Bonneville
POWER ADMINISTRATION

Comments? Questions?