



# Status and Trend of Okanogan summer/fall Chinook

Chief Joseph Hatchery  
2021 Annual Program Review

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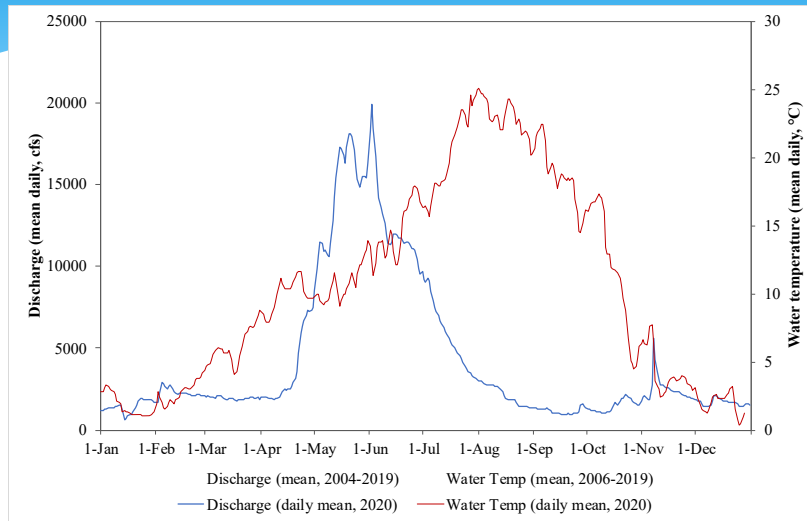


KMQ 1: What is the current status and recent historical trend of the naturally-spawning population in terms of Viable Salmonid Population (VSP) parameters?

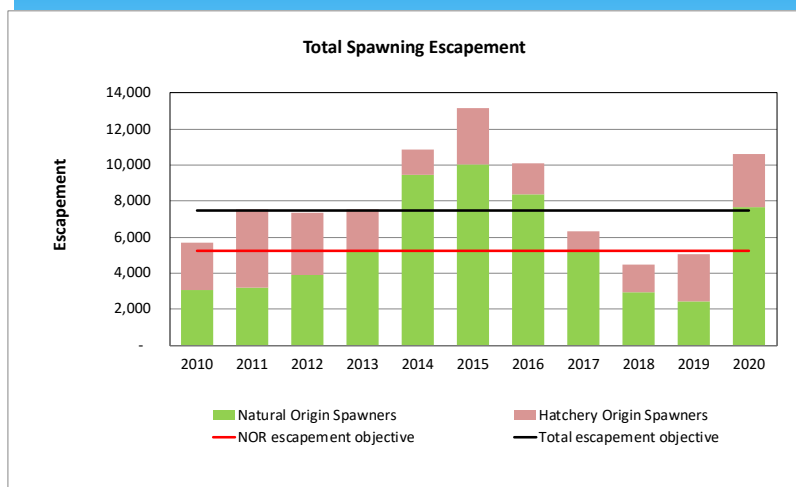
## Viable Salmonid Population (VSP)

- Independent of other populations  
(distance, genetics, stray rates, size)
- Negligible risk of extinction  
(less than 5% over 100 yr timeframe)
- Abundance, Productivity, Spatial Structure, Diversity

# Water discharge and temperature

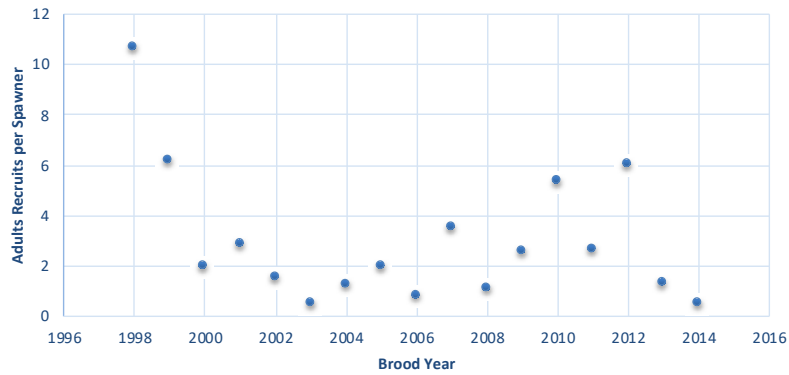


# Abundance



# Productivity

## Recruits/Spawner by Brood Year

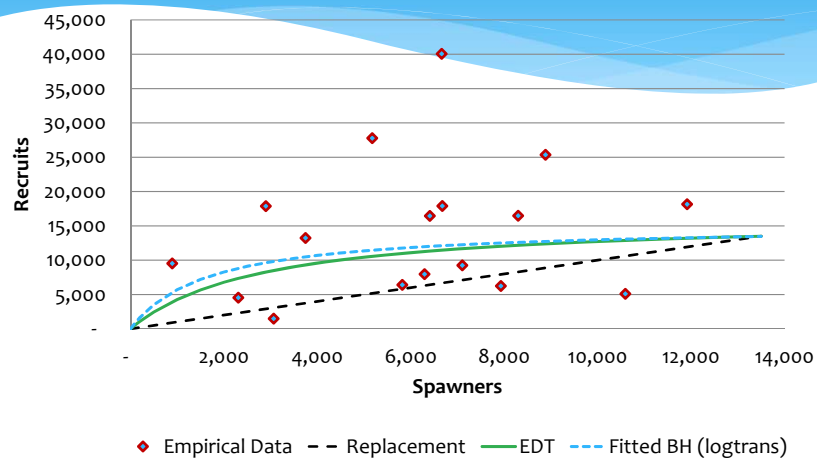


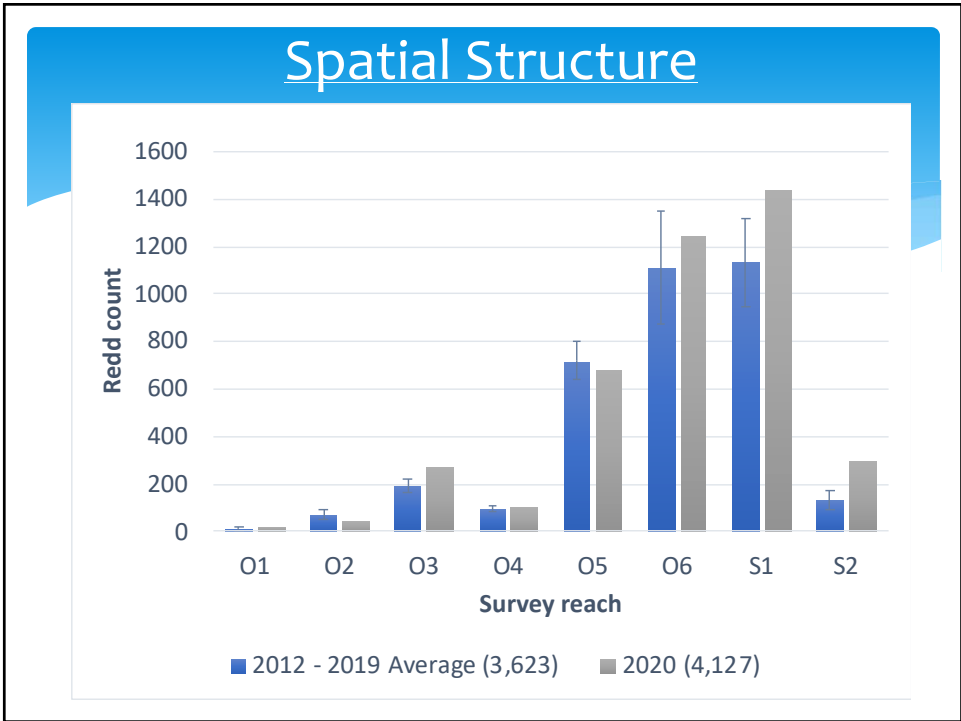
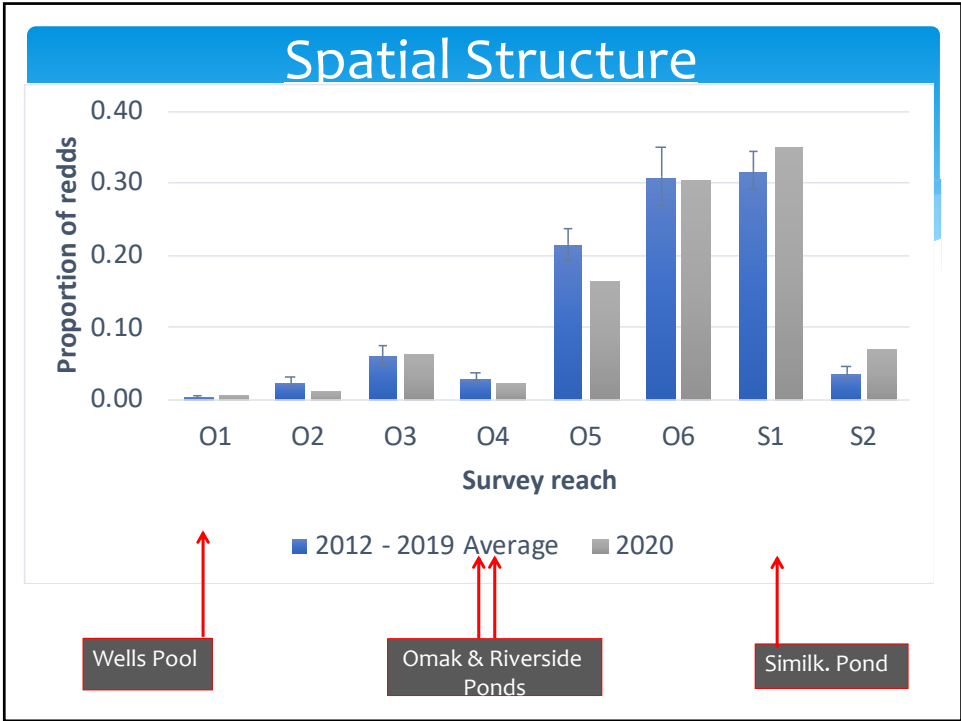
Overall Mean (1998-2014) = 3.0 R/S  
10 Yr Mean (2005-2014) = 2.6 R/S  
3 of 16 years < 1 R/S

# Intrinsic Productivity

(Beverton-Holt modeled = 9.2)

BY1998-2014





# Diversity

## 1. Genetic

- Structure of upper Columbia River summer Chinook and evaluate the effects of hatchery supplementation programs
  - \* Objective
    - Determine if genetic diversity, population structure and effective population size have changed in natural spawning populations as a result of the hatchery programs
    - Hatchery and wild groups from upper Columbia basin
      - Okanogan, Methow, Chelan Falls, Entiat, Wenatchee and Hanford Reach
    - Make comparisons between pre-supplementation (1993) to post-supplementation (2008)

# Diversity: Moving Forward

- \* Broodstock collection protocols under the new CJH program (2010) should improve genetic differentiation.
- \* Selective harvest to lower pHOS will reduce the number of non-target (stray) hatchery fish on the Okanogan spawning grounds.
- \* PUD M&E program has a 10 yr recurrence interval for genetic evaluation.
  - \* What's the status of the Hatchery Committee and PUD's decision to conduct the 10 year study?

## Plan for 2021

Assess the genetic effects of the hatchery program on natural populations

- \* BY17 and BY18 Analyses
  - \* natural-origin baseline samples, natural-origin contemporary samples and hatchery-origin contemporary samples
  - \* hatchery-origin baseline samples and hatchery-origin contemporary samples to look at genetic divergence between hatchery-origin and natural-origin population with segregated program
- \* Genotype samples from upper Columbia programs with appropriate SNP panel
  - \* Wenatchee, Methow, Entiat, and Okanogan basins
- \* Okanogan will include 100 baseline samples (n=50 each from Similkameen and Okanogan) to be genotyped, contemporary samples were genotyped from the CRITFC PBT analyses
- \* Analyses completed by July 2021

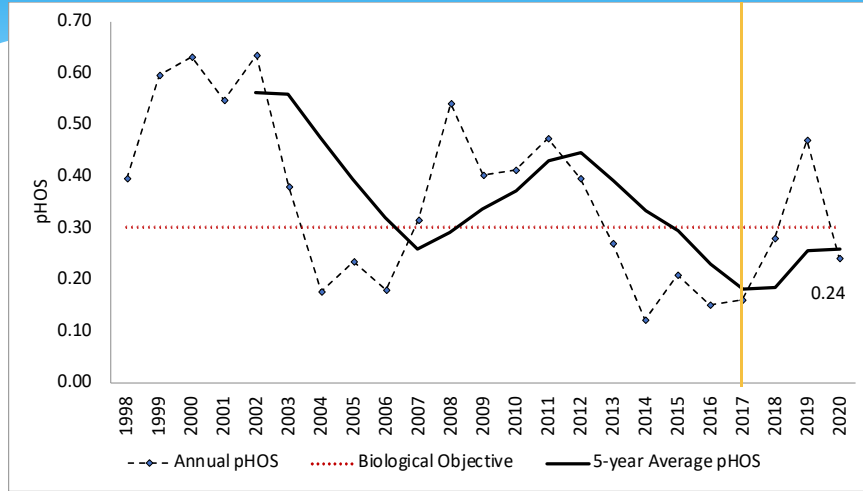
## Diversity

### 2. Phenotypic (morphology and life history traits).

- \* Adult run timing
- \* Spawn timing
- \* Age structure
- \* Morphometrics (length, fecundity, others)
- \* Juvenile rearing strategies
  - \* Natural yearlings?
  - \* Transient rearing
  - \* True subyearling migrants

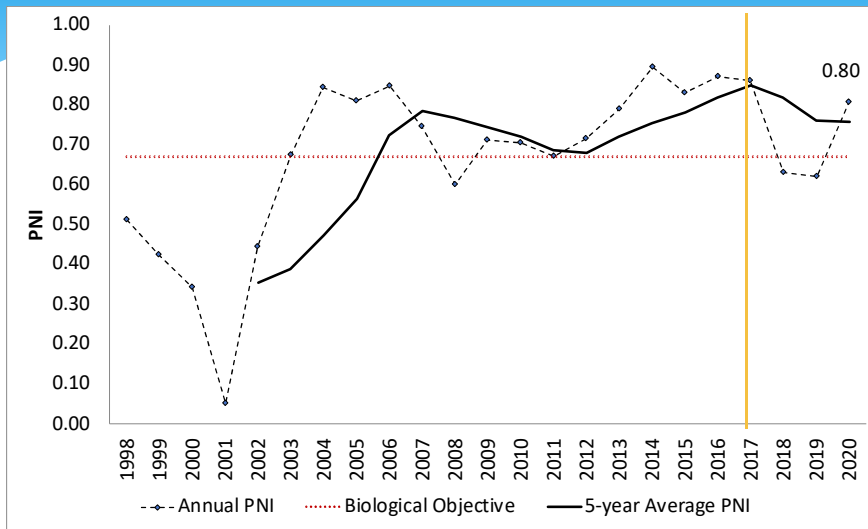
# Diversity

## 3. Risk factors (spawner composition; pHOS)



# Diversity

## Risk factors (spawner composition; PNI)



## Conclusions

- Abundance: above the objective for total escapement and natural origin spawners and trending up again, similar to 2014
- Productivity: still higher than previous assumptions
- Spatial Structure: similar to previous years overall but starting to see an increase in lower distribution in the Okanogan (O3) and upper Similkameen (S2)
- Diversity: Last year we saw pHOS levels above the objective, but in 2020 the level was below the .30 objective (5-year avg. has leveled out). PNI is back up above objective (5-year avg. starting to level out again), region wide genetic evaluations occurring for upper Columbia in 2021, including the Okanogan population