The Chief Joseph Hatchery
2021 Annual Program Review

March 30-31, 2021

Virtual Meeting

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Part 1 – Program Overview

Colville Confederated Tribes
Chief Joseph Hatchery Program

March 30, 2021

Welcome to the Chief Joseph Hatchery's –11 th Annual Program Review (APR)

Please accept this invitation to join us at the 11th Annual Chief Joseph Hatchery Program Review. This year's meeting will be held virtually on March 30th and 31st. This workshop provides a unique opportunity for our staff to work with regional partners in support of the Colville Tribes' Anadromous Fish Division and its Hatchery Program. The technical and management expertise each of you brings to the APR is a key component for success.

The first day of this year's meeting is set aside to present results from 2020 activities and to discuss what we've learned. We will review our monitoring and evaluation designs, harvest regimes and our fish culture and production operations. We will also address the program's key management questions and provide information to facilitate the adaptive management process. Previous APRs have helped in this regard, and we expect this year to be no different. The rest of the agenda, on Day 2, is structured to examine the key analytical assumptions, biological targets and the decision rules which guide our hatchery, harvest and monitoring plans and activities for 2021. While these workshops typically are a Colville Tribes staff exercise, all invitees are welcome to attend beyond Day 1.

An informational packet is included with the Day 1 presentations in Part 3 as well as the 2021 hatchery production plan and notes from the 2020 APR meeting. Chief Joseph Hatchery was in its 8th year of operation last year and we were excited to see the fourth year of adult Chinook returns. 2020 was a good year for returns to the Upper Columbia and the program was able to achieve their hatchery and harvest goals for the season. We are encouraged that pre-season forecasts indicate similar conditions for fish returns to the Upper Columbia in 2021.

The Chief Joseph Hatchery Program's primary goal is to provide for long absent ceremonial and subsistence needs for our members, with secondary goals to also benefit other fishermen and wildlife from the ocean to the streams. Our objective is to do this through a conservation-based approach to increase the abundance, distribution and health of natural and hatchery-origin fish populations. Lastly, the CCT Fish and Wildlife program will continue to provide leadership for the recovery and protection of listed and non-listed fish, and their habitat, throughout the Columbia Basin.

On behalf of the Colville Confederated Tribes Fish and Wildlife Department, we appreciate your support and look forward to seeing you at this year's Annual Program Review.

Sincerely,

Joe Peone

Joe Peone, Director
Fish and Wildlife Department
Colville Confederated Tribes
Office: 509.634.2113
Cell: 509.634-1525
joe.peone.fnw@colvilletribes.com

The Chief Joseph Hatchery Program –Principles[1]

The Colville Tribes assert that hatchery production is an indispensable part of a multifaceted strategy to improve destabilized fish abundance and diminished system-wide survival. Unsustainable harvest regimes, migratory impediments, habitat degradation and other environmental factors have contributed to historic declines that require substantive action.

Put simply, we cannot replace lost habitat or overcome multiple human-caused limitations to sustainability, or maintain viable natural fish populations, unless hatchery programs are part of the overall approach. Therefore, individual program components must be viewed as tools that can be managed as a comprehensive policy to meet conservation and resource goals.

The actions being implemented by the Colville Tribes' Fish and Wildlife Department represent an extraordinary effort to recover Okanogan and Columbia River natural salmon and steelhead populations. The Tribes have embraced hatchery reform efforts that seek to find a balance between artificial and natural production and address the often conflicting goals of increased harvest and conservation.

Sound science and management principles and an adaptive framework are incorporated into the Chief Joseph Hatchery Program. This insures that production plans and activities are guided by science-based standards and that rigorous monitoring and evaluation designs are applied. These principles are:

1. *Manage hatchery broodstock to achieve proper genetic integration with, or segregation from, natural populations;*
2. *Promote local adaptation of natural and hatchery populations;*
3. *Minimize adverse ecological interactions between hatchery- and natural-origin fish;*
4. *Minimize effects of hatchery facilities on the ecosystem;*
5. *Maximize survival of hatchery fish in integrated and segregated programs;*
6. *Develop clear, specific, quantifiable harvest and conservation goals for natural and hatchery populations within an "All H" (Hatcheries, Habitat, Harvest, Hydro) context;*
7. *Design and operate hatchery programs in a scientifically defensible manner;*
8. *Monitor, evaluate and adaptively manage hatchery programs;*
9. *Institutionalize and apply a common implementation framework;*
10. *Use the framework to set priorities, guide project review, and determine return on investments;*
11. *Provide training for all program staff;*
12. *Host the Chief Joseph Annual Program Review as part of the adaptive management principle, and*
13. *Develop and maintain a state-of-the-art CJHP database and a highly functional web-presence.*

[1] Adapted from the Hatchery Reform Project, the CJHP 2012 Implementation Plan and other key program documents developed under the CJHP Master Plan (3-Step Process), Hatchery Science Review Group reports and independent science review.

CHIEF JOSEPH HATCHERY AT A GLANCE

1. RESERVOIR WATER INTAKE
On the upstream face of Chief Joseph Dam, a screened intake draws water from the dam's reservoir for use at the hatchery. A 36" steel pipe on the downstream face of the dam delivers the water to a buried pipeline starting near the foot of the dam.

2. RESERVOIR WATER PIPELINE
The buried pipeline conveys water drawn from the dam's reservoir to the hatchery headbox.

3. FISH LADDER
Cool water from the hatchery flows through this ladder to attract adult Chinook salmon that have returned after several years in the ocean.

4. ADULT SALMON RACEWAYS
Adult salmon ("broodstock") that are collected on the purse seine fishing boat, weir, or enter the fish ladder are directed to raceways where they are held until their eggs ripen.

5. SPAWNING BUILDING
In the spawning building, fish culturists collect and fertilize eggs from the returned adult fish. The fertilized eggs are transferred to the main hatchery, where they are placed in incubators.

6. MULTI-USE PIPELINE CORRIDOR
Major pipelines run through the corridor between the main hatchery and the broodstock area. These include the reservoir-water supply line going to the headbox, a groundwater supply line going to the spawning building, and a hatchery water discharge line going to the fish ladder.

7. ADMINISTRATION BUILDING
Hatchery managers and administrative staff work in this building, which also features meeting space and an educational display area.

8. PUBLIC USE TRAIL
A trail outside the fenced hatchery grounds has been reconstructed for public use.

9. GROUNDWATER PIPELINE CORRIDOR
A pipeline buried in this corridor delivers groundwater to the hatchery from five wells at Bridgeport State Park.

10. HEADBOX
The headbox is the central arrival point for water supply to the hatchery. Groundwater and reservoir water are aerated, excess nitrogen is removed, the river water is filtered, and the water is conveyed to various end uses at the hatchery.

11. STORAGE BUILDING
This building is the hatchery's home for supplies, spare parts, vehicles and trailers.

12. HATCHERY BUILDING
This 14,000-square-foot building is where salmon eggs are incubated and salmon fry are raised. It also houses a laboratory, a shop area, some offices, fish food storage, and equipment for treating and chilling water.

13. REARING RACEWAYS
Chinook salmon fry are raised to small fingerlings in these two banks of 20 raceways, each 10 feet wide and 110 feet long.

14. REARING PONDS
Chinook salmon are raised from fingerlings to smolts in 210-foot-long rearing ponds, one that is 80 feet wide and two that are 50 feet wide.

15. CLEANING WASTE POND
Fish waste from the rearing raceways and ponds settles in this pond for later removal from the site.

16. GENERATOR
A generator is available on site to provide power in the event of failure of the main power source for any reason.

Columbia River Treaty 2014/2024 Review Program
Columbia River Watershed Dams

BRITISH COLUMBIA
ALBERTA
CANADA
UNITED STATES OF AMERICA
WASHINGTON
OREGON
IDAHO
MONTANA
WYOMING
NEVADA
UTAH

Upper Columbia River
Middle Columbia River
Kootenai-Pend Oreille-Spokane Rivers
Lower Columbia River
Mainstem Columbia River
Willamette River
Lower Snake River
Upper Snake River

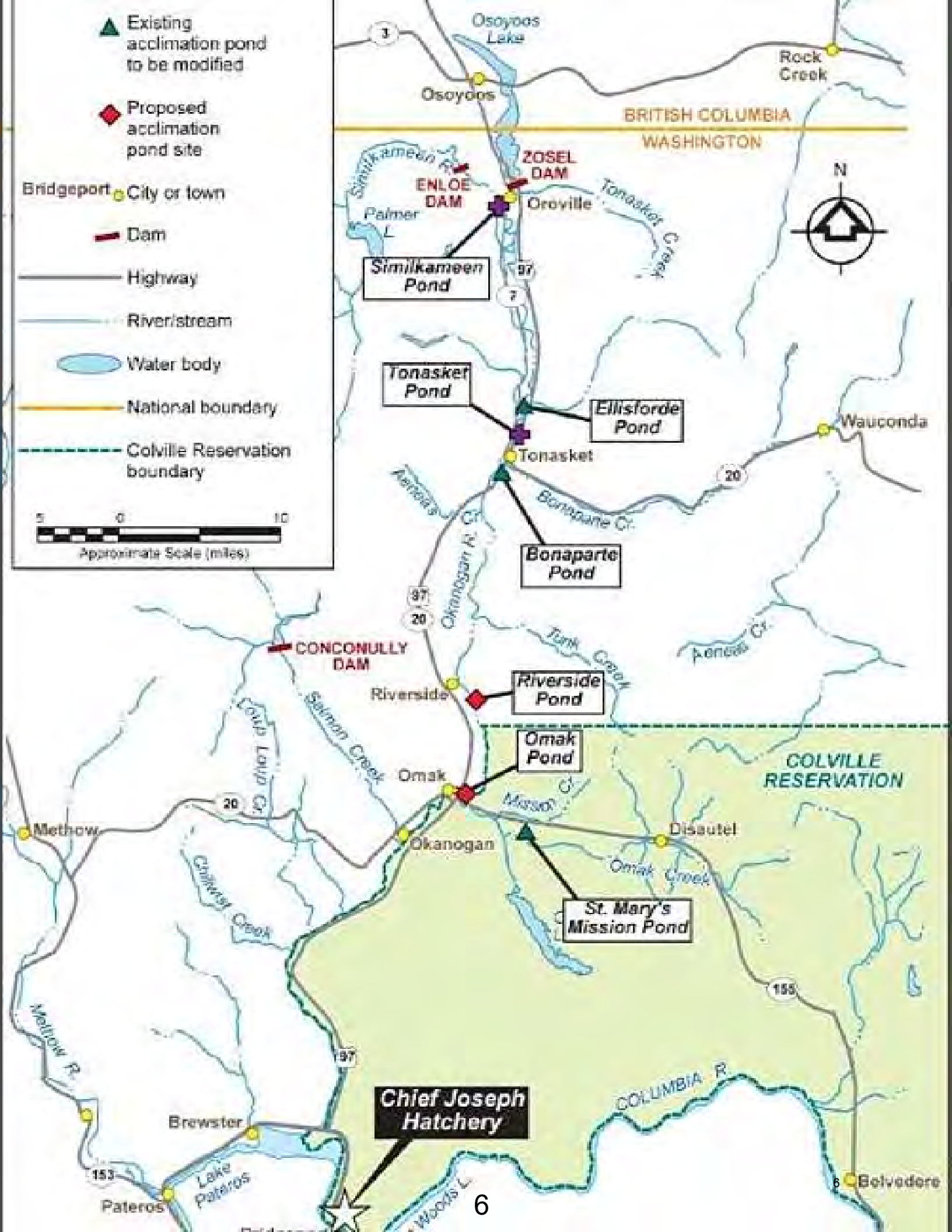
Mica
Revelstoke
Duncan
Corra Linn & Kootenay Canal Projects
Lower Bonnington
Upper Bonnington
Slocan
Brilliant
Arrow Lakes/ Hugh Keenleyside
Seven Mile
Waneta
Boundary
Box Canyon
Priest Lake
Albeni Falls
Cabinet Gorge
Libby
Hungry Horse
Columbia Falls
Bonners Ferry
Grand Coulee
Long Lake
Wells
Chief Joseph
Chelan
Rocky Reach
Wenatchee
Keechelus
Kachess
Cle Elum
Rock Island
Bumping Lake
Tieton
Yakima
Priest Rapids
Wanapum
Lower Monumental
Little Goose
Lower Granite
Dworshak
Lewiston
Clearwater River
Pasco
Richland
Kennewick
Ice Harbor
McNary
Vancouver
Bonneville
The Dalles
John Day
Hillsboro
Gresham
Beaverton
Portland
Salem
Pelton Rereg
Pelton
Round Butte
Eugene
Springfield
Bend
Hells Canyon
Oxbow
Brownlee
Cascade
Deadwood
Owyhee
Boise
Nampa
Arrowrock
Lucky Peak
Anderson Ranch
American Falls
Pocatello
Idaho Falls
Palisades
Jackson Lake
Missoula
Kerr
Flathead Lake
Thompson Falls
Noxon Rapids
Post Falls
Nine Mile
Little Falls
Spokane
Monroe Street
Upper Falls
Coeur d'Alene Lake
Lake Pend Oreille

Columbia River
Kootenay River
Duncan River
Pend Oreille River
Priest River
Kootenai River
Spokane River
Sanpoil River
Methow River
Chelan River
Lake Chelan
Banks Lake
Naches River
Riffe Lake
Cowlitz River
Lewis River
Yakima River
Grande Ronde River
Snake River
Clearwater River
North Fork Clearwater River
Clark Fork
Thompson River
Flathead River
North Fork Flathead River
South Fork Flathead River
Hungry Horse Reservoir
Clackamas River
Willamette River
North Santiam River
South Santiam River
McKenzie River
Deschutes River
Powder River
Malheur River
Owyhee River
Boise River
Snake River
Henry's Fork
Little Wood River

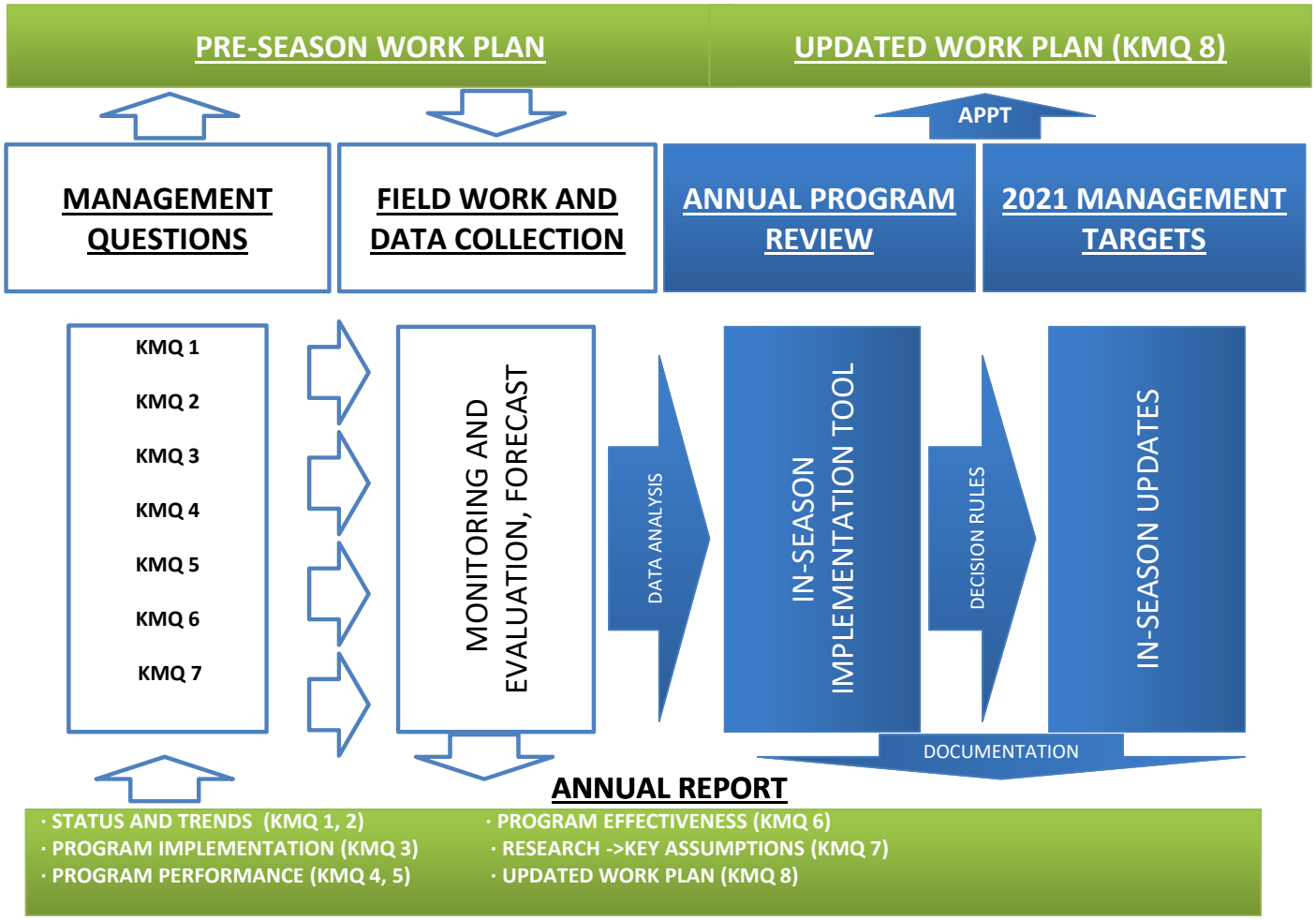
0 50 100 200
Miles
N

BONNEVILLE POWER ADMINISTRATION
US Army Corps of Engineers®

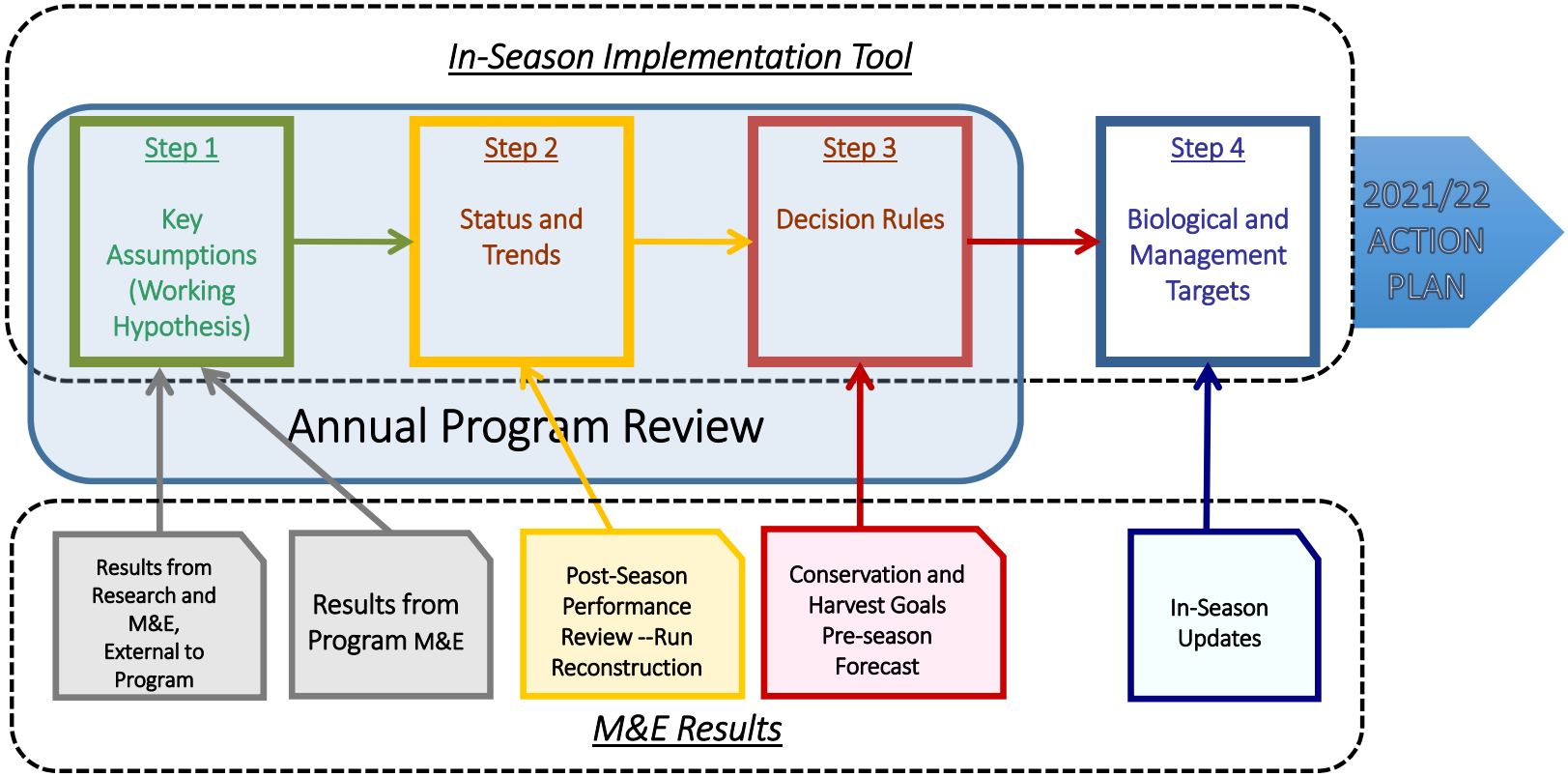
Map Created: 22 JUN 11


Existing acclimation pond to be modified
Proposed acclimation pond site
Bridgeport City or town
Dam
Highway
River/stream
Water body
National boundary
Colville Reservation boundary
5 0 10
Approximate Scale (miles)
Osoyoos Lake
Osoyoos
Rock Creek
BRITISH COLUMBIA
WASHINGTON
Similkameen R.
ENLOE DAM
ZOSEL DAM
Oroville
Tonasket Creek
Palmer L.
Similkameen Pond
Tonasket Pond
Ellisforde Pond
Tonasket
Wauconda
Aeneas Cr.
Bonaparte Cr.
Bonaparte Pond
Okanogan R.
CONCONULLY DAM
Riverside
Riverside Pond
Turtle Creek
Aeneas Cr.
Loup Loup Cr.
Salmon Creek
Omak Pond
Omak
COLVILLE RESERVATION
Mason Cr.
Methow
Okanogan
Disautel
Omak Creek
Chiliwist Creek
St. Mary's Mission Pond
Methow R.
Brewster
Chief Joseph Hatchery
COLUMBIA R.
Lake Pateros
Pateros
Belvedere
Woods L.
N

Adaptive Management Implemented

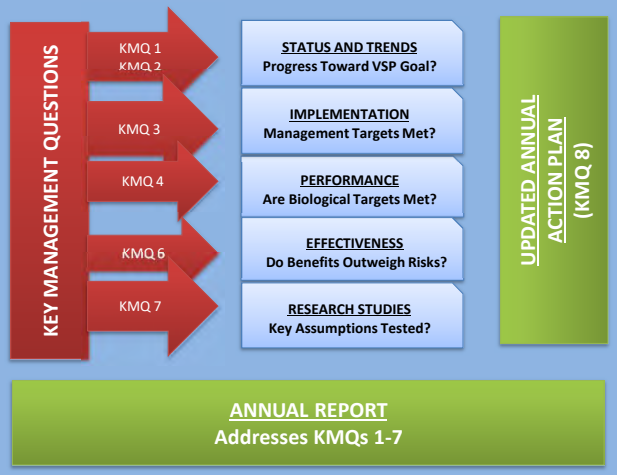


ISIT and the Annual Program Review



Key Management Questions

Status and Trends:	1. What is the current status and recent historical trend of the naturally-spawning population in terms of Viable Salmonid Population (VSP) parameters?
	2. What is the current status and recent historical trend for hatchery returns and harvest?
Implementation:	3. Is the hatchery program meeting target in-hatchery performance standards?
Performance:	4. Are the hatchery post-release targets met for survival and total catch contribution?
	5. Are targets for catch contribution and selectivity for HORs met in Fisheries above Wells Dam?
Effectiveness:	6. Are CJH program benefits consistent with conservation of summer/fall and spring Chinook natural populations?
Research:	7. Are assumptions about natural production potential valid?
Action Plan:	8. How should the program be operated in the coming year (management targets for pNOB, PNI, pHOS)?



R M&E Activities required to answer the Key Management Questions

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

a. Record/review VSP targets for the affected natural populations.
b. Annual estimates of: spawner abundance, distribution, composition (origin, age, and sex)
c. Annual estimates of: total adult equivalent recruitment of NORs by age (brood year)
d. Annually updated estimates of recruits per spawner
e. Updated estimates of spawner-recruit relationship from empirical observations (a-c)
f. Compare estimates of VSP parameters to their targets (hypothesis test)

2. What is the current status and recent historical trend for hatchery returns and harvest?

a. Annual estimates of: smolt releases by age/size for each hatchery program
b. Annual estimates of: total adult equivalent recruitment of HORs by brood year for each hatchery program
c. Annual contribution to defined fisheries for each hatchery program by brood year

3. Is the hatchery program meeting target in-hatchery performance standards?

a. Record of pre-season targets for broodstock selection, mating protocols, life stage survival, marking and genetic sampling
b. Annual record of number and source of broodstock spawned
c. Record of mating protocols
d. Annual estimates of fecundity by age and broodstock source (NOB, HOB)
e. Annual estimates of survival by life stage for each program and egg lot
f. Record of marking and sampling activities and results
g. Annually updated estimates of: pNOB and smolts per spawner for each hatchery program

4. Are the hatchery post-release targets met for survival and total catch contribution?

a. Record of pre-season targets for SAR, catch contribution by fishery, maximum contribution to non-Okanogan natural spawning, maximum rate of straying to the Okanogan from CJH released fish, minimum return rate of fish released into the Okanogan River.
b. Compare annual estimates from 2. a, b, c to targets in 4.a. View targets as testable hypotheses.

5. Are targets for catch contribution and selectivity for HORs met in Fisheries above Wells Dam?

a. Record of target for harvest of HORs from each hatchery program and maximum harvest related mortality to Okanogan NORs by fishery above Wells Dam
b. Annually estimate catch and harvest related mortality of HORs and NORs by fishery and gear type and compare to targets.

6. Are CJH program benefits consistent with conservation of summer/fall and spring Chinook natural populations?
a. Record of pre-season targets for maximum contribution to non-Okanogan natural spawning, maximum rate of straying to the Okanogan from CJH released fish, minimum return rate of fish released into the Okanogan River.
b. Annually estimate (and compare to targets in 6a) the number of strays from each CJH program to each neighboring population relative to the maximum contribution targets for those populations. View targets as testable hypotheses.
c. Annually estimate (and compare to target in 6a) the contribution of each hatchery program to the Okanogan natural escapement--view target as a testable hypothesis.
d. Annually evaluate whether hatchery contribution rates to natural spawning are meeting or exceeding HSRG standards for pHOS and PNI for all affected populations.
e. Periodically evaluate whether long term targets for conservation and harvest could be met w/o one or more of the hatchery programs.
7. Are assumptions about natural production potential valid?
a. Review/update habitat based natural production potential (EDT)
b. Review/update assumptions about relative reproductive success of hatchery origin spawners in the wild
c. Review/update assumptions about fitness effects of hatchery fish on the naturally spawning population
d. Test theoretical natural production potential (based on EDT and Ford genetic fitness) against observed spawner recruit observations.
8. How should the program be operated in the coming year (management targets for pNOB, PNI, pHOS)?
a. Conduct annual program review (APR)
b. Annually refine runsize forecasting and in-season updating methods
c. Obtain/collect dam counts and other data as prescribed by the forecasting/updating methods
d. Periodically, during the pre-season, update estimated return of Okanogan and CJH origin returns above Wells each year
e. Update annual work plan based on most recent results from the RM&E program and the current run forecast.

Part 2 – Data Analysis and Presentation: 2020 Year-in-Review

Population Status

Status and Trend of Okanogan summer/fall Chinook

Chief Joseph Hatchery
2021 Annual Program Review

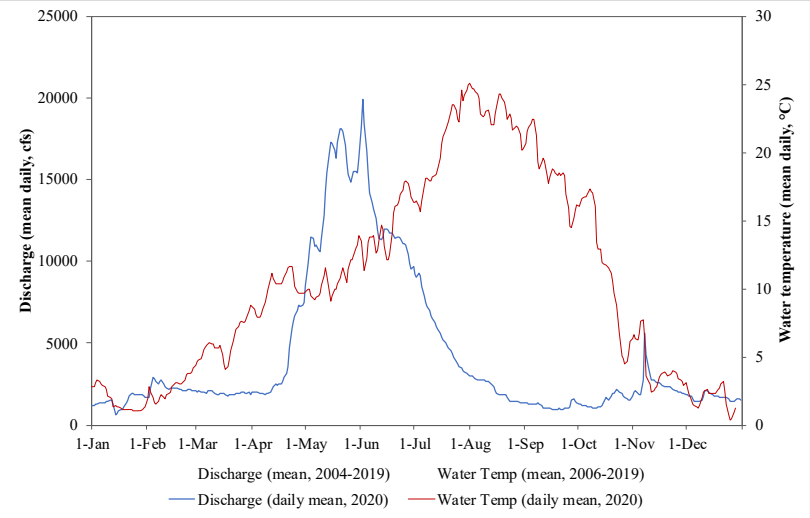
Andrea Pearl
Colville Confederated Tribes
Sr. Fisheries Biologist

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

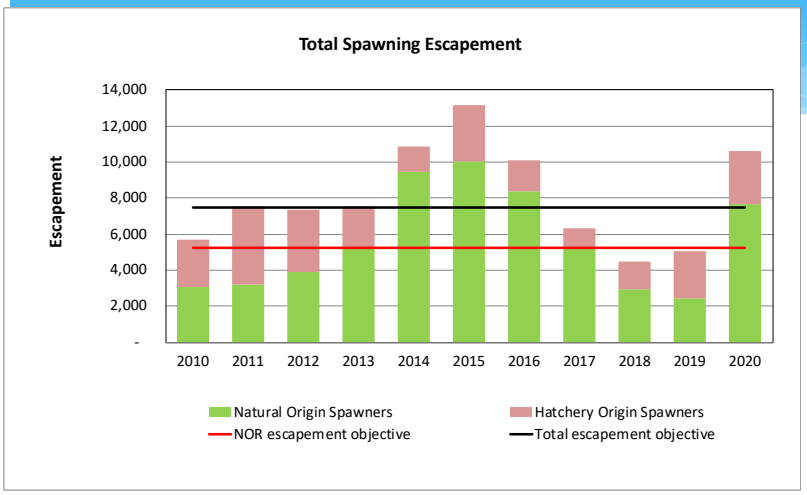
Viable Salmonid Population (VSP)

- 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

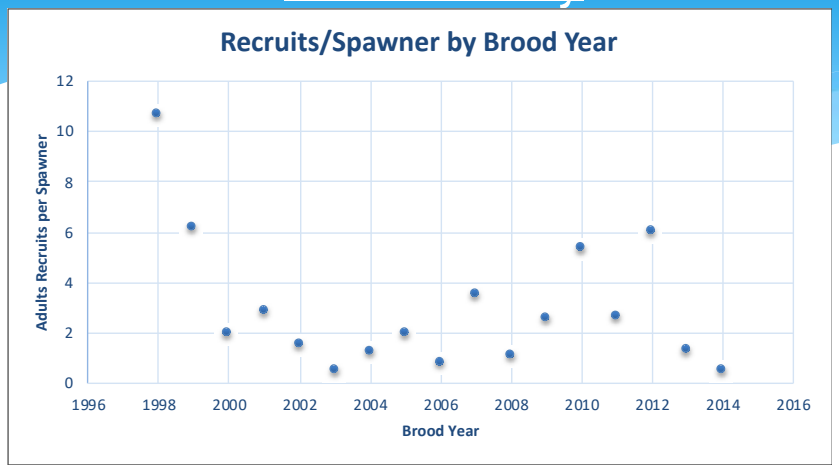


5 yr mean

7,299

5,325

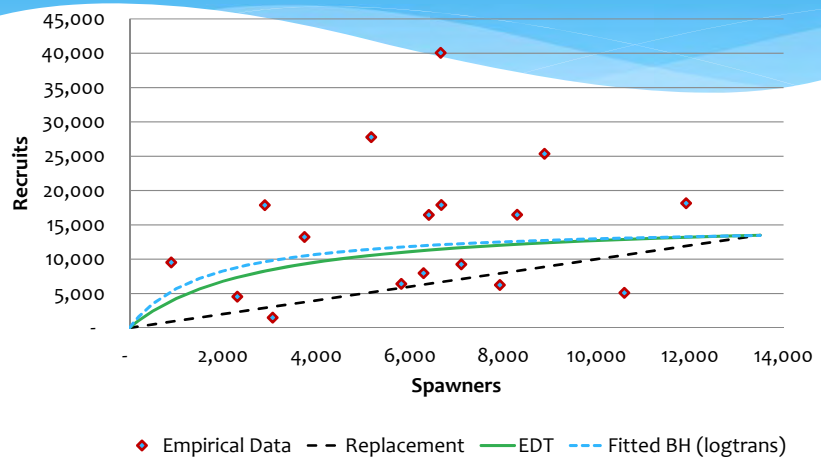
Productivity

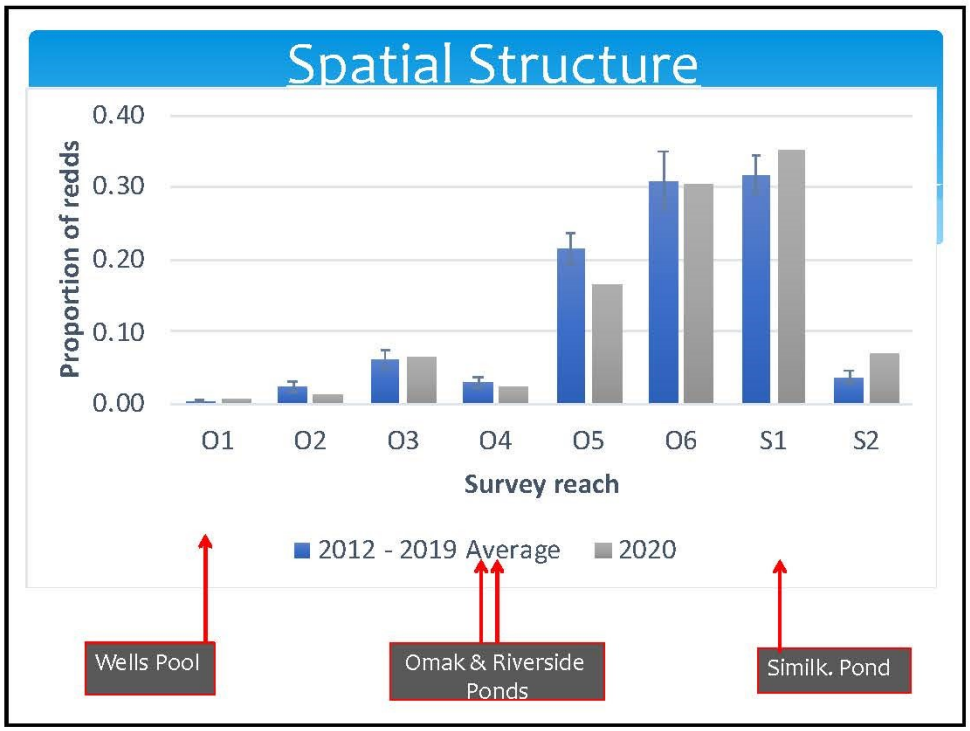


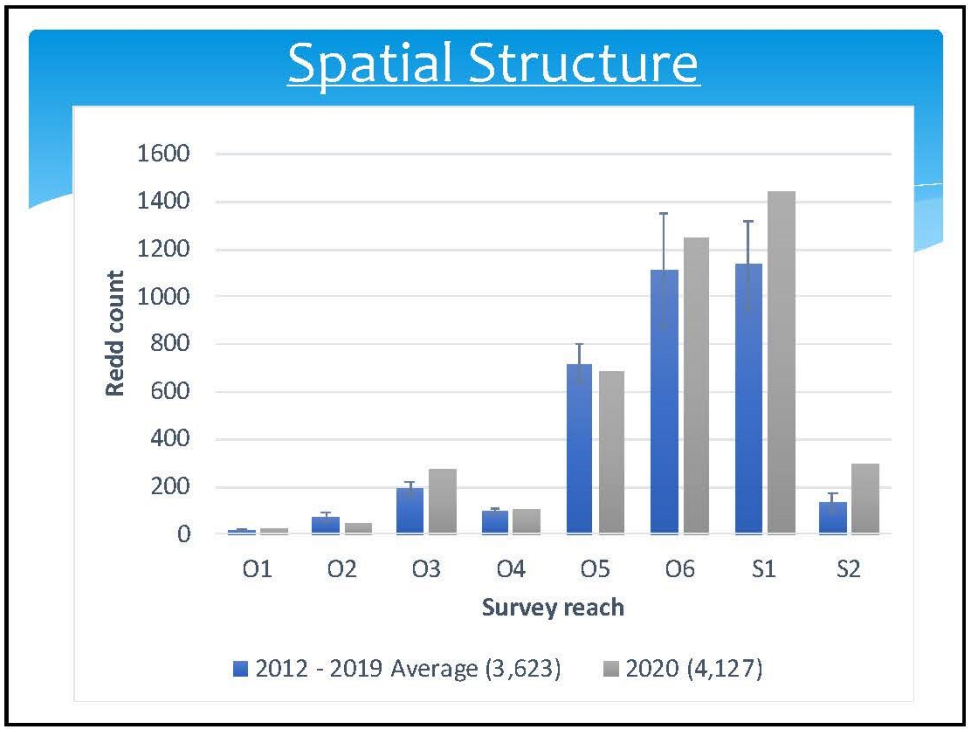
Overall Mean (1998-2014) = 3.0 R/S
10 Yr Mean (2005-2014) = 2.6 R/S
3 of 16 years < 1 R/S

Intrinsic Productivity

(Beverton-Holt modeled = 9.2) BY1998-2014




Spatial Structure
Proportion of redds
0.40
0.30
0.20
0.10
0.00
O1
O2
O3
O4
O5
O6
S1
S2
Survey reach
2012 - 2019 Average
2020
Wells Pool
Omak & Riverside Ponds
Similk. Pond


Spatial Structure
Redd count
1600
1400
1200
1000
800
600
400
200
0
O1
O2
O3
O4
O5
O6
S1
S2
Survey reach
2012 - 2019 Average (3,623)
2020 (4,127)

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

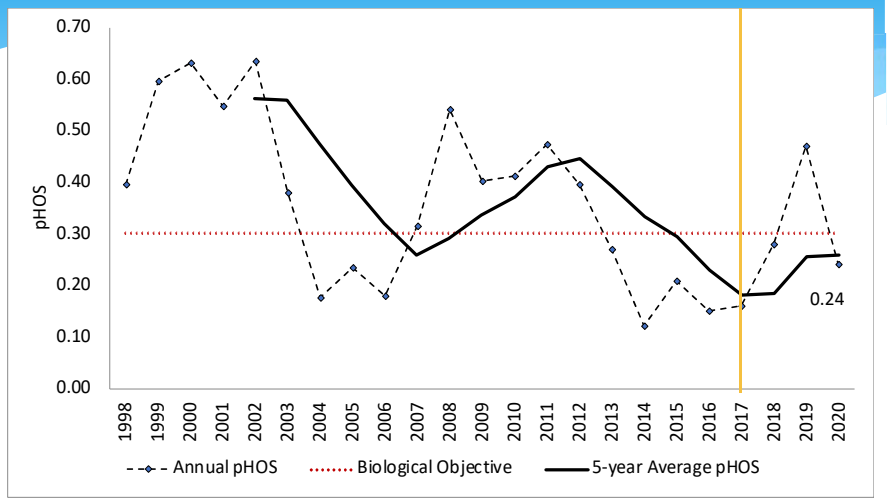
- Assess the genetic effects of the hatchery program on natural populations
- BY17 and BY18 Analyses
  - natural-origin baseline samples, natural-origin contemporary samples and hatchery-origin contemporary samples
  - hatchery-origin baseline samples and hatchery-origin contemporary samples to look 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

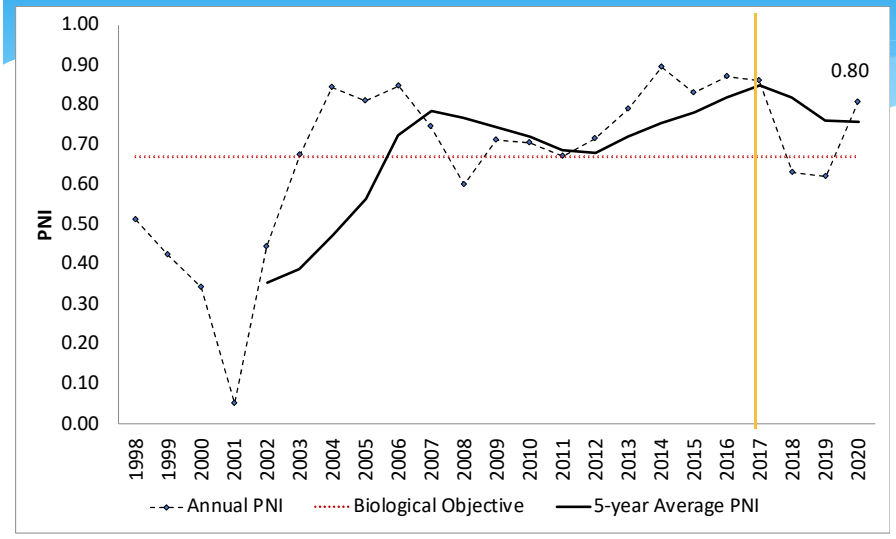
Diversity

3. Risk factors (spawner composition; pHOS)



Diversity

4. 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

Notes

Part 3 – Review Operating Hypothesis

Management Framework

APR Part 3
Management Framework For Summer/Fall Chinook

- Review Logic Path for the Adaptive Management Process
- Review Key Assumptions
- 2020 Outcomes and 2021 Forecasts

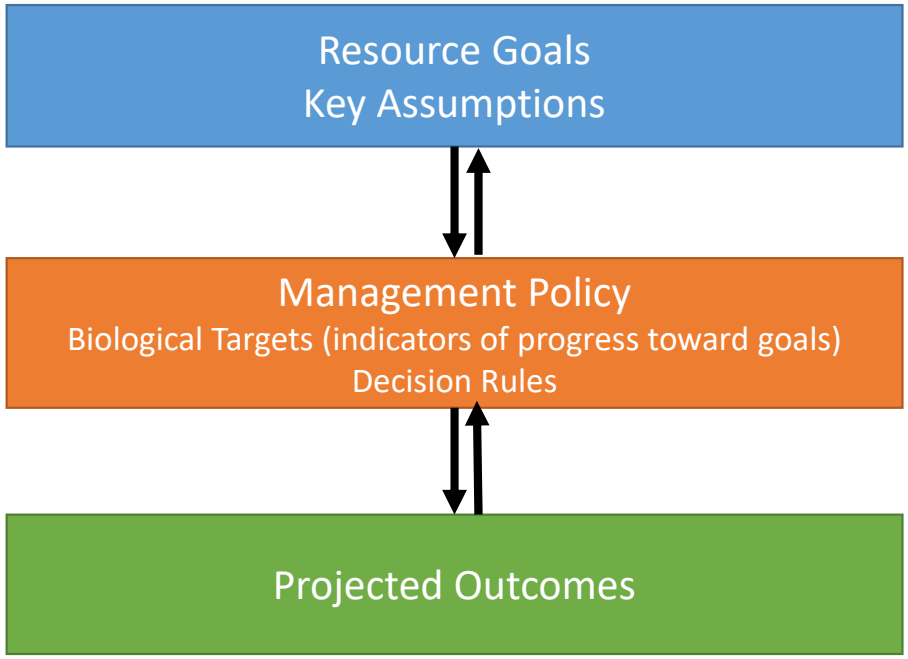
Components of Adaptive Management

I. Annual Program Review
   a. Program Goals (harvest and conservation)
   b. Key Assumptions
   c. Management Policy

Purpose of the APR: Confirm/adjust Key Assumptions and Management Policy to ensure that Program Goals are met over time

II. In-Season Management
   a. Run Forecasts
   b. Management Targets (escapement, harvest, hatchery)

Components of Adaptive Management



Program Goals

- **Conservation or Natural Production Goals:**
  - 7,500 total spawners—5,250 natural origin spawners (NOS)
  - Increase temporal and spatial diversity of spawning/rearing
  - High PNI, low pHOS so that the natural environment is driving adaptation
- **Harvest Goals:**
  - Increase harvest for all fishers
  - Harvest full tribal allocation (2021 pre-season = 5,700)
  - Increase % of individual tribal member harvest

Key Assumptions – Natural Production

HABITAT PARAMETERS	2011	2012	2013	2014	2015	2016	2017	2018	5-year average	Current Conditions
Habitat Productivity		7.5			8.9		5.8		NA	5.8
Habitat Capacity		12,499			7,442		16,296		NA	16,296
OCEAN AND PASSAGE SURVIVAL (SAR)										
Juvenile Outmigration										27.0%
Ocean Survival (BON to BON)										1.98%
Adult Migration										83.0%
Smolt-to-Adult Survival (SAR) (OK to OK)									0.63%	0.44%

- Habitat productivity and capacity assumptions based on EDT (last updated in 2016)
- Juvenile outmigration and adult migration assumptions are based on the BiOp
- Ocean survival (BON to BON) assumption is based on 2016 EDT analysis. Empirical data for NORs (based on PIT tag returns) suggests much higher SARs for BY 2010 and 2011.

Key Assumptions - Harvest

HARVEST RATES-NORs	2018	2019	2020	5-year average
Ocean (unmarked)	24.3%	22.1%	19.1%	24.5%
Lower Col. Zones 1-5 (unmarked)	0.8%	0.4%	0.8%	1.1%
Upper Col. Bonneville to Wells (unmarked)	26.8%	18.0%	13.7%	22.0%
NOR Terminal Induced Mortality Rate	3.0%	3.3%	1.2%	3.4%
HARVEST RATES-HORs				
Ocean (marked)	24.3%	22.1%	19.1%	24.5%
Lower Col. Zones 1-5 (marked)	4.4%	0.4%	2.9%	2.9%
Upper Col. Bonneville to Wells (marked)	30.6%	30.8%	20.1%	27.3%
Terminal Above Wells - Integrated	38.4%	36.5%		35.9%
Terminal above Wells - Segregated	47.5%	57.5%		24.2%

- TAC harvest rates used for ocean, Zones 1-5, and Upper Columbia to Wells fisheries
- RMIS (based on CWTs) data for terminal harvest of HORs
- NOR terminal harvest rate is estimated using CJHP program data
- Total exploitation rate is 44% for NORs and 66% for Integrated HORs
- Big decrease in Upper Columbia (Bon to Wells) harvest rates in 2020
- Low NOR terminal harvest rate by MSF is critical for brood and escapement
- MSF sport fisheries in Columbia River Zones 1-6 also help NOR returns

Key Assumptions - Hatchery

Integrated Program In-Hatchery Assumptions	5-year average	Planning Assumptions
In-Hatchery Pre-spawning survival - NORs	79.8% (-)	90.0%
Eggs/Female - NORs	4,081 (-)	4,600
Egg to smolt survival-yearlings	73.4% (-)	86.0%
Egg to smolt survival-subyearlings	83.5% (+)	84.0%
Segregated Program In-Hatchery Assumptions	**5-year average**	**Planning Assumptions**
In-Hatchery Pre-spawning survival - HORs	80.5% (-)	90.0%
Eggs/Female - HORs	3,922 (-)	4,600
Egg to smolt survival-yearlings	81.5% (-)	86.0%
Egg to smolt survival-subyearlings	75.6% (-)	84.0%

- 7 of 8 metrics are not meeting expectations
- Options- 1) Collect more brood (not without more space or cooler water)

  2) Change management practices (CJH has been doing this, but not the big stuff (i.e. water and space)

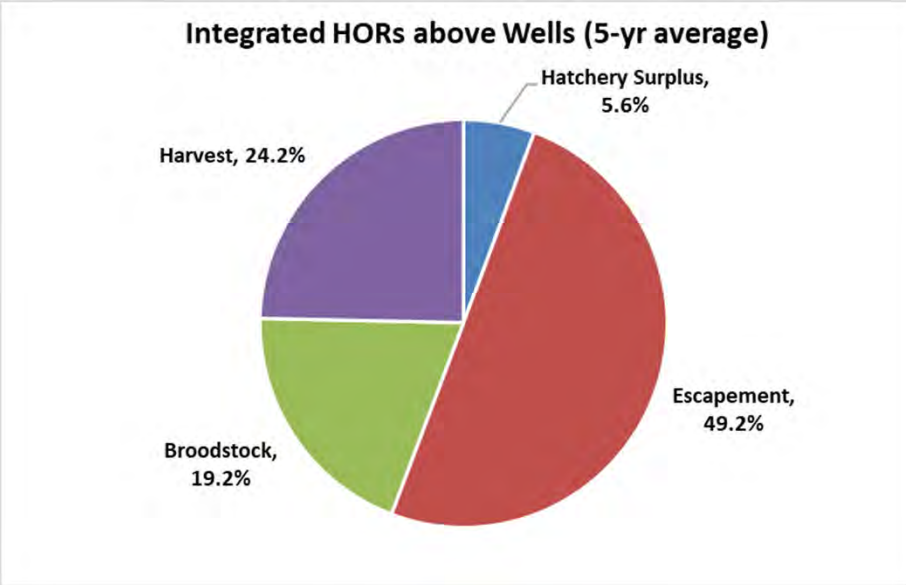
  3) Accept the lower biological targets and reduce the program goals for smolts released

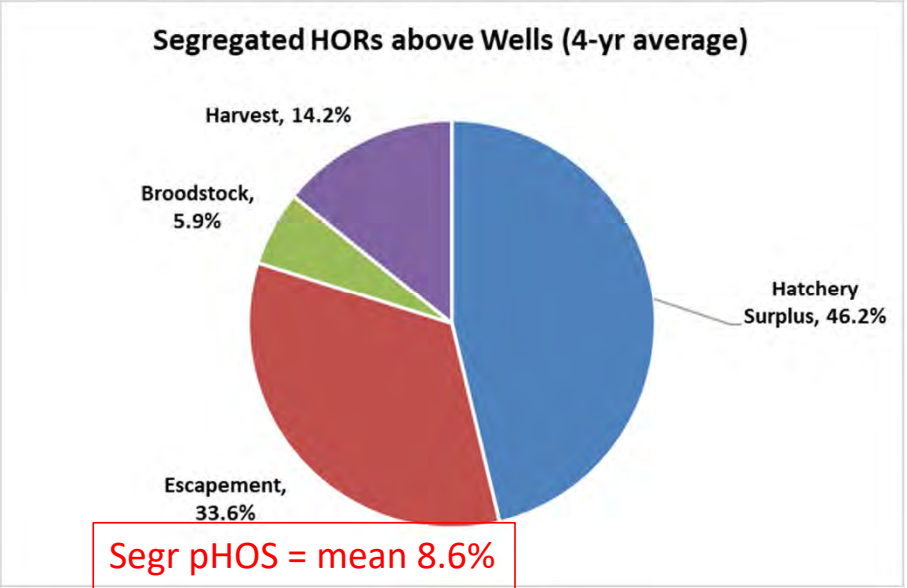
Key Assumptions - Hatchery

HATCHERY	5-year average	Planning Assumptions
SAR- integrated yearlings - BY	1.66%	0.90%
SAR- integrated subyearlings - BY	0.28%	0.27%
SAR- segregated yearlings - BY	1.07%	0.90%
SAR- segregated subyearlings - BY	0.15%	0.27%
Stray Rate from Integr. Prog (to other basins)	0.57%	??
Stray Rate from Segr. Prog (to other basins)	0.52%	??

- Yearling SARs have consistently exceeded original program assumption of 0.8-0.9%.
- Subyearling SARs estimated for the first time, and are similar to planning assumptions.
- Stray rate of CJ HORs (Int and Seg) to other streams and hatcheries is very low.

Key Assumptions - Hatchery





Segr pHOS = mean 8.6%
max 17%

- ~6% of Integrated HORs returning to the CJ Hatchery helps the program meet pHOS target
- Segregated HOR escapement has been high in the past two years (2019-2020); goal is for majority of seg HORs to be harvested or return to the hatchery ladder

Many segr. summer Chinook are left in the river:

-early on, its to provide fish for the fishery

-later, its to avoid steelhead ‘take’ and rendering at the dump

October 6, 2020

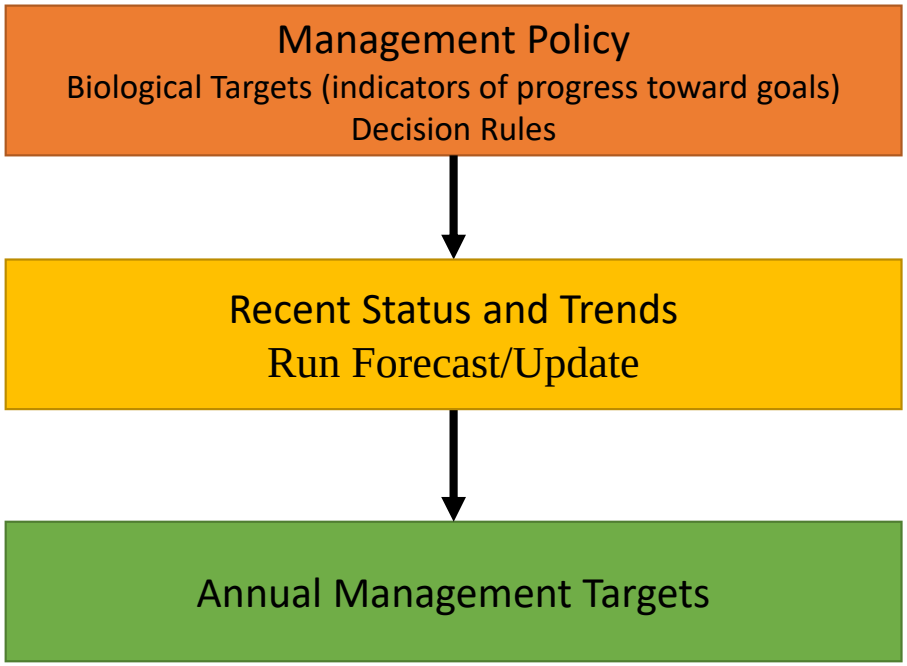
Components of Adaptive Management

I. Annual Program Review

II. In-Season Management Decision Making

II. In-Season Management Decisions

What is the “right thing to do” the coming season to meet Biological Objectives



Biological Targets are indicators of annual progress toward meeting program goals.

- Total pHOS (all programs) < 30%
- Segregated program pHOS <5%
- PNI > 0.67
- Minimum NOS target of 800 to collect brood for the integrated program
- pNOB between 30% and 100%
- Smolt release targets

Management Targets are annual targets for broodstock collection, harvest, weir removals, etc.

- They are driven by the Run Forecast, Biological Targets and Decision Rules.
- They ensure the best actions are taken given the current run forecast and assumptions about the population.

Run Forecast Methods

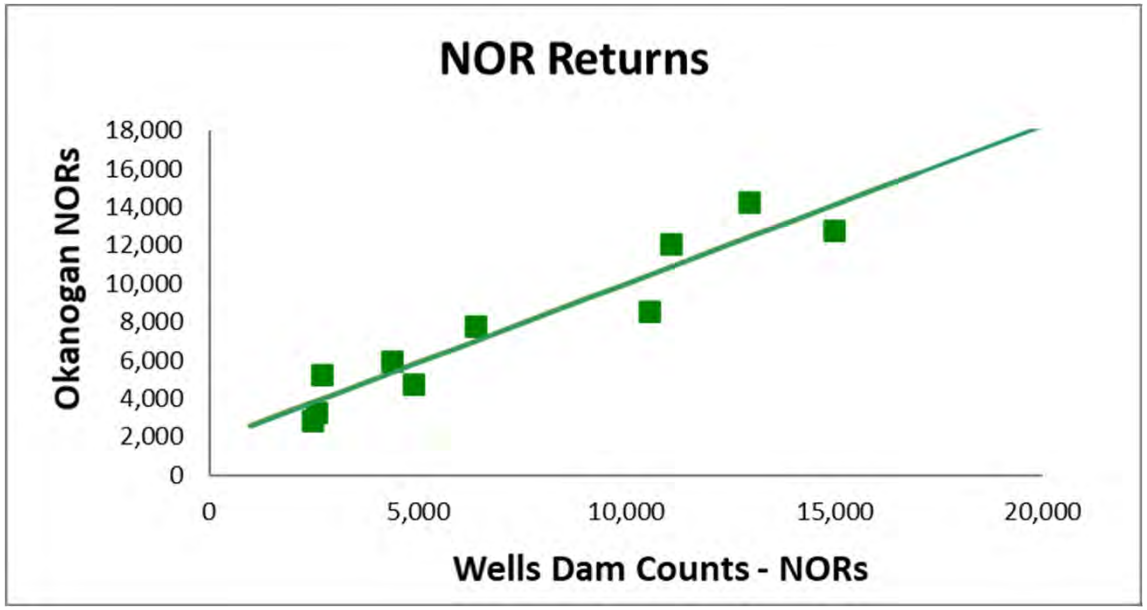
1) Preseason forecast (prior to July 15)
    1) Columbia River Preseason TAC forecast used to predict Okanogan HORs and NORs
    2) 2021 TAC forecast is 77,600
    3) TAC will revise in-season and we will adjust
2) In-season run forecast (July 15)
    - Wells Dam counts used to predict Okanogan HORs and NORs
3) Life Cycle Model Forecast
    - Forecast returns of Okanogan HORs and NORs using ISIT tool: using empirical data on escapement, hatchery releases, age composition data, and key assumptions (habitat, hatchery, harvest)
4) Predicted HOR returns based on PIT tag expansions
    - In-season updates as PITs return to BON and Wells Dam

Wells Dam Run Forecast and Returns – 2020

2020 Forecasts and Returns	Preseason TAC Run Forecast (38,300 to BON)	Life Cycle Model Forecast	Inseason TAC Run Forecast (65,000 to BON)	Forecast Based on 7/15 Wells Dam Counts	PIT Tag Forecast as of 7/15	Final PIT tag forecast	Actual Returns
Okanogan NOR Forecast	3,370	5,752	4,270	10,451	NA	NA	9,271
Okanogan HOR Forecast	3,089	3,356	3,915	7,623	3,635	4,052	3,500
CJH HOR Forecast	2,048	2,009	2,595	5,053	3,228	2,826	1,763
Total Return Forecast	8,507	11,117	10,780	23,127	6863 HORs	6878 HORs	14,534

- TAC and LCM were not good at predicting NOR, but July 15 Wells Dam counts did a great job of predicting NOR.
- All models did a pretty good job at prediction integrated HOR, except July 15 Wells Dam count
- Nothing did particularly well at predicting segregated HOR, but we have reason to believe the actual return was biased low (because we didn't run the ladder much)
- The July 15 Wells counts are not good at predicting HOR, but PIT tags are.
- 'Actual Returns' are also estimates, with unknown error (creel, redd counts, etc.)

NOR Forecast based on July 15 Wells Dam Counts



Management Targets and Outcomes – 2020

Based on final Wells Dam run sizes of:

9,271 NORs
3,500 Integrated HORs
1,763 Segregated HORs

	Management Targets	2020 Performance Review Final Targets	2020 Actuals
Harvest*	Okan. HORs retained in Terminal Fisheries	727	360
	CJH HORs retained in Terminal Fisheries	646	327
	Incidental Loss of NORs	246	108
Hatchery and Weir*	Return of Okan. HORs to Hatchery	328	12
	Return of CJH HORs to Hatchery	2,066	729
	Okan. HORs retained at Weir	129	151
	CJH HORs retained at Weir	26	3
Integrated Hatchery Program	Natural Origin Brood (NOB)-Okan (collected)	702	676
	Hatch. Origin Brood (HOB)-Okan (collected)	-	-
	Projected Annual pNOB-Okan	100%	89%
	Cum pNOB	78%	74%
		800,000 Yearl.	235,740 Yearl.
	Smolt Release-Okanogan	300,000 Subs	169,344 Subs
Segregated Hatchery Program	Hatch. Origin Brood (HOB) - Int	571	541
	Hatch. Origin Brood (HOB) - Seg (purse seine and ladder)	-	71
		500,000 Yearl.	189,967 Yearl.
	Smolt Release-CJH	400,000 Subs	396,433 Subs
Natural Spawning Escapement	Nat. Origin Spawners (NOS)	8,553	7,639
	Hat. Origin Spawners (HOS) - Int	1,693	2,193
	Hat. Origin Spawners (HOS) - Seg	442	570
	Hat. Origin Spawners (HOS) - out-of-basin	NA	176
	Total Number of Spawners (excludes jacks)	10,687	10,577
	Effective pHOS	17%	24%
	PNI	0.86	0.79

Wells Dam Run Forecast – 2021

2021 Forecasts and Returns	Preseason TAC Run Forecast (77,600 to BON)	Life Cycle Model Forecast
Okanogan NOR Forecast	5,988	5,751
Okanogan HOR Forecast	3,496	4,602
CJH HOR Forecast	2,250	3,451
Total Return Forecast	11,735	13,804

- 2021 Preseason TAC estimate for summer Chinook at Bonneville is 77,600 (last year's was 38,300)
- Life Cycle model estimates for 2021 are based on SAR of 2% (NOR) and 1.66% (HOR), which may be too optimistic based on Ocean indicators and recent SAR patterns.

Management Targets for 2021

Based on 2021 preseason TAC forecast, with adjustments to extend to Wells Dam:

5,988 Okanogan NORs
3,496 Integrated HORs
2,250 Segregated HORs

	Management Targets	2021 Targets
Harvest*	Okan. HORs retained in Terminal Fisheries	1,255
	CJH HORs retained in Terminal Fisheries	545
	Incidental Loss of NORs	221
Hatchery and Weir*	Return of Okan. HORs to Hatchery	252
	Return of CJH HORs to Hatchery	1,364
	Okan. HORs retained at Weir	64
	CJH HORs retained at Weir	17
Integrated Hatchery Program	Natural Origin Brood (NOB)-Okan (collected)	702
	Hatch. Origin Brood (HOB)-Okan (collected)	-
	Projected Annual pNOB-Okan	100%
	Cum pNOB	77%
	Smolt Release-Okanogan	800,000 Yearl. 300,000 Subs
Segregated Hatchery Program	Hatch. Origin Brood (HOB) - Int	571
	Hatch. Origin Brood (HOB) - Seg (purse seine and ladder)	-
	Smolt Release-CJH	500,000 Yearl. 400,000 Subs
Natural Spawning Escapement	Nat. Origin Spawners (NOS)	4,559
	Hat. Origin Spawners (HOS) - Int	1,218
	Hat. Origin Spawners (HOS) - Seg	292
	Hat. Origin Spawners (HOS) - out-of-basin	NA
	Total Number of Spawners (excludes jacks)	6,069
	Effective pHOS	21%
	PNI	0.83

Expected outcomes if 2021 preseason run forecast is correct and management targets are met

STATUS OF BIOLOGICAL INDICATORS (5-year Running Averages)

	Program Biological Targets	Status in 2020 (5-year average)	Projected status in 2021 (based on pre-season TAC forecast)	Projected status in 2021 (5-year average)
NOS	5,250	5,325	4,559	4,566
pHOS	30%	23%	21%	25%
PNI	0.67	0.76	0.83	0.75

Conclusions

- **2020 returns were unexpectedly high, despite low preseason TAC forecast**
  - Lower than expected harvest rates, particularly in Zone 6
  - Achieved spawn escapement target
  - Achieved PNI target
  - Achieved pHOS target
  - Made brood collection # for both integrated and segregated programs
  - ~35% smolt release target (integrated program); ~65% for segregated program
  - Ocean conditions neutral to good for the 2020 outmigrating smolts

- **2021 preseason TAC forecast is optimistic and consistent with LCM**
  - Aggressive HOR terminal harvest
  - Full brood collection (100% pNOB for integrated program, integr. HORs for segr. program)
  - Expect to meet pHOS and PNI targets; NOR escapement ~4,500 (close to goal)

Notes

Part 4 – Data Analysis and Presentation: 2020 Year-in-Review

Hatchery Program Harvest Surplus

Hatchery Production, Release Numbers, Broodstock Collection

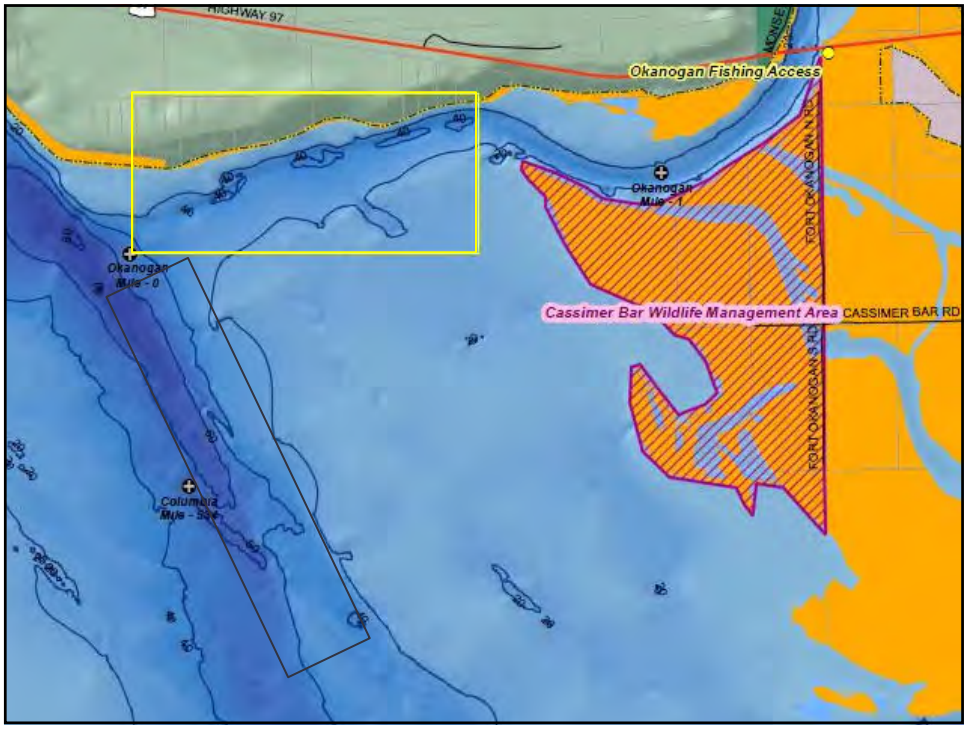
RM&E Summer/ Fall Chinook

RM&E Spring Chinook

2020 Harvest Review & 2021Forecast

Isaiah Martin Harvest Manager
Brian Dietz Biologist

CCT Fish & Wildlife



CCT Harvest Program Goals

- *Collect summer Chinook broodstock for the hatchery: natural-origin (NOR) & hatchery-origin (HOR)*
- *Affect pHOS and improve PNI in summer/fall Chinook spawning areas*
  - *Selectively removing HORs*
  - *Successfully releasing NORs*
- *Provide harvest data to hatchery staff for help in setting the yearly, hatchery-production target*

Key Harvest Management Questions

- *KMQ-2*
  - *What is the current status and recent historical trend for hatchery returns and harvest?*
    - *Local exploitation of UCR summer Chinook in the upper Columbia*
    - *Overall exploitation on the entirety of UCR summer Chinook*
- *KMQ-5*
  - *Are targets for catch contribution and selectivity for HORs met in Fisheries above Wells Dam?*
    - *For all hatchery-origin summer Chinook above Wells*
    - *For Okanogan HOR Chinook above Wells*

Mark Studies and Selective Fishing

Overview

- *Allows harvest of target species while minimizing impacts on non-target fishes and or weak stocks in a mixed-stock fishery*
- *Allows for removal of predatory and invasive species*
- *Allows opportunity for PIT and radio tag interrogation*
- *Share harvest monitoring data with CJHM&E staff, project partners and regional entities*

Harvest Data

2020 Purse Seine fishing effort

Total # adult salmon caught	6,980
Days fished	25
Number of sets	115
Average sets/day	5
Average set duration (in min)	25.8
HOR brood collected	611
NOR brood collected	592
NOR Chinook released	410
NOR Mortality	1
HOR Released	235
HOR Harvested	25
Sockeye harvested	3,890
Sockeye released	1,216

Table 1. 2020 CCT Harvest Data - Columbia River and Okanogan River July 1 - December 17

Activity	Summer/Fall Chinook										Sockeye		Steelhead		Coho
	NOR Adult Broodfish	HOR Adult Broodfish	NOR Adults Released [1/]	NOR Adults Retained	NOR Jacks Released [1/]	NOR Jacks Retained/Morts	HOR Adults Retained/Morts	HOR Adults Released	HOR Jacks Retained	Total Adults Removed	Sockeye Harvested/Morts	Sockeye Released	Wild Released [2/]	Hatchery Released	Released
CCT F&W Purse Seine	592	611	410	1	121	0	25	234	145	1,229	3,890	1,216	0	0	0
CCT F&W Tangle Net++	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribal Member Net Fishermen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CJD Tailrace Fishery (expanded; includes snag, dip net and hook and line effort and a calculated release mortality)	0	0	0	90	0	49	1,609	0	49	1,699	15	0	30	7	0
CCT F&W Okanogan Weir	84		606		19		154	3.0	6	238		13	9	18	9
Chief Joseph Hatchery Ladder Surplus			59	0	3	0	1,053	0	88	1,053	0	0	0	0	0
Harvest sub-total (includes post release mortality)	**0**	**0**	**0**	**91**	**0**	**49**	**1,788**	**0**	**200**	**1,879**	**3,905**	**0**	**0**	**0**	**0**
Sub-total Fish Released	**0**	**0**	**1,075**	**0**	**143**	**0**	**0**	**237**	**0**	**0**	**0**	**1,229**	**39**	**25**	**9**
Sub-total Handling and Release Mortality	**0**	**0**	**11**	**0**	**1**	**0**	**0**	**2**	**0**	**13**	**0**	**12**	**7**	**3**	**0**
Total Fish Removed	**676**	**611**	**11**	**91**	**1**	**49**	**2,841**	**2**	**0**	**4,232**	**3,905**	**12**	**7**	**3**	**0**
Grand Total of Adult Fish Removed	**Chinook**										**Sockeye**		**Steelhead**		**Coho**
	4,232										**3,917**		**10**		**0**

[1/] - Purse seine, weir and surplus related releases not included as harvest

[2/] - Derived from total adipose present steelhead released by month and angler type and wild proportion in the adipose present population sampled at Wells Dam (0.851)

Table 2. 2020 CCT Harvest Summary - Columbia River May 21 - June 30, 2020

	Spring Chinook														Sockeye	Steelhead					Coho
Activity	HOR Adult Broodfish	[1/] NOR Adults Released	[1/] NOR Adults Retained	[1/] NOR Jacks Released	[1/] NOR Jacks Retained	[2/] 10J Adult Retained	[2/] 10J Adult Released	[2/] 10J Jack Retained	[2/] 10J Jack Released	[3/] HOR Adults Retained/Morts	[3/] HOR Adults Released	[3/] HOR Jacks Retained	[3/] HOR Jacks Released	Total Chinook Adults Removed	Retained	[4/] AD Present Retained/ Morts	[4/] AD Present Released	AD Absent Retained/ Morts	AD Absent Released	Sub-total Steelhead Removed	SubTotal Coho Harvested
Chief Joseph Hatchery Broodstock Ladder Collection	483	70	0	6	0	0	256	0	34	0	40	0	15	483	0	0	4	0	36	**0**	0
Chief Joseph Dam, Creel (May 27- June 30) Expanded with calculated release mortality . Includes 10J proportion	0	16	0.0	0	0	0	60	0.0	0	112	0	0	0	112	0	0	0	0	0	**0**	0
Total Harvest Release Mortality (mortality associated with harvest actions only)	**0**	**1**	**0.0**	**0.0**	**0.0**	**0**	**3.0**	**0.0**	**0.0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Harvest Sub-total	**0**	**1**	**0**	**0**	**0**	**0**	**3**	**0.0**	**0**	**112**	**0**	**0**	**0**	**116**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Handling Mortality Sub-total (mortality associated with non-harvest actions (i.e.CJH broodstock))	**0**	**1**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0.0**	**0**	**0**	**0**	**0**
Total Fish Removed	**483**	**1**	**0.0**	**0**	**0.0**	**0.0**	**6**	**0.0**	**0**	**112**	**0**	**0.0**	**0**	**603**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Adult Harvest Total Counted Towards Allocation	**Spring Chinook Harvest**														**Sockeye Harvested**	**Steelhead Harvested**					**Coho Harvest**
	116														**0**	**0**					**0**
Total Adults Removed from the System	**Spring Chinook**														**Sockeye**	**Steelhead**					**Coho**
	603														**0**	**<1**					**0**

[1/]- Adiposepresent/no marks/no tags

[2/]- Adipose present, CWT/PIT

[3/]- Adipose clipped

[4/]- NOTE: Wild proportion within the ad-present population sampled at Wells Dam is 0.851

Data exchange

Helping inform the hatchery production decision tree

Data exchange between harvest, hatchery and M&E programs

- *Pre-season*
  - *TAC run forecast*
  - *CCT harvest allocation*
  - *broodstock collection schedule and quota*
- *In-season*
  - *track fish passage, fish harvest & environmental conditions*
  - *revise Chinook broodstock collection quota, if necessary*
- *Post-season*
  - *report Sockeye & Chinook harvest*
    - *by run, by origin (HOR v NOR), by gear type & by fishing location*
  - *analyze and submit tag data (CWT, PIT, radio, anchor, etc.)*

In-season

Tracking fish passage, fish harvest & environmental conditions

- *Weekly monitoring of salmon passage at multiple Columbia River dams.*
  - *Data retrieved from FPC and Columbia River D.A.R.T.*
- *At minimum, weekly tracking of fish harvest and brood collection totals*
- *In-river temperature and discharge monitoring*
  - *USGS Malott provides real-time data on river condition*
    - *Temperature & discharge*
  - *Wells Dam forebay elevation*

Summer Chinook Allocation

2020 CCT allocation with assumptions of ocean harvest

- *Initial CCT summer Chinook harvest allocation estimate based on the pre-season TAC run forecast 38,300 which allotted 1,601 fish for the CCT*
- *Revised CCT summer Chinook harvest allocation estimate was based on the final, TAC run update of 65,494 which allotted 4,120 for the CCT*
  - *Actual CCT Summer Chinook Harvest 1,879*

2020 TAC Returns
Post season actual

*Columbia River Adult Salmon Returns: Actual and Forecasted**

		2020 Forecast	2020 Return	2021 Forecast
Spring Chinook	**Upriver Total** *	**81,700**	**81,300**	**78,200**
	Upper Columbia	13,600	12,815	13,000
	Upper Columbia natural-origin	*2,300*	*2,139*	*2,200*
	Snake River Spring/Summer **	56,400	51,605	40,000
	Snake River natural-origin **	*9,600*	*14,374*	*11,100*
	Lower River Total	**64,100**	**61,194**	**65,000**
	Total Spring Chinook	**135,500**	**142,494**	**143,200**
	Area-specific detail			
	Willamette River	40,800	45,965	50,000
	Sandy River	5,200	7,518	5,300
	Select Areas***	4,300	3,714	6,300
	Cowlitz River	1,400	908	1,800
	Kalama River	1,000	1,215	2,200
	Lewis River	1,400	1,874	2,400
	Wind River***	2,000	2,076	1,200
	Drano Lake/Little White Salmon River***	4,600	3,850	3,900
	Hood River***	2,300	n/a	n/a
	Klickitat River***	1,800	1,517	1,500
	Deschutes River***	n/a	1,015	n/a
	John Day River***	2,800	2,095	n/a
	Umatilla River***	900	516	900
	Yakima River***	2,800	2,830	3,200
Summer Chinook	**Upper Columbia**	**38,300**	**65,494**	**77,600**
Sockeye	**Total Sockeye**	**246,300**	**345,018**	**155,600**
	Wenatchee	39,400	56,111	27,300
	Okanogan	201,800	273,667	127,300
	Yakima	2,500	11,790	200
	Deschutes	300	n/a	100
	Snake River	2,300	734	700

* All forecasts are rounded to the nearest 100s place.

* Upriver totals are developed by TAC for use in management of *U.S. v. OR* fisheries. Wild components are included in the stock total. Area-specific estimates for upriver tributaries detailed here are provided by other agencies/entities and may not sum to TAC's upriver abundance estimates.

** 2020 return is based on current TAC run reconstruction methodology.

*** Return to tributary mouth.

12/11/2020

Allocation Options Before Start Date

- Ocean Harvest option 1. (60k Chinook and 120k Coho)-----resulting CCT allocation 5,528 Chinook
- Ocean Harvest option 2. (50k Chinook and 110k Coho)-----resulting CCT allocation 5,795 Chinook
- Ocean Harvest option 3. (Closed to non-treaty fishing) -----resulting CCT allocation 6,572 Chinook (this option is extremely unlikely, but for legal reasons the PFMC has to consider it)

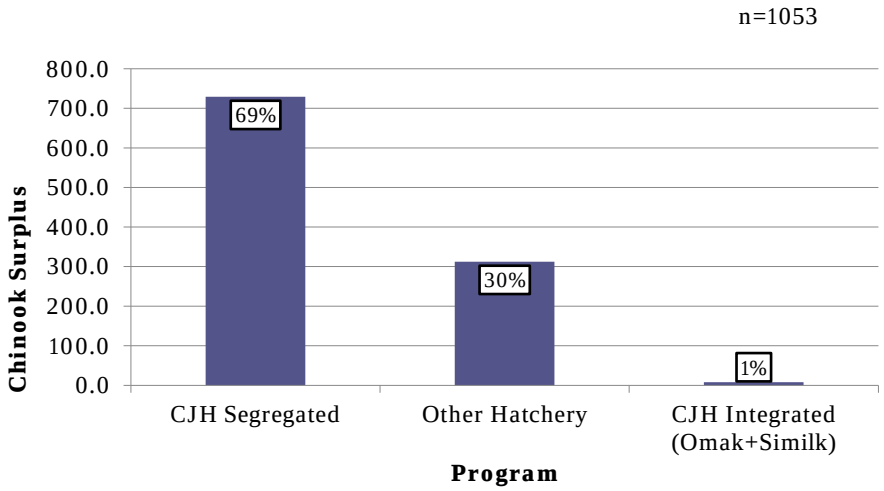
CJH Ladder Surplus Data

CJH volunteer ladder Chinook removal; June 1– September 30, 2020

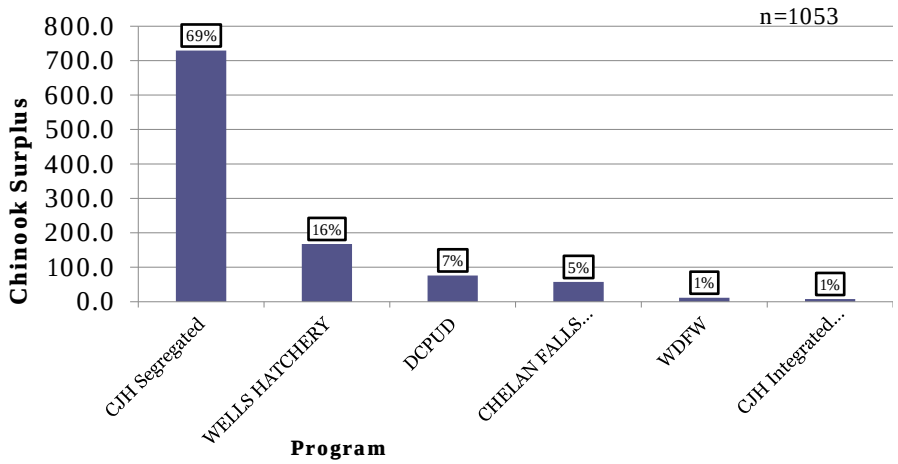
Month-	Removed		Returned to Stream		
	HOR Adults	HOR Jacks *	HOR Adults	NOR Adults	NOR Jacks
Jun-2020	-	-	-	-	-
Jul-2020	-	-	-	-	-
Aug-2020	1053	88	-	59	3
Sep-2020	-	-	-	-	-
Total - Summer	***1053***	***88***	***-***	***59***	***3***

*includes mini jacks

CJH Ladder Surplus Composition
by CWT Analysis



CJH Ladder Surplus
by CWT Analysis
Adult Fish Only

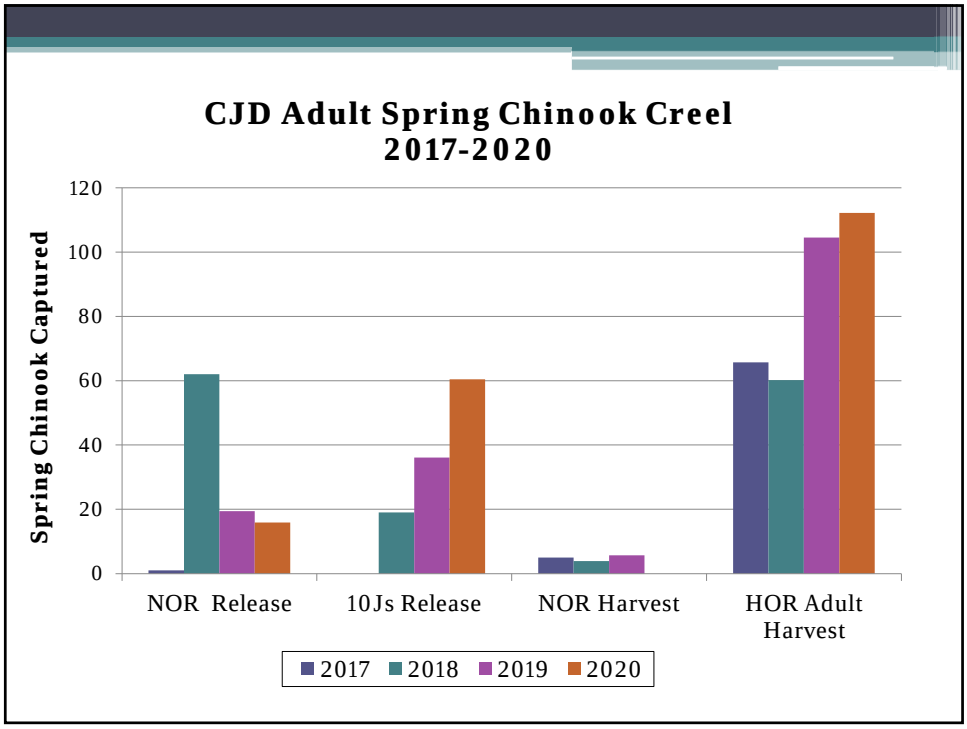


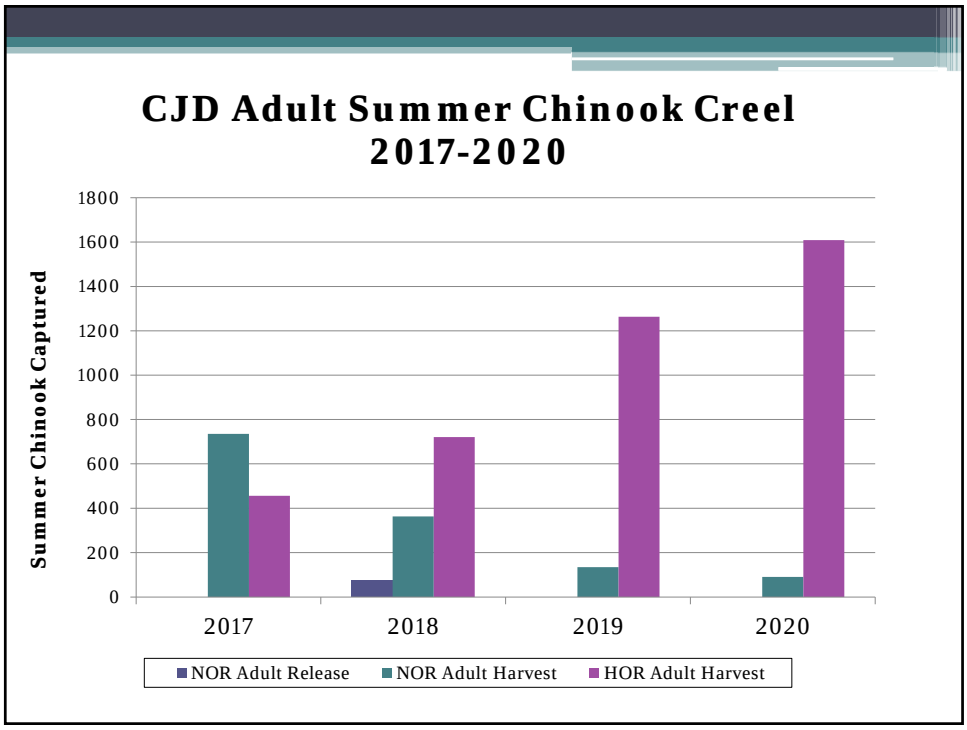
In-season

Tribal member fishing harvest monitoring

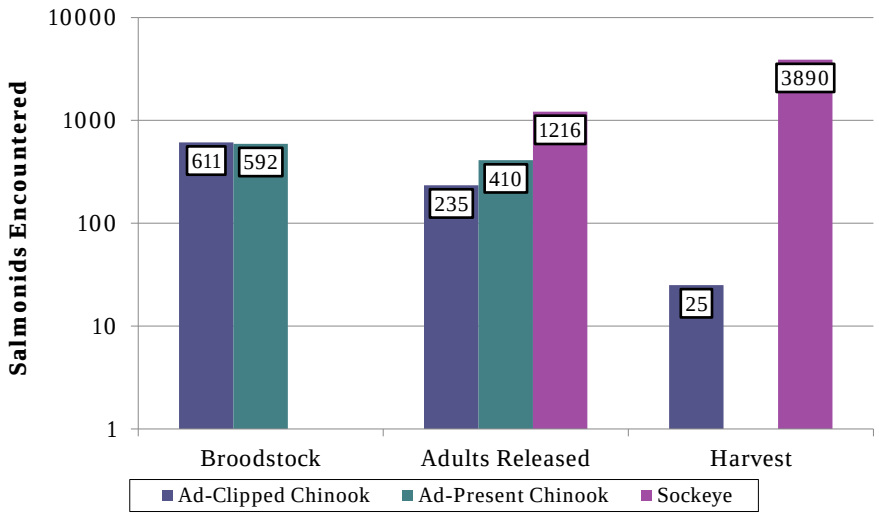
Harvest and effort data collected at Chief Joseph Dam Tailrace by creel technician

- *Hook & Line*
  - *May 25 – June 30* — *Spring Chinook*
  - *Mid-October – December 7* — *Fall Chinook, Coho*
  - *Selective fisheries*
  - *Mandatory release of NOR summer Chinook, Bull trout, sturgeon and all steelhead*
- *Snag Fishery*
  - *July 1– mid-October* — *Summer Chinook, Sockeye, steelhead*
  - *Non-selective fishery*
    - *includes a 50% mortality assessed on fish hooked but not landed.*

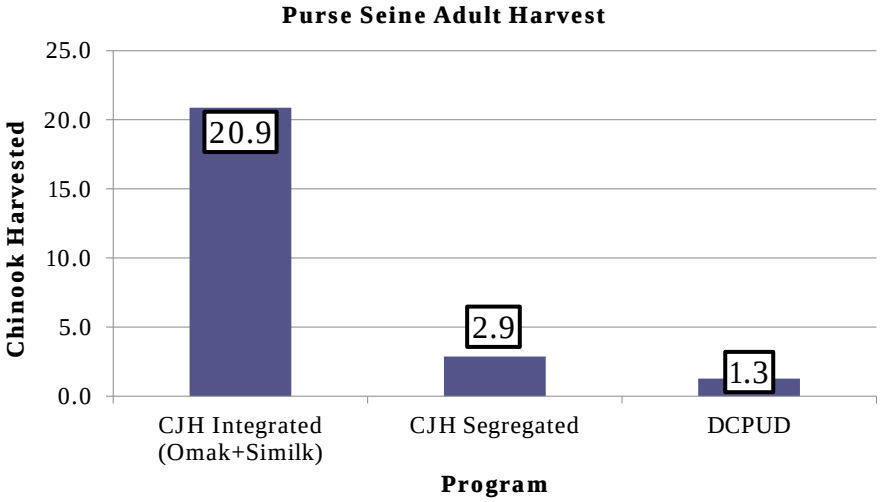

CJD Adult Spring Chinook Creel
2017-2020
Spring Chinook Captured
120
100
80
60
40
20
0
NOR Release
10Js Release
NOR Harvest
HOR Adult Harvest
2017
2018
2019
2020


CJD Adult Summer Chinook Creel
2017-2020
Summer Chinook Captured
1800
1600
1400
1200
1000
800
600
400
200
0
2017
2018
2019
2020
NOR Adult Release
NOR Adult Harvest
HOR Adult Harvest

2020 Purse Seine Harvest



2020 Purse Seine Catch Totals




ELLIOTT
CRESTLINER

Colville Confederated Tribes
Chief Joseph Hatchery
2021 APR Production Update

Colville Tribes Fish & Wildlife

Presenters

Matt McDaniel – CJH Manager

Casey Baldwin – Sr. Research Scientist

Contributors

Jim Andrews – Assistant Manager

Tony Cleveland – Acclimation Ponds Lead

Brian Dietz – Biologist

Andrea Pearl – Sr. Biologist

Summer Chinook
2020 Release Summary

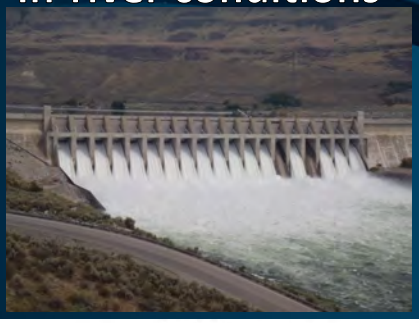
Summer Chinook – Okanogan Stock

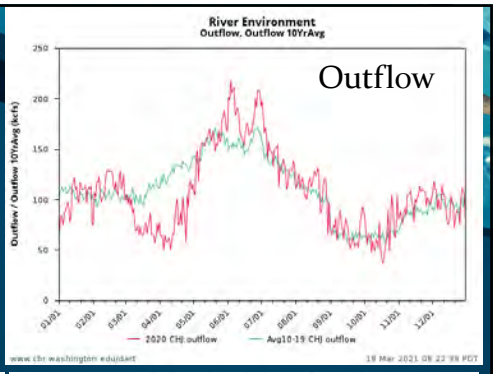
Life History	Brood Year	Release Date(s)	Site	Method	Size (fpp)	# Fish	Target
Integrated Yearling	2018	4/15/20 – 4/16/20	Omak AP (Okanogan R.)	Volitional	9.7	122,147	400,000
Integrated Yearling	2018	4/15/20 – 4/30/20	Similkameen AP	Volitional	10.0	113,593	400,000
Segregated Yearling	2018	4/15/20 – 4/16/20	CJH (Columbia R.)	Forced	11.3	189,967	500,000
				SUBTOTAL:		**425,707**	**1.3 M**
Integrated Sub-yearling	2019	5/27/20	Omak AP (Okanogan R.)	Forced	57.5	169,344	300,000
Segregated Sub-yearling	2019	5/28/20	CJH (Columbia R.)	Forced	77.0	396,433	400,000
				SUBTOTAL:		**565,777**	**700,000**
				GRAND TOTAL:		**991,484**	**2.0 M**

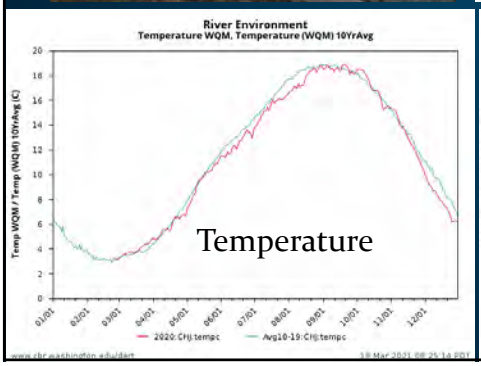
KQM 4: Are the hatchery post-release targets met for survival?

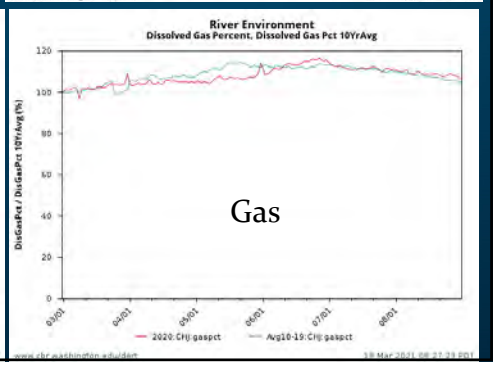
Methods: PIT tag mark-recapture using CJS model on DART

In-river conditions



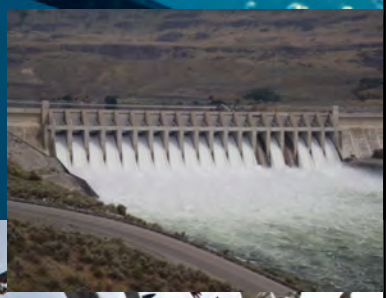


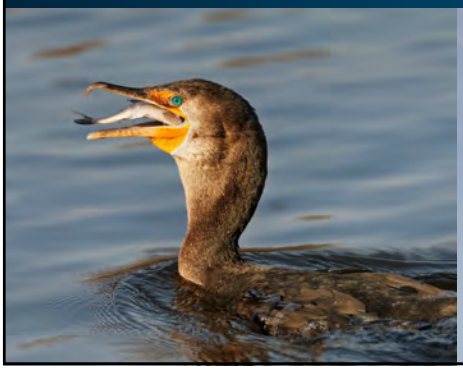




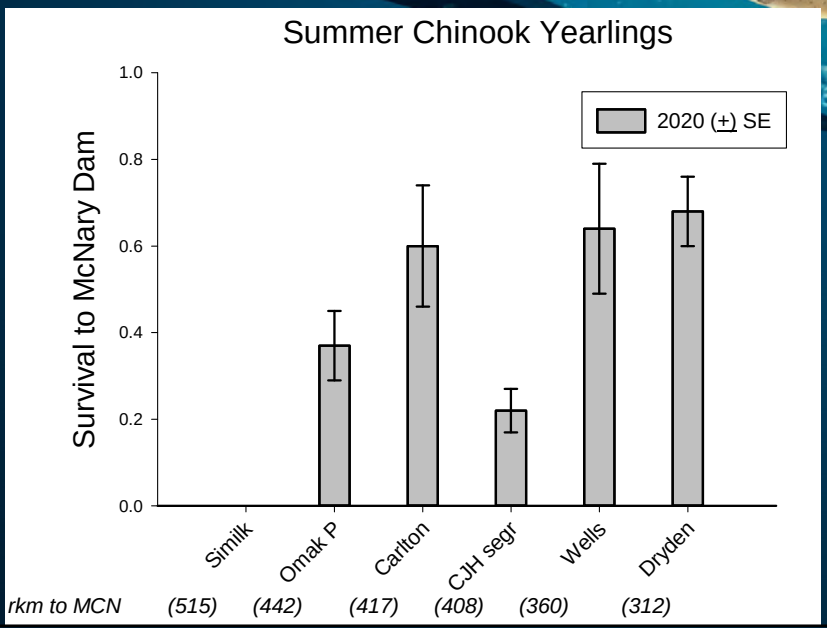
Management Practices

- 2020 night volitional release then 'force out' at CJH to reduce predation (SOP since 2016)
- Fish size and release timing:
  - SumChk Yearlings FPP = 10.3 (target = 10)
  - Spr Chk Yearlings FPP = 13.5 (target = 15)
  - SumChk Subs FPP = 67.3 (target = 50)
  - Yearlings released April 15-16
  - Subs released May 27-28

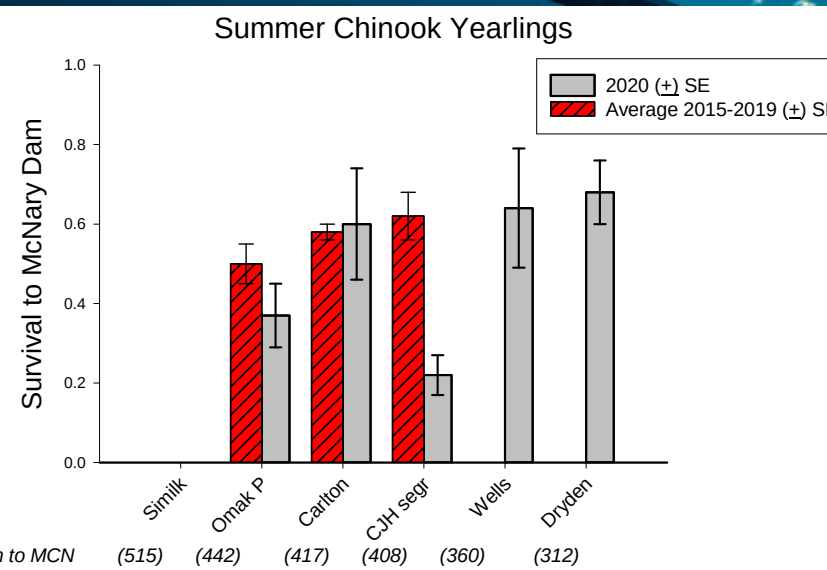




Survival to McNary Dam

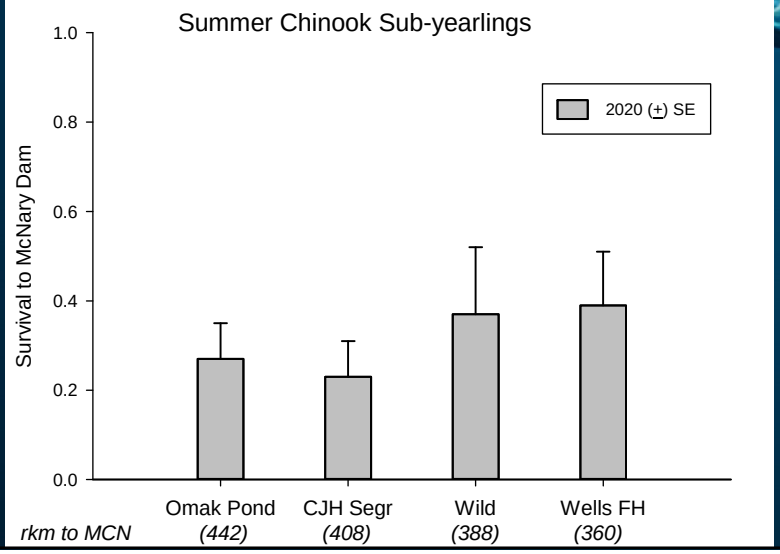


Survival to McNary Dam



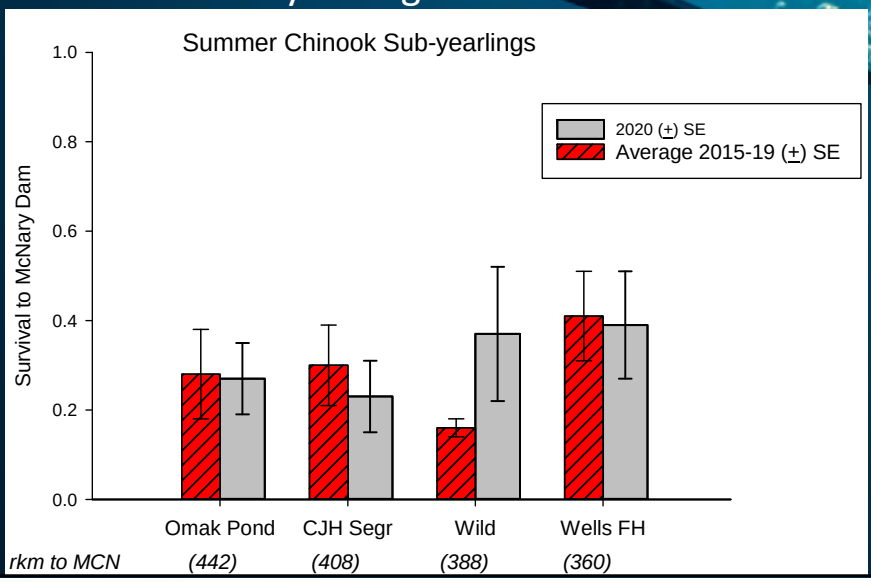
Survival to McNary Dam

Subyearling Summer Chk



Survival to McNary Dam

Subyearling Summer Chk



Summer Chinook In-river Survival Summary

- Generally bad outmigration survival year for yearlings
  - CJH Segregated yearlings [very bad (-35-40%)]
  - Omak Pond [bad (-15-25%)]
  - Similk. Pond- No data
  - Nearby programs (no problem)
  - Yearling problems likely due to poor smolt quality due to BY18 chiller issues
- Subyearlings; survival was pretty good (relative to expectations)

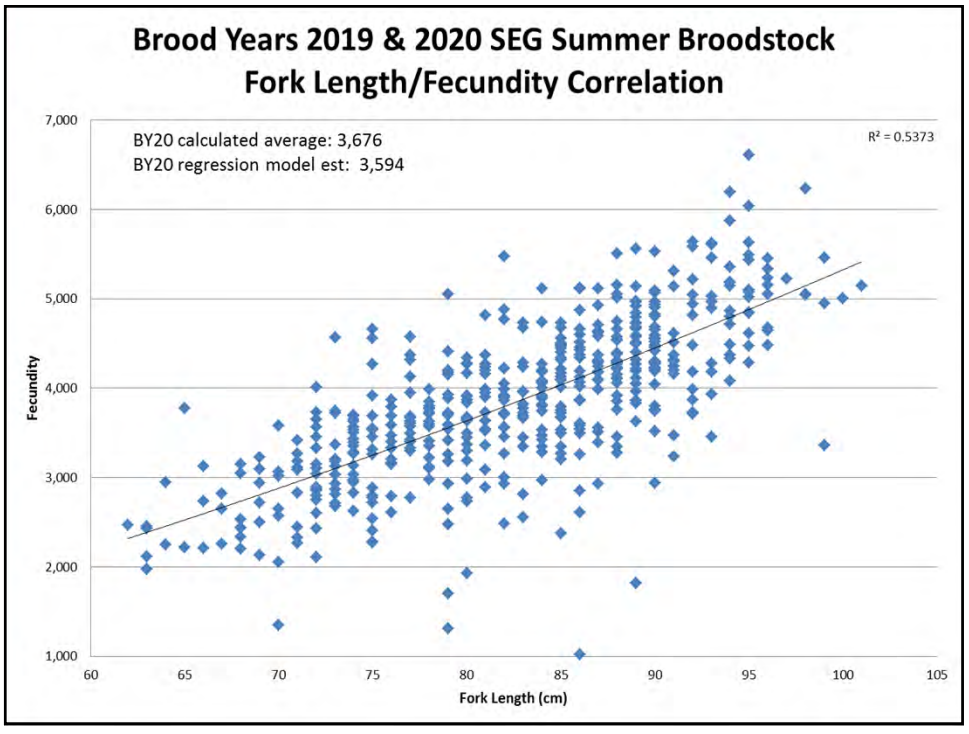
BY20 Summer Chinook Broodstock Survival to Spawn

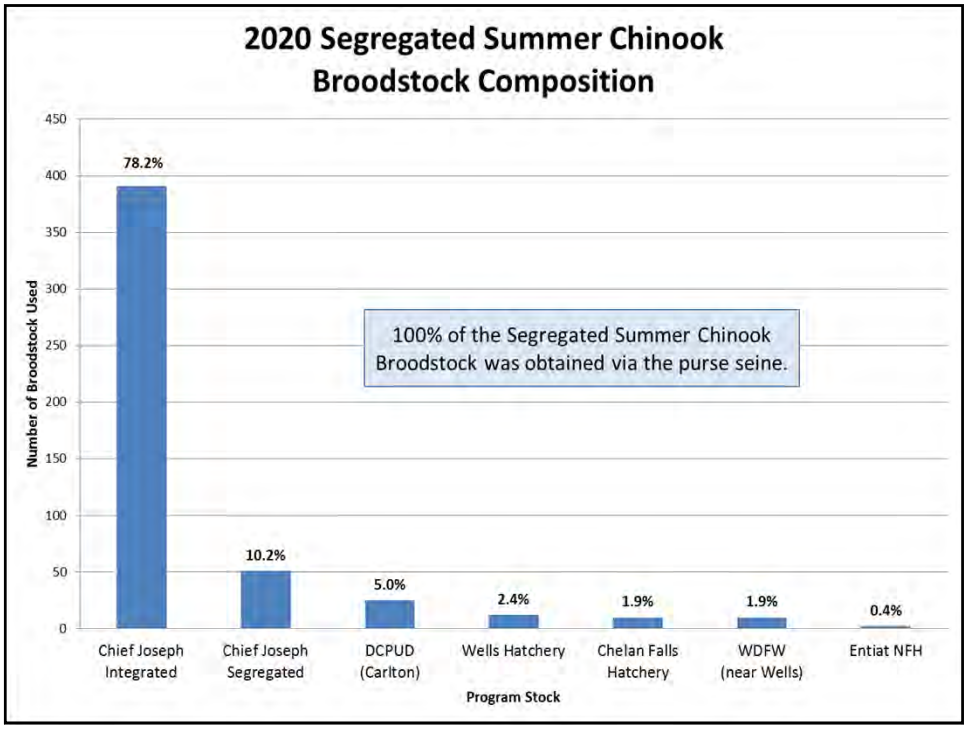
Integrated (NOR)			
	# Fish Spawned	# Brood Collected	% Survival to Spawn
Females	281	330	87.0%
Males / Jacks	234 / 10	329 / 14	71.1%
Total	**525**	**673**	**79.3%**
Segregated (HOR)			
	# Fish Spawned	# Brood Collected	% Survival to Spawn
Females	245	277	88.4%
Males / Jacks	221 / 25	296 / 38	75.1%
Total	**491**	**611**	**81.2%**

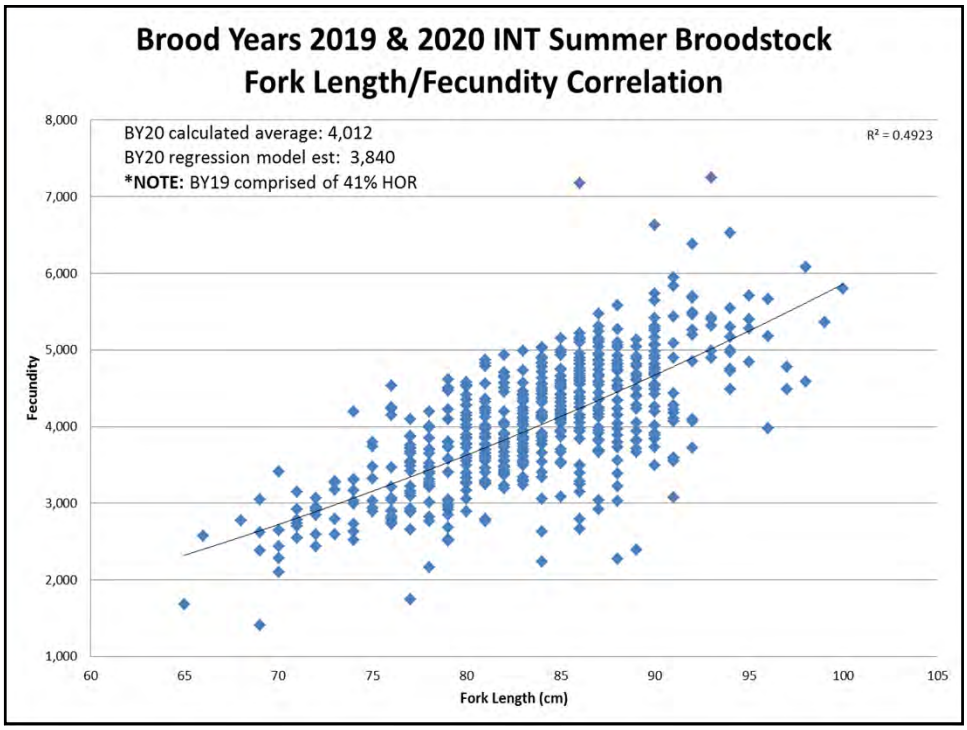
Bio-criteria standard for survival to spawn: 90%

BY20 Summer Chinook Egg Take

- **Integrated (NOR) Eyed-Egg Take Target: 1,296,405**
  - 906,103 total eyed eggs (70.0% of target)
- **Segregated (HOR) Eyed-Egg Take Target: 1,060,200**
  - 733,233 total eyed eggs (69.2% of target)
- **Contributing factors to reduced eyed egg take:**
  - Fecundity below assumed fecundity of 5,000
    - 4,012 actual for integrated
    - 3,676 actual for segregated
  - Low green to eyed egg survival:
    - 80.4% for integrated
    - 81.4% for segregated




2020 Segregated Summer Chinook
Broodstock Composition
Number of Broodstock Used
450
400
350
300
250
200
150
100
50
0
78.2%
10.2%
5.0%
2.4%
1.9%
1.9%
0.4%
100% of the Segregated Summer Chinook Broodstock was obtained via the purse seine.
Chief Joseph Integrated
Chief Joseph Segregated
DCPUD (Carlton)
Wells Hatchery
Chelan Falls Hatchery
WDFW (near Wells)
Entiat NFH
Program Stock


Brood Years 2019 & 2020 INT Summer Broodstock
Fork Length/Fecundity Correlation
BY20 calculated average: 4,012
BY20 regression model est: 3,840
*NOTE: BY19 comprised of 41% HOR
R² = 0.4923
Fecundity
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
60
65
70
75
80
85
90
95
100
105
Fork Length (cm)

Integrated (NOR) Summer Chinook In-Hatchery Performance

Parameter	Assump-tion	Mean	# Years Targets Met	BY 2020	BY 2019 (59% NOB)	BY 2018 (62% NOB)	BY 2017	BY 2016	BY 2015
Pre-spawn Survival	**90%**	**77.0%**	1/6	79.3%	95.8%	72.5%	62.6%	88.7%	62.9%
Eggs/Female	**5,000**	**4,059**	0/6	4,012	4,096	3,745	4,138 (4,234)	4,413 (4,309)	3,953
Percent Eggs Culled	**3%**	**0.35%**	6/6	0%	0%	0.4%	0.7%	0%	1%
Green-to-Eyed Survival	**90%**	**79.8%**	0/6	80.4%	82.9%	67.7%	87.5%	85.8%	74.3%
Eyed Egg-to-Fry Survival	**95%**	**80.0%**	0/5	N/A	88.8%	54.4%	90.6%	90.0%	76.2%
Egg-to-Smolt Survival – Yearlings	**86%**	**77.1****	3/4	N/A	82.4%*	38.2%	87.1%	88.3%	94.9%
Egg-to-Smolt Survival – Subyearlings	**84%**	**82.2%**	2/3	N/A	89.7%	N/A	N/A	66.9%	90.0%
Releases – Yearlings	**800,000**	**444,648** (55.6%)**	0/4	N/A	713,410*	235,740	520,780	678,233	343,840
Releases – Sub-yearlings	**300,000**	**112,384 (37.5%)**	0/5	100,000 (estimated)	169,344	0	0	216,804	175,771

*Current as of Mar. 15, 2021.
**Does not include BY19.

Segregated (HOR) Summer Chinook In-Hatchery Performance

Parameter	Assump-tion	Mean	# Years Targets Met	BY 2020	BY 2019	BY 2018	BY 2017	BY 2016	BY 2015
Pre-spawn Survival	**90%**	**79.5%**	0/6	81.2%	89.7%	66.0%	79.0%	86.5%	74.3%
Eggs/Female	**5,000**	**3,873**	0/6	3,676	4,046	3,571	3,877 (3,917)	4,438	3,631
Percent Eggs Culled	**3%**	**0.23%**	6/6	0%	0%	0%	1.0%	0%	0.4%
Green-to-Eyed Survival	**90%**	**79.9%**	0/6	81.4%	87.2%	56.3%	87.6%	85.7%	81.3%
Eyed Egg-to-Fry Survival	**95%**	**84.9%**	0/5	N/A	90.9%	69.1%	90.1%	80.3%	94.2%
Egg-to-Smolt Survival – Yearlings	**86%**	**80.7%****	2/4	N/A	84.5%*	52.8%	87.3%	85.0%	97.5%
Egg-to-Smolt Survival – Subyearlings	**84%**	**76.9%**	2/4	N/A	81.8%	N/A	89.1%	51.7%	85.0%
Releases – Yearlings	**500,000**	**321,449** (64.3%)**	0/4	N/A	569,677*	189,967	399,299	464,429	232,103
Releases – Sub-yearlings	**400,000**	**196,621 (49.2%)**	0/5	200,000 (estimated)	396,433	0	182,462	185,821	218,393

*Current as of Mar. 15, 2021.
**Does not include BY19.

SEG vs INT Summer Chinook Mean In-Hatchery Performance

Parameter	Assumption	Segregated (HOR)	Integrated (NOR)	# Years Targets Met Segregated	# Years Targets Met Integrated
Pre-spawn Survival	90%	79.5%	77.0%	0/6	1/6
Eggs/Female	5,000	3,873	4,059	0/6	0/6
Percent Eggs Culled	3%	0.23%	0.35%	6/6	6/6
Green-to-Eyed Survival	90%	79.9%	79.8%	0/6	0/6
Eyed Egg-to-Fry Survival	95%	84.9%	80.0%	2/5	0/5
Egg-to-Smolt Survival – Yearlings	86%	80.7%**	77.1**	2/4	3/4
Egg-to-Smolt Survival – Sub-yearlings	84%	76.9%	82.2%	2/4	2/3
Releases – Yearlings		321,449** (64.3%)	444,648** (55.6%)	0/4	0/4
Releases – Sub-yearlings		196,621 (49.2%)	112,383 (37.5%)	0/5	0/5

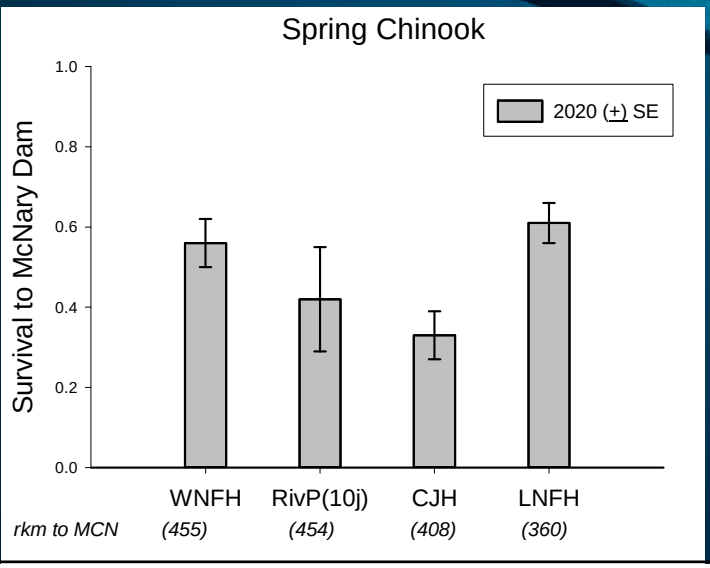
*Does not include BY19.
**No INT sub-yearlings in BY17 and no sub-yearlings for either program in BY18.

Spring Chinook 2020 Release Summary

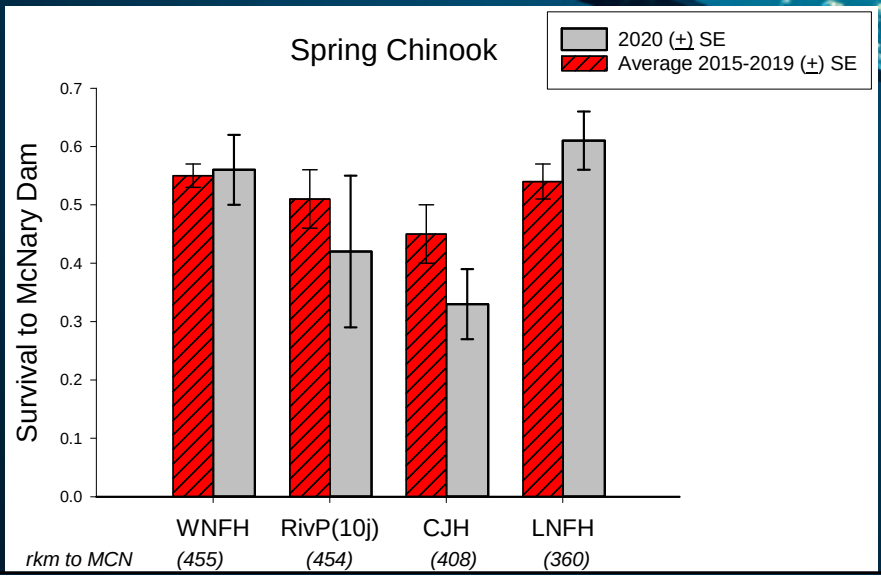
Spring Chinook

Stock	Brood Year	Release Date(s)	Site	Method	Size (fpp)	# Fish	Target
Leavenworth	2018	4/15/20 – 4/16/20	CJH (Columbia R.)	Forced	12.2	102,702	700,000
MetComp 10j	2018	4/15/20 – 4/16/20	Riverside AP (Okanogan R.)	Forced	14.7	17,315	200,000
				TOTAL:		**120,017**	**900,000**

Survival to McNary Dam
Spring Chinook



Survival to McNary Dam
Spring Chinook



Spring Chinook Yearling In-river Survival Summary

- Moderately low survival from CJH & RivP (-10-15% compared to other programs and years)
- Lagging effects from failed chiller on BY18 were less pronounced with Spring Chinook than Summer Chinook

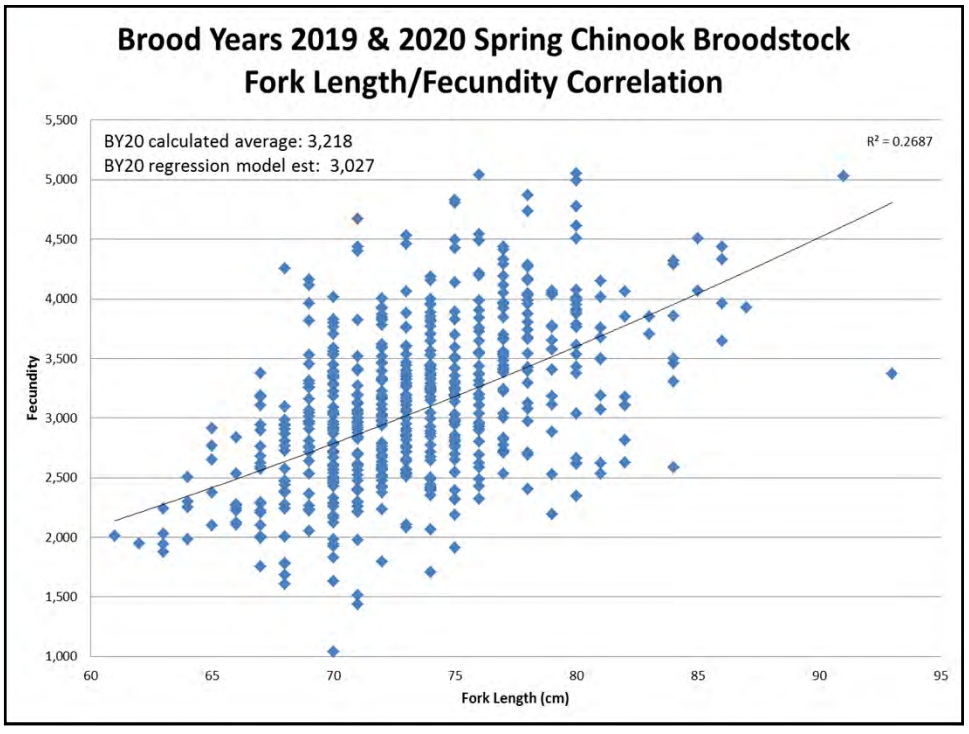
BY20 Spring Chinook Broodstock

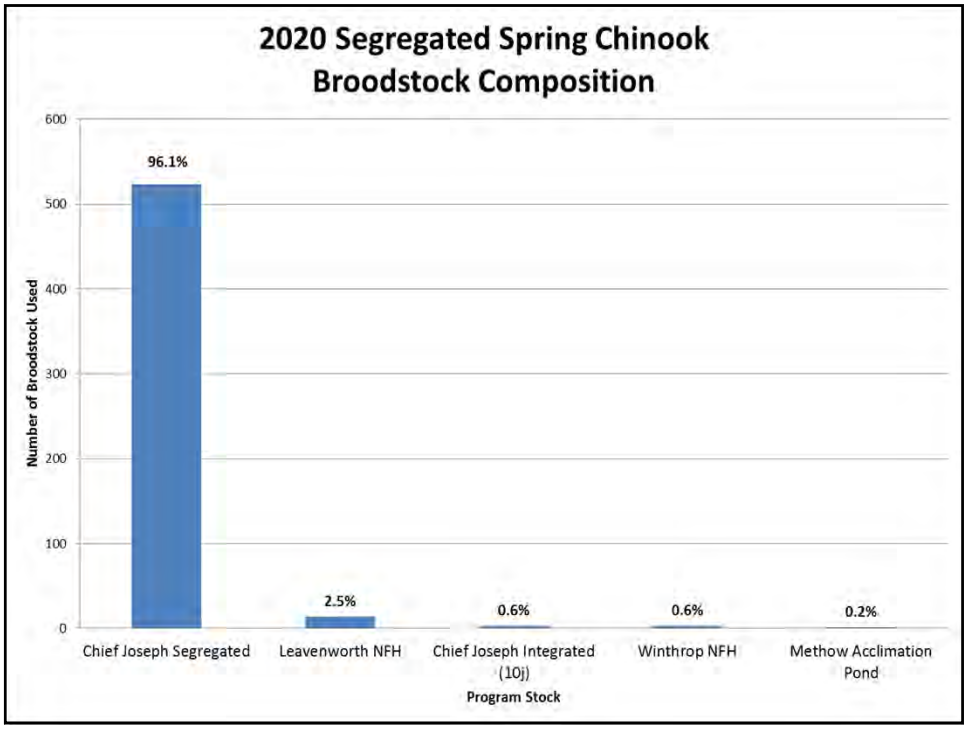
Spring Chinook – CJH Stock			
	# Fish Spawned	# Brood Collected*	% Survival to Spawn
Females	329	333	98.8%
Males / Jacks	217 / 1	228 / 2	94.8%
Total	**547**	**563**	**97.2%**

Bio-criteria standard for survival to spawn: 90%
*Brood collected includes 65 females and 15 males collected at LNFH.

BY19 HOR Spring Chinook Egg Take

- **Eyed-Egg Take Target: 787,968**
  - 920,143 CJH eyed eggs (116.8% of target)
- **Contributing factors to increased eyed egg take:**
  - Pre-spawn mortality was very low (2.8%)
  - Increase in number of females spawned
- **Fecundity still below expectations:**
  - Actual: 3,218
  - Assumed: 3,800





HOR Spring Chinook In-Hatchery Performance

Parameter	Assump-tion	Mean	# Years Targets Met	BY 2020 – CJH stock	BY 2019 – CJH stock	BY 2018 – CJH stock	BY 2017 – CJH stock	BY 2016 – LNFH stock	BY 2015 – LNFH stock
Pre-spawn Survival	**90%**	**80.0%**	2/6	97.2%	78.3%	32.8%	85.3%	88.5%	98.1%
Eggs/Female	**3,800**	**3,232**	0/6	3,218	2,987	3,014	3,259	3,792	3,125
Percent Eggs culled	**20%**	**1.6%**	6/6	0.36%	0.38%	0.01%	8.0%	0.03%	1.0%
Green-to-Eyed Survival	**90%**	**78.2%**	3/6	87.2%	93.1%	90.6%	48.7%	58.1%	91.2%
Eyed Egg-to-Fry Survival	**95%**	**87.5%**	3/5	N/A	98.6%	63.1%	78.2%	98.9%	98.7%
Egg-to-Smolt Survival	**84%**	**70.5****	2/4	N/A	90.8%*	34.9%	72.5%	90.2%	84.5%
Releases	**700,000**	**419,723** (60.0%)**	1/4	N/A	794,135*	102,702	276,560	555,636	743,996

***Current as of Mar. 15, 2021.**
****Does not include BY19.**

MetComp 10j Spring Chinook In-Hatchery Performance

Parameter	Assump-tion	Mean	# Years Targets Met	BY 2019	BY 2018	BY 2017	BY 2016	BY 2015	BY 2014
Eyed Egg-to-Fry Survival	**95%**	**85.1%**	5/6	99.9%	14.0%	99.0%	99.4%	99.1%	98.9%
Egg-to-Smolt Survival	**84%**	**78.0%****	4/5	91.0%*	7.9%	95.3%	97.5%	96.3%	92.9%
Releases	**200,000**	**166,771** (83.4%)**	4/5	222,980*	17,315	210,582	200,827	201,821	203,311

*Current as of Mar. 15, 2021.
**Does not include BY19.

Key Challenges to Date

- **Disease Issues**
  - Columnaris in all broodstock due to warm well water, more of an issue in summer chinook for BY20.
- **Fecundity**
  - Lower than expected fecundity contributes to low egg take.
- **Broodstock Capacity**
  - Additional broodstock not an option as broodstock rearing capacity is at its max.

KMQ #3: Is the hatchery meeting target in-hatchery performance standards?

Are the program goals and Key Assumptions realistic?
Do they need adjustment?

KMQ #3: Is the hatchery meeting target in-hatchery performance standards?

Are the program goals and Key Assumptions realistic?
Do they need adjustment or are other management actions needed?

- **Prespawn mortality (PSM)**
  - 1/6 years has target key assumption been met for Int. Summer Chinook
  - 0/6 years for Segregated Summer Chinook
  - 2/6 years for Segregated Spring Chinook
- **Fecundity**
  - 0/6 years for Integrated Summer Chinook
  - 0/6 years for Segregated Summer Chinook
  - 0/6 years for Segregated Spring Chinook
- Low fecundity and warm water temps, resulting in Columnaris infection and thus inflicting elevated PSM, are outside of staff control. PSM will continue to be an issue without a cooler water source along with continued chemical treatment. Both are performance parameters that are consistently not meeting targets and should be re-evaluated.

Summer Chinook
2021 Projected Releases

Summer Chinook – Okanogan Stock

Life History	Brood Year	Projected Release Date	Site	Method	Est. Size (fpp)	# Fish	Target
Integrated Yearling	2019	4/15/2021	Omak AP (Okanogan R.)	Volitional	10.0	309,000	400,000
Integrated Yearling	2019	4/15/2021	Similkameen AP	Volitional	10.0	400,000	400,000
Segregated Yearling	2019	4/15/2021	CJH (Columbia R.)	Forced	10.0	550,000	500,000
				SUBTOTAL:		**1.259 M**	**1.3 M**
Integrated Sub-yearling	2020	5/15/2021	Omak AP (Okanogan R.)	Volitional	50.0	100,000	300,000
Segregated Sub-yearling	2020	5/15/2021	CJH (Columbia R.)	Forced	50.0	200,000	400,000
				SUBTOTAL:		**300,000**	**700,000**
				GRAND TOTAL:		**1.559 M**	**2.0 M**

Spring Chinook
2021 Projected Releases

Spring Chinook

Stock	Brood Year	Projected Release Date	Site	Method	Est. Size (fpp)	# Fish	Target
Leavenworth	2019	4/15/2021	CJH (Columbia R.)	Forced	10.0	770,000	700,000
MetComp 10j	2019	4/15/2021	Riverside AP (Okanogan R.)	Volitional	15.0	220,000	200,000
				TOTAL:		**990,000**	**900,000**

Changes Made in 2019

- **Broodstock:**
  - Prophylactic treatment of H_2O_2 for copepods in spring chinook broodstock
  - Prophylactic treatment of Chloramine-T for Columnaris in summer chinook broodstock, plus Diquat when Columnaris detected.
- **Spawning:**
  - First sort was day before first spawn, then all sorting occurred the morning of spawning.
  - Add salt to raceways during sort to reduce stress

Changes Made in 2019

- **Incubation:**
  - Regular water monitoring on incubation water
  - Weekly visual assessment on eggs and not just relying on estimated TUs
  - Limiters for incubation flows – only allowing a max flow to prevent too much flow going through a particular stack

Changes Made in 2020

- **Broodstock:**
  - Monitored spring chinook for Columnaris regularly, prophylactic Chloramine-T treatments, Diquat when Columnaris detected.
- **Fertilization & Incubation:**
  - Bio rings in place of vexar as substrate in a few trays as a test (though won't be used in 2021).
  - New chiller!!!

Changes to Make in 2021

- **Broodstock:**
  - Increased Diquat treatments, especially in summer broodstock.
  - Use Diquat during transport of summer broodstock.
- **Fertilization & Incubation:**
  - Focus on fertilization procedures: ensure all culturists are following the same procedure consistently throughout the spawning seasons.
  - Increase monitoring of eggs during incubation, before and after picking.
- **Juvenile Rearing:**
  - Increase cleaning frequency of raceways and rearing ponds.

KMQ #3: Is the hatchery meeting target in-hatchery performance standards?

Are the program goals and Key Assumptions realistic?

Do they need adjustment or are other management actions needed?

- **Possible solutions:**
  - PSM – The need for a cooler water source is evident; we need cooler water during adult rearing to reduce Columnaris events.
  - Fecundity – adjusting fecundity to a more realistic level should be seriously considered for future brood years. However, lowering fecundity while keeping the program goals the same increases broodstock needs.
  - Production Goals – do production goals need to be reevaluated?

Kirsten Brudevold
M&E Biologist
Chief Joseph Hatchery Science Program

2020 Okanogan
Juvenile Chinook Monitoring
Beach Seine

Rotary Screw Trap

CJH M&E staff were regrettably unable to operate the RST due to COVID-19 safety guidelines

Pharr Road

Total Days Fished = 2
Total Catch = 1,588

Pharr Road Juvenile Habitat

Juvenile Rearing Side Channel
Fall 2020

2020 Fall Redds

Pharr Rd. Downstream Recaptures

TOTAL Recaptures = 14 tagged fish

Downstream travel average = 12 days

Downstream travel range = 6 to 19 days

Gebbers Landing

Total Days Fished = 26
Total Catch = 18,752

Juvenile Beach Seine PIT Tag Effort @ Gebbers Landing

Total Days Fished = 26

Number of sets = 220

Average sets/day = 7.86

Total Catch = 20,340

Catch Per Unit Effort (sets) = 92.45

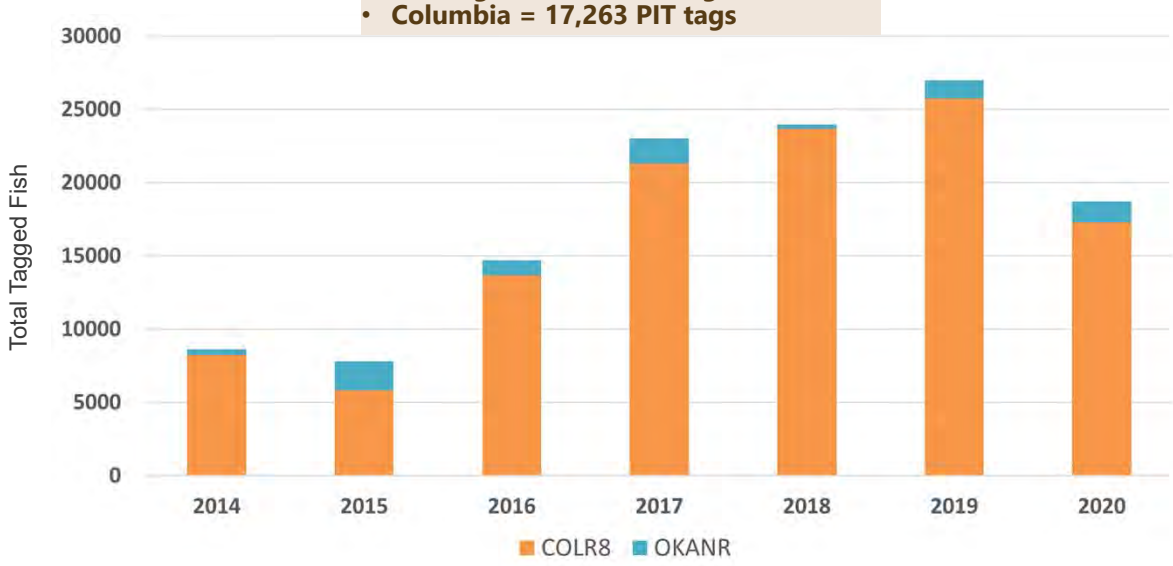
Subyearling vs. Yearlings

2020 Subyearling
taggable fish

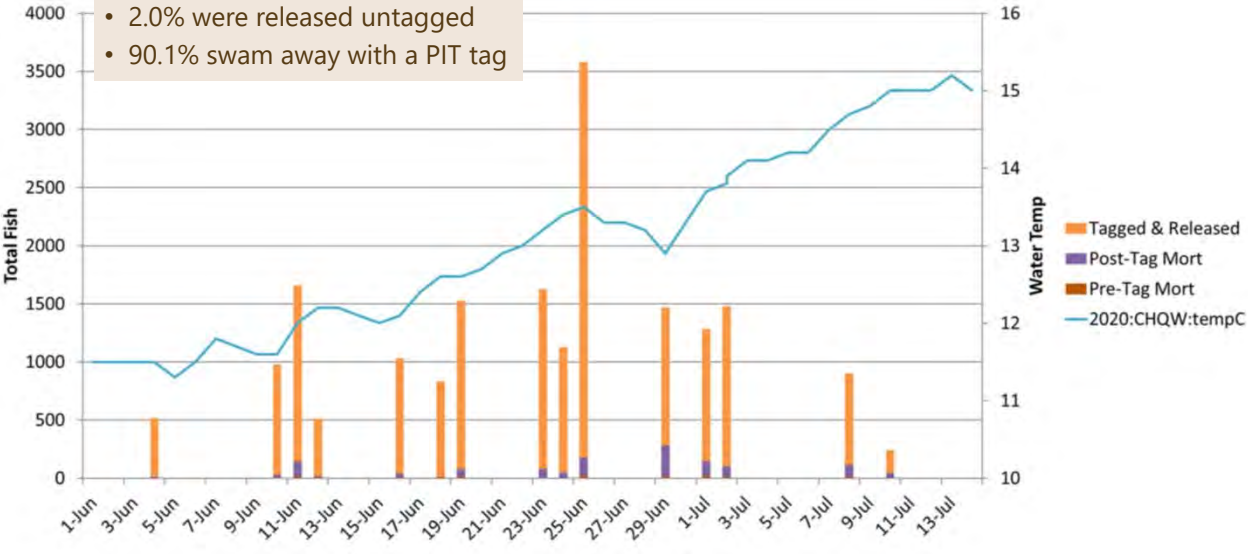
DCPUD Yearling Recapture
Tagged in 2019

DCPUD Yearling Recapture
Tagged in 2019

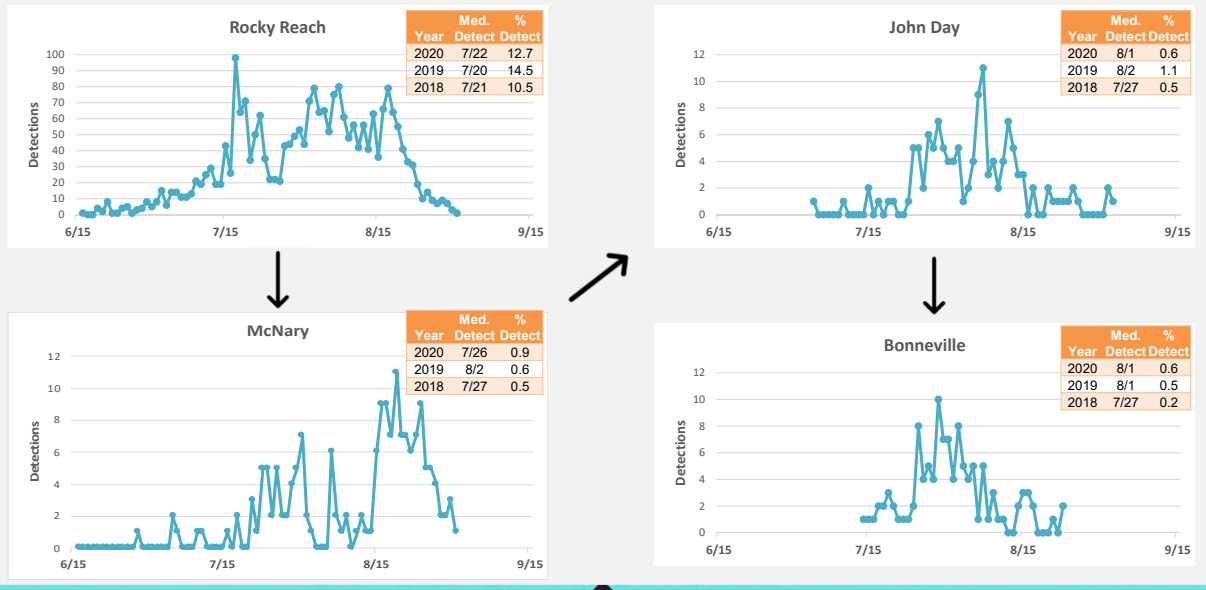
18,700 TOTAL PIT tags Deployed in 2020
- **Okanogan = 1,437 PIT tags**
- **Columbia = 17,263 PIT tags**



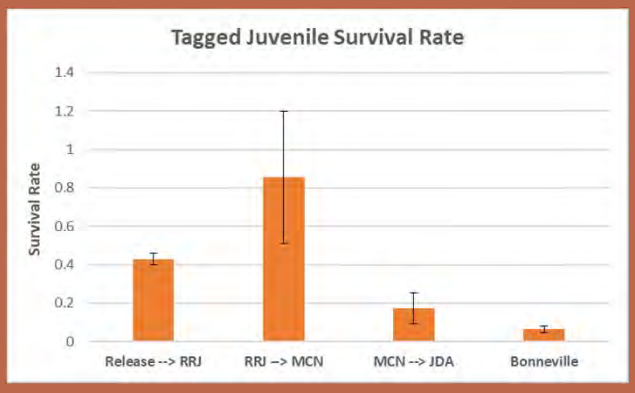
Of the Chinook handled:
- 7.9% died pre/post tag
- 2.0% were released untagged
- 90.1% swam away with a PIT tag



Distribution of Detections



Outmigration survival rates



Cormack/Jolly-Seber Estimates (Cormack 1964, Jolly 1965, Seber 1965)

High Fives to our Technicians!

- Jesse Marchand
- John Pakootas
- Tatum Gunn
- Vertis Campbell

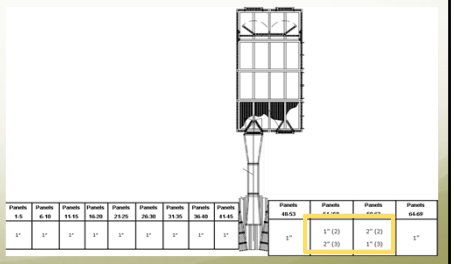
Questions?

2020 Operation

- Deployed on August 17th at 1,900 cfs flow @ Malott
- Completed August 21st with underwater video system
- Daily monitoring activities began following week
- Trapping began on August 27th
  - Trapped for month, except for 2 days
  - Ended on September 24th after brood goal met
- Configuration
  - River right- 1" picket spacings
  - River left- 1" picket spacings, set of (5) 2" picket spacings for passage, similar to previous years

2020 Configuration and Design

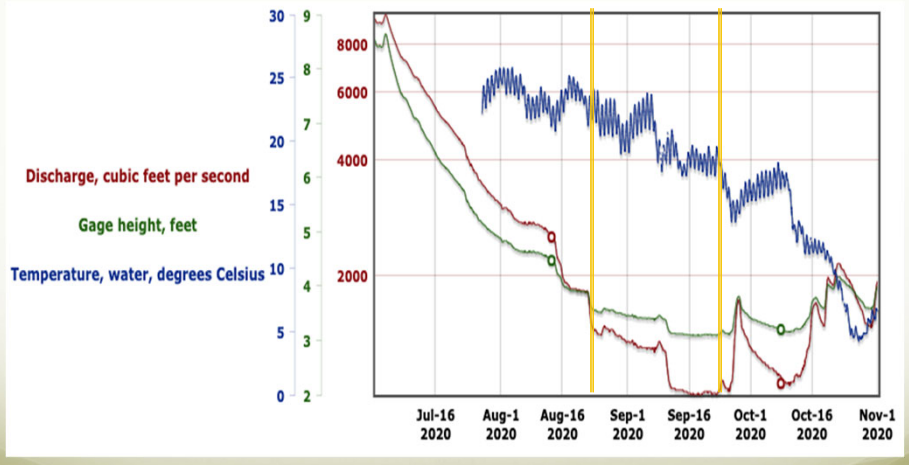
- Installed the accelerator chute again
- Installed a light bar and camera housing on west side trap and two in the chute
- Moved the trap downstream
- Did not install the Whooshh™ fish transport system for brood stock collection
- Used an aerial cable system for the weir video cables again



Daily Monitoring Activities

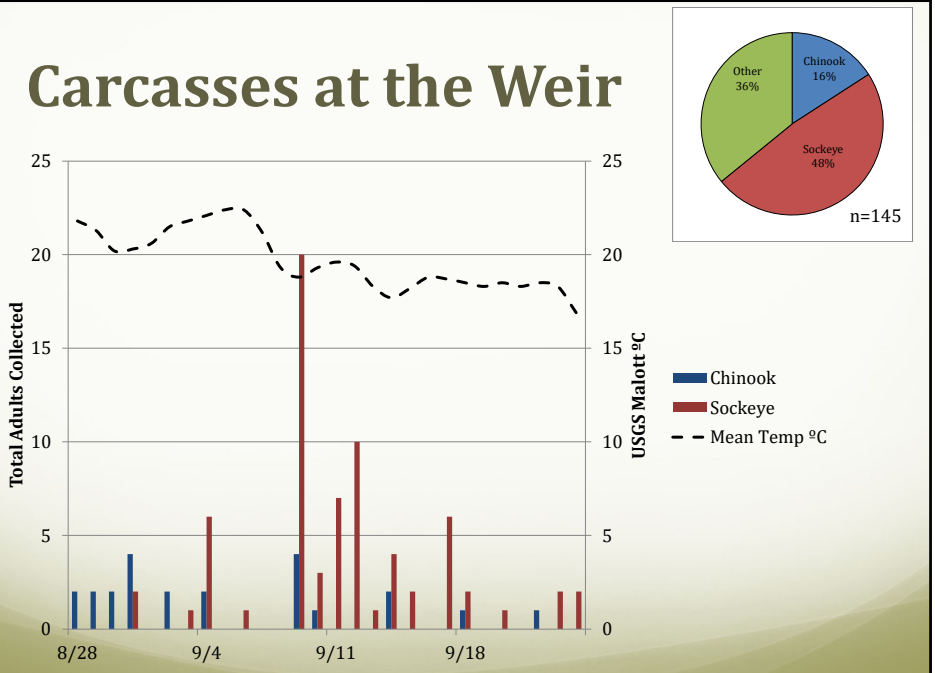
- **Daily maintenance-** debris, carcass removal, cameras, lights
- **Water quality:** temperature, dissolved oxygen, and turbidity
- **Water velocity and head differential***
- **Direct observations** (estimates)
  - Tower- 3x/day, 5 minutes, morning, afternoon, evening
  - Bank- about .8 river km downstream, 2x/day, 10 minutes
- **Mortalities**
  - Collected, assessed, biological information
    - 23 total Chinook (21 NOR, 3 HOR)
    - 67 Sockeye, 1 Steelhead
  - Coded wire tag snout recovery
- **Underwater video review**
  - 2 cameras along the chute (1 DS, 1 US), 1 camera inside trap (west panel)
  - Live monitoring to assist in daytime trapping

Water Quality

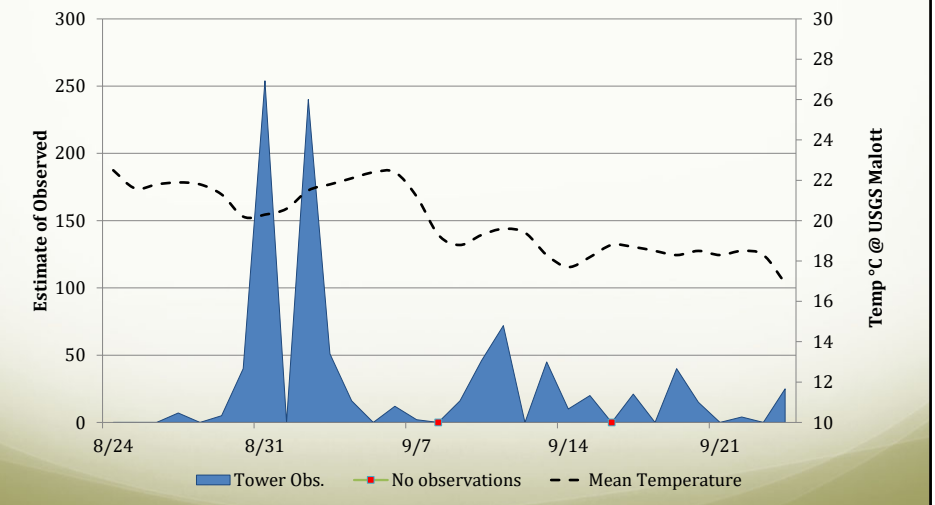


https://nwis.waterdata.usgs.gov/wa/nwis/uv?

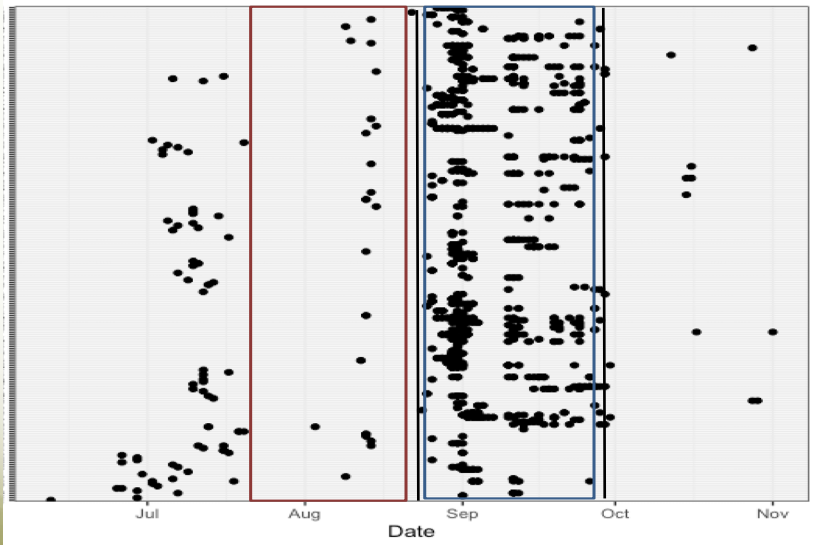
Carcasses at the Weir



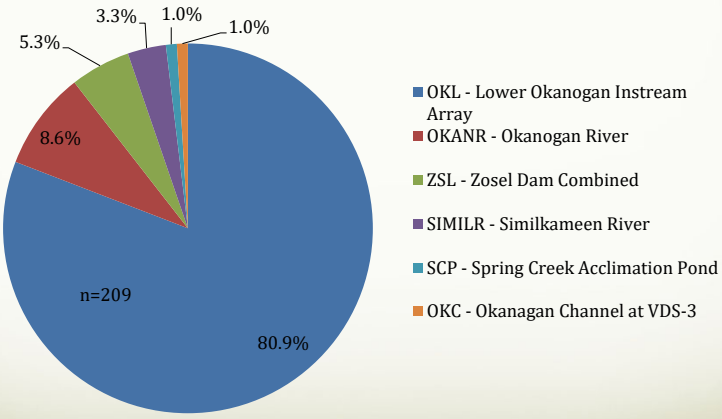
Tower Observations



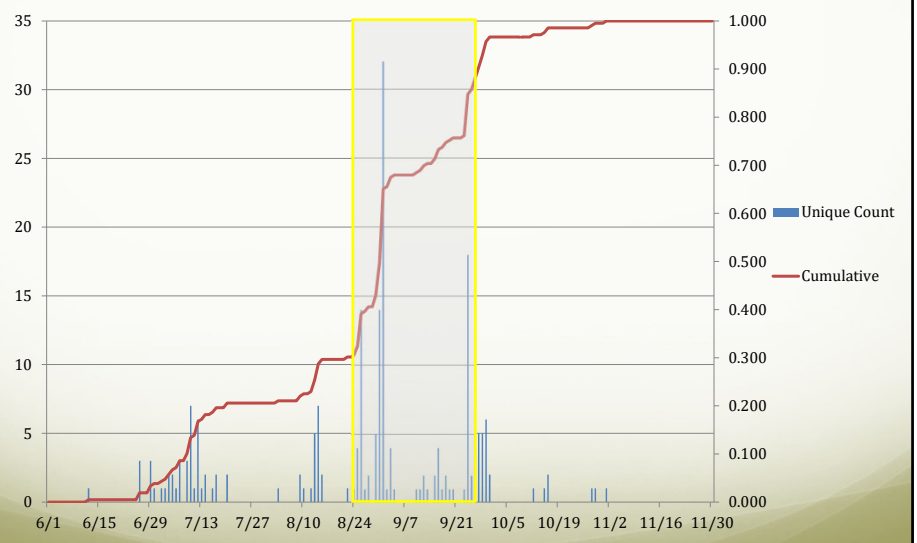
OKL Array 2020



Last Detection Site



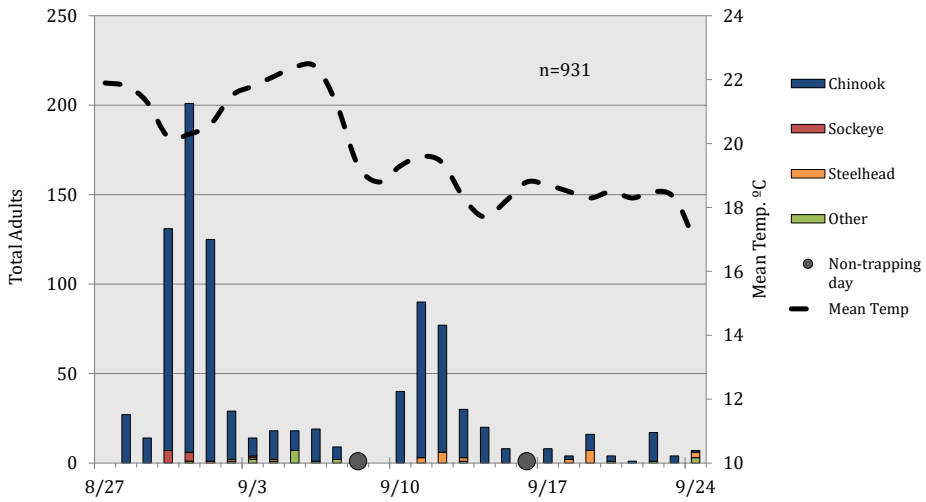
Last Detection OKL



Trapping Operations

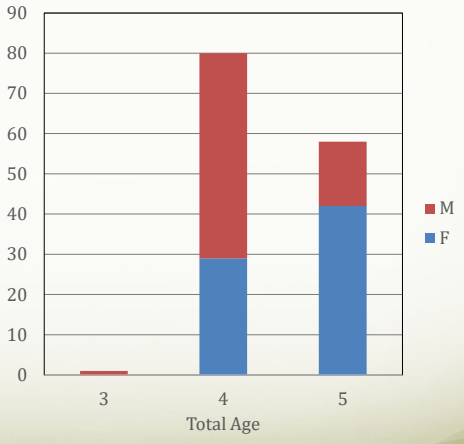
- Trapping began on August 24th, ended on Sept. 24th
- 845 adult summer Chinook
  - 606 NOR released
  - 84 NOR brood
  - 152 HOR removed
  - 25 jacks
- 13 adult sockeye (mostly in August)
- 27 steelhead (10 ad present, 17 ad clipped)
- 9 coho in last week of trapping (all ad present)

Daily Trapped



CWT Results- Weir Surplus

- 152 HOR surplussed
- 143 CWTs Extracted
  - 141 tags read
- 136 Recoveries from integrated summer releases (97%)
  - 81 from Omak Pond
  - 55 from Sim. Pond
- 1 recovery from Segregated program



Survey Year	Chinook Adults Encountered in the Weir Trap		Chinook Spawning Escapement Estimates[c,d]		Weir Metrics	
	Natural Origin (NOR)	Hatchery Origin (HOR)	Natural Origin (NOS)	Hatchery Origin (HOS)	Weir Efficiency[a]	Weir Effectiveness[b]
2013	73	18	5,627	2,567	0.010	0.006
2014	2,006	318	10,402	1,762	0.147	0.138
2015	35	19	10,350	3,398	0.004	0.005
2016	135	34	8,661	1,944	0.014	0.016
2017	344	103	5,283	1,285	0.057	0.066
2018	32	16	3,322	1,538	0.009	0.001
2019	82	24	2,619	2,834	0.017	0.000
2020	709	161	8,030	2,989	0.065	0.044

[a] Estimates for weir efficiency are adjusted for prespawn mortality and include Chinook adults that are harvested, released, and collected for brood.

[b] Estimates for weir effectiveness are adjusted for prespawn mortality and include Chinook adults that are harvested or removed for pHOS management.

[c] Estimates do not include Chinook Zosel Dam counts.

[d] NOS and HOS estimates determined by 'reach-weighted' pHOS calculations

2020 Conclusions

- Flow not an issue for deployment- Installed in mid- August at 1,900 cfs (maximum flow of 2,300 for current trap location) before major thermal barrier breakdown
- Based on adult pit detections at Wells and OKL, we suspect that 30% had migrated past the weir before the weir was functional on August 24th
- Met NOR brood goal for 15% component
- 97% of hatchery recoveries in the trap were from the integrated program
- Use similar trap location in 2021
  - Provided enough water in trap box
  - Just above riffle zone and out of the pool
  - Redesign Whooshh chute so that it aligns with the point of access at the bank


THANK YOU TO OUR CCT FIELD STAFF
Vertis Campbell
Tatum Gunn
Jesse Marchand
John Pakootas Jr.
Tony Cleveland
Matthew Laramie
Kirsten Brudevold
Grant County
PUBLIC UTILITY DISTRICT
BONNEVILLE
P.U.D.
CHELAN COUNTY
DOUGLAS COUNTY PUD

Chief Joseph Hatchery
2021 Annual Program Review

Chinook Spawning Grounds Summary

Matthew B. Laramie
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Andrea Pearl
Fisheries Biologist, Colville Confederated Tribes

Brian Dietz
Fisheries Biologist, Colville Confederated Tribes

Objectives

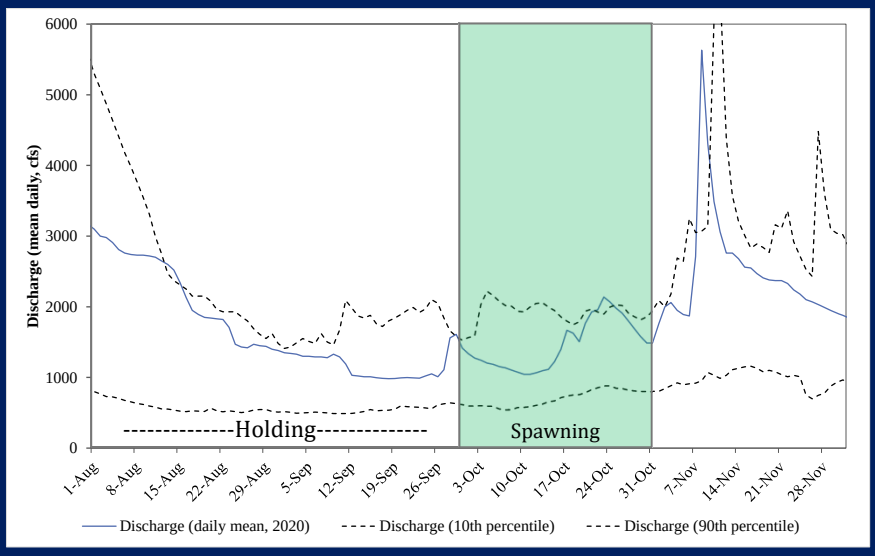
Monitor Status and Trends:

- Environmental Conditions
- Spawn timing
- Spatial distribution
- Pre-spawn mortality
- Age structure (scales, CWT)
- Stray rates
- Sex ratio
- Fish size

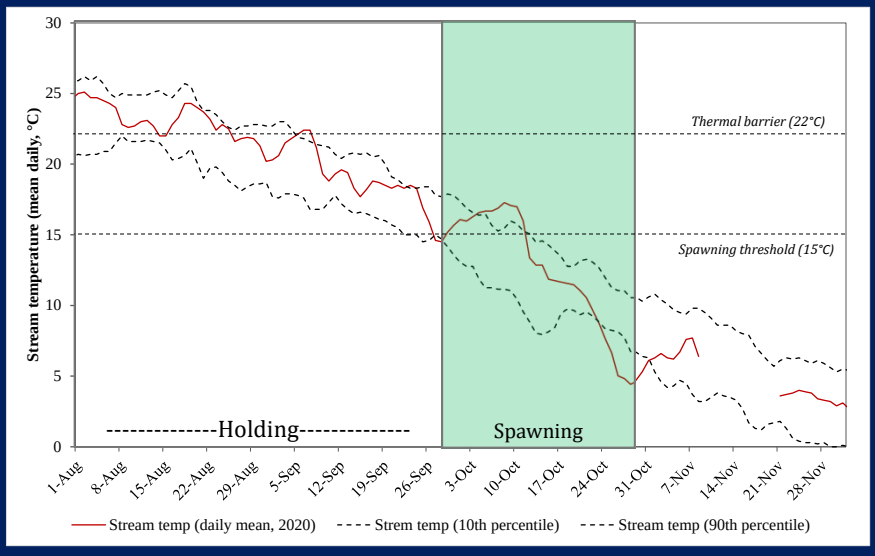
Estimate:

- Escapement
- Composition (pHOS)

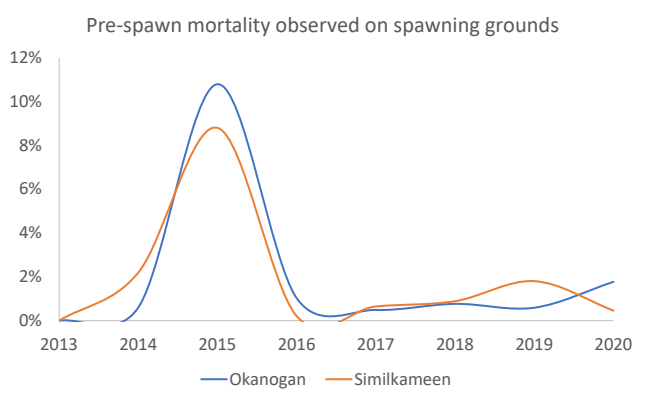
Environmental Conditions



Environmental Conditions



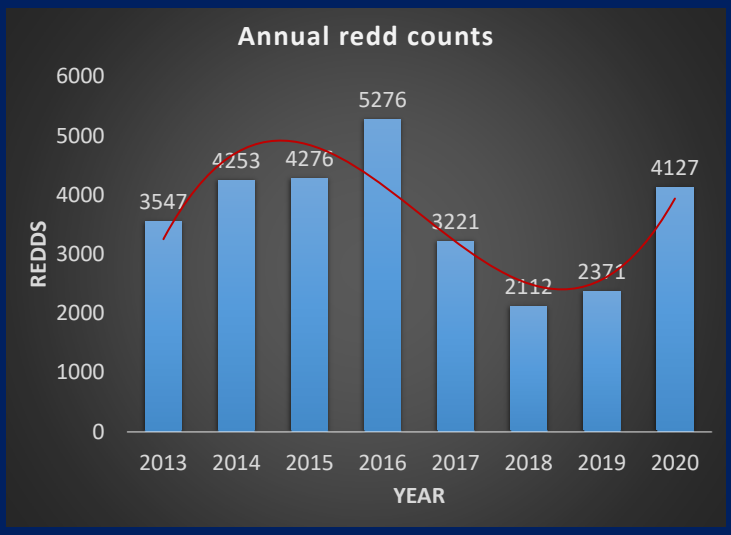
Pre-spawn mortality (PSM)



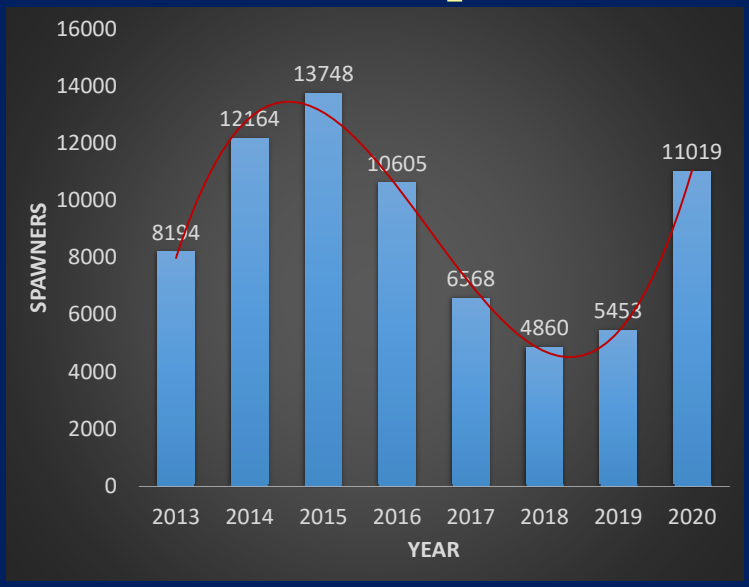
Count of recovered female carcasses (i.e., *sample size*)

River	2013	2014	2015	2016	2017	2018	2019	2020
Okanogan	314	621	398	786	412	261	170	734
Similkameen	249	681	923	1018	309	113	111	655
Total	563	1302	1321	1804	721	374	281	1389

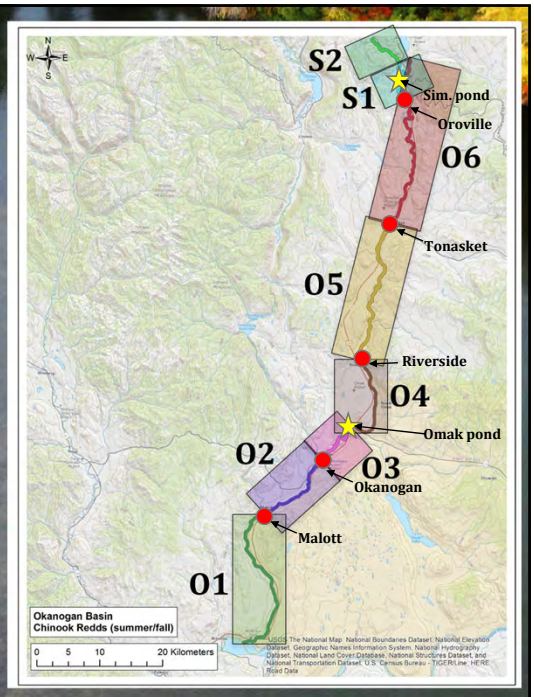
Redd counts

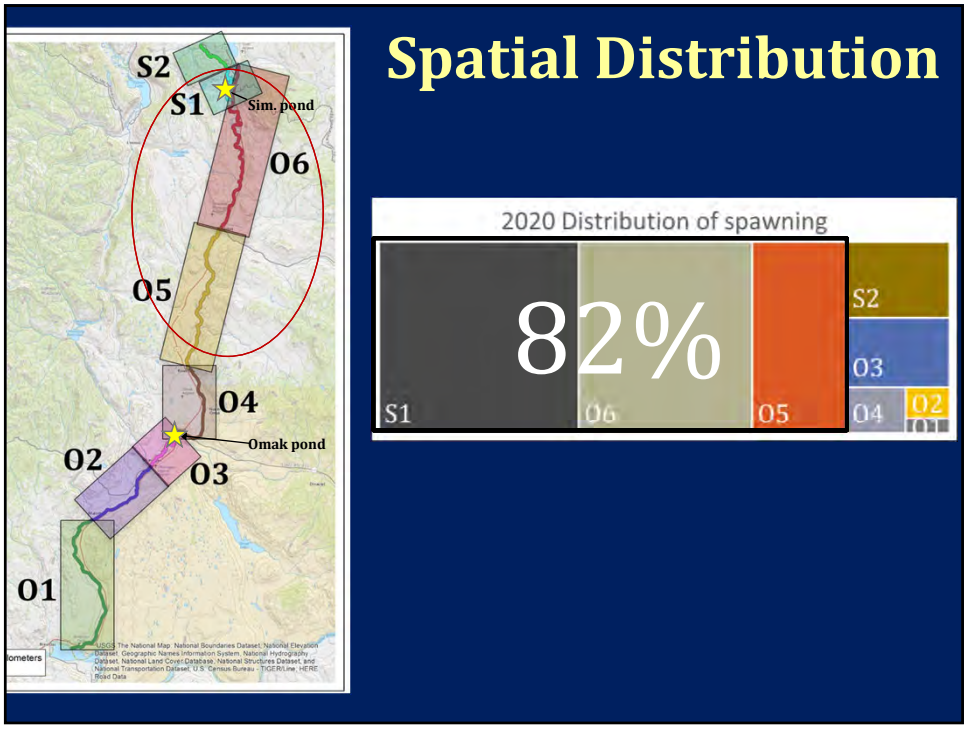


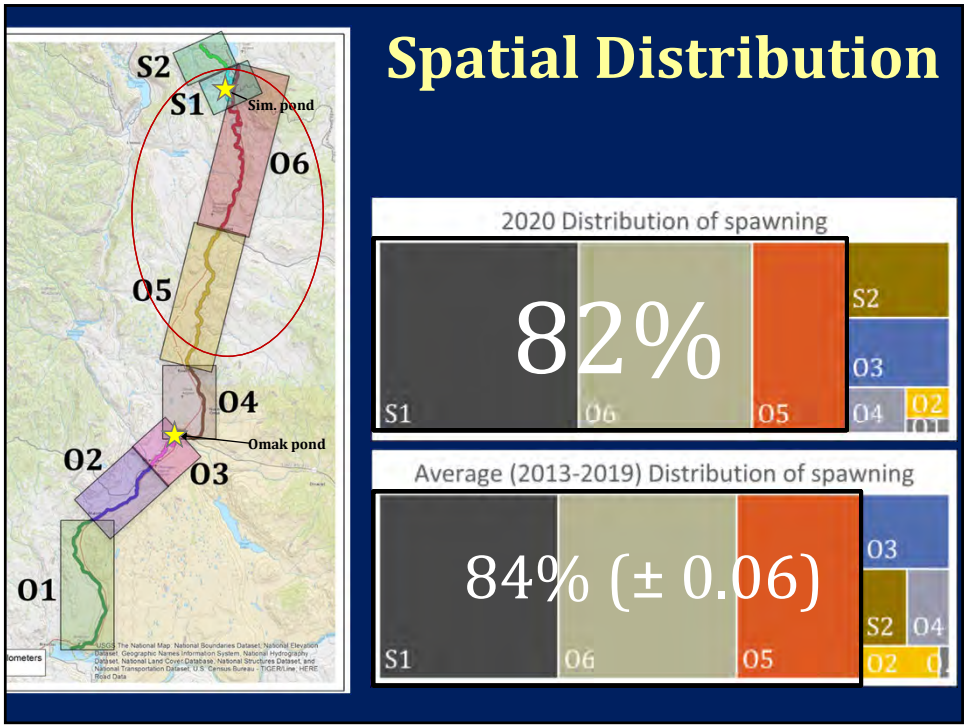
Annual Escapement

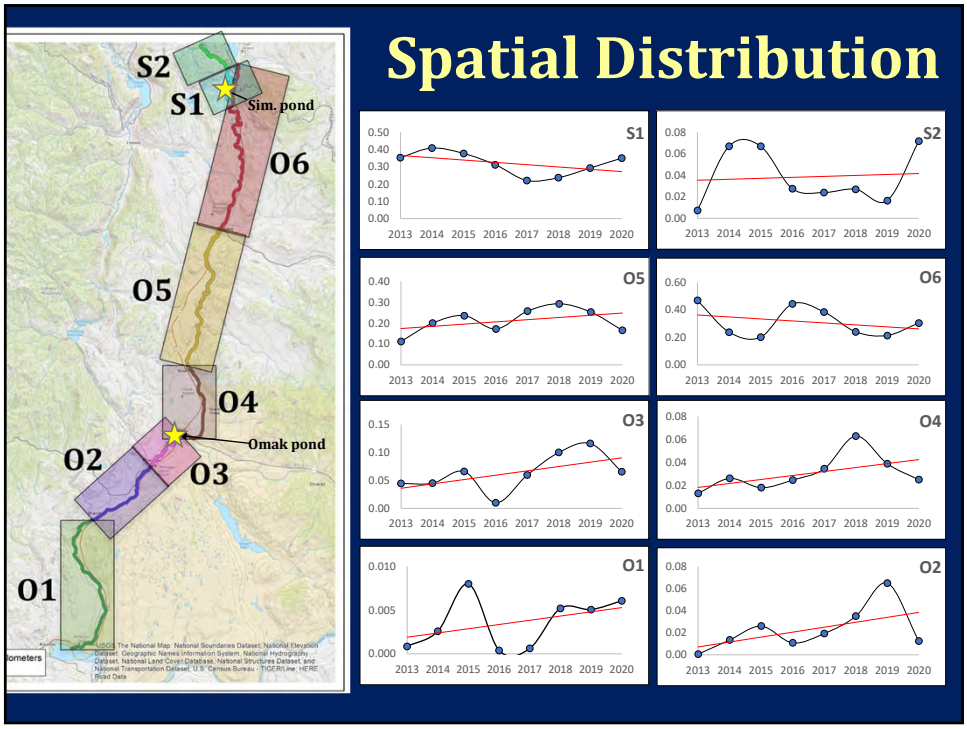


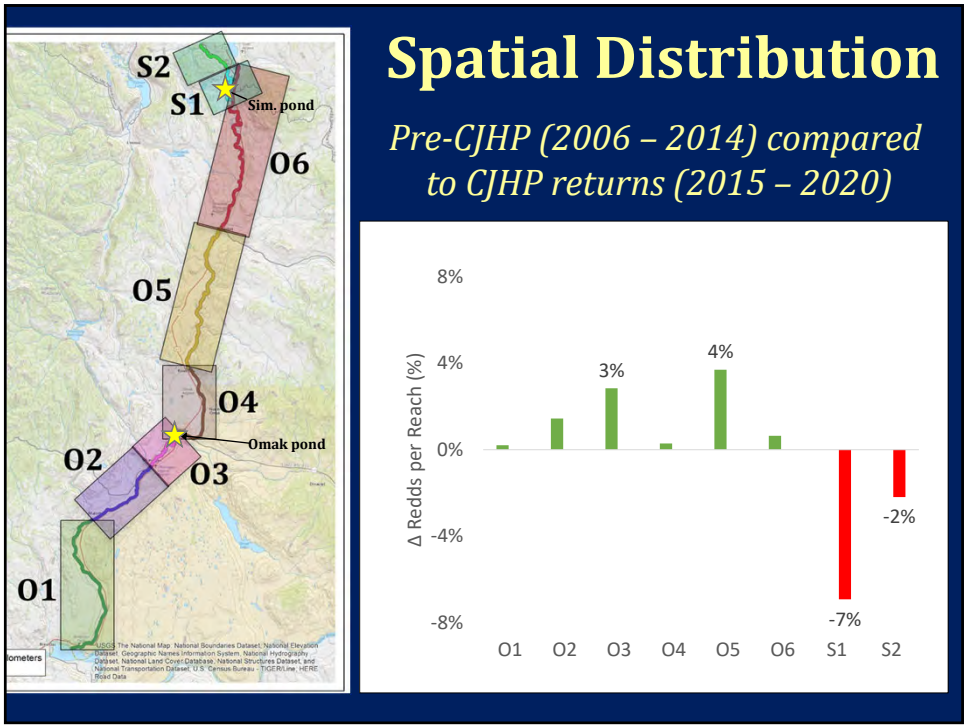
Spatial Distribution - Spawning

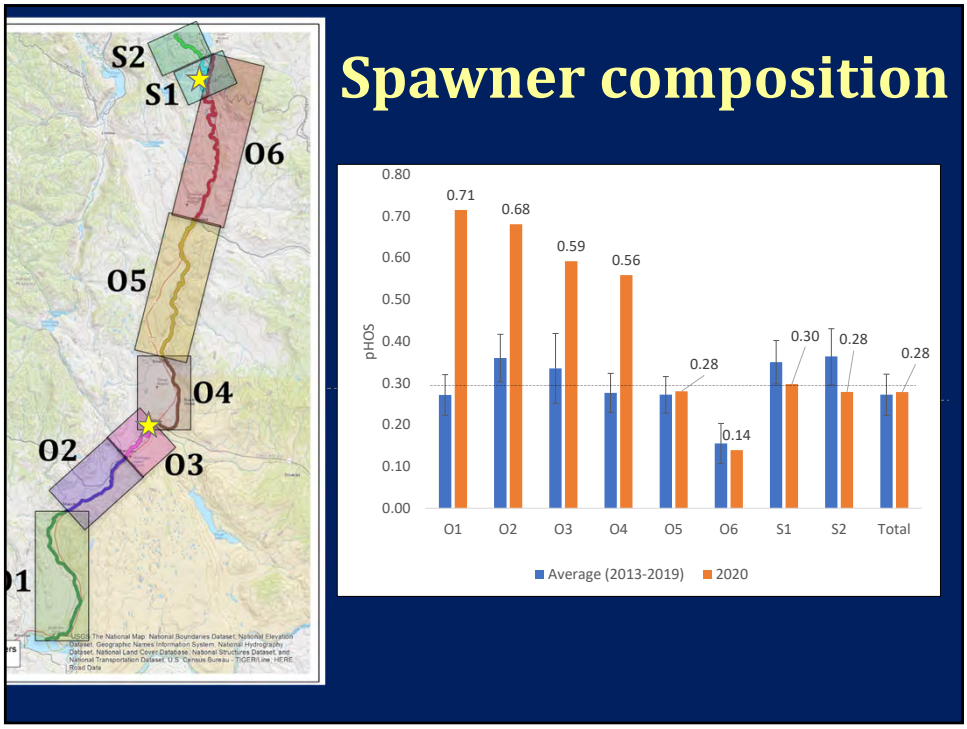


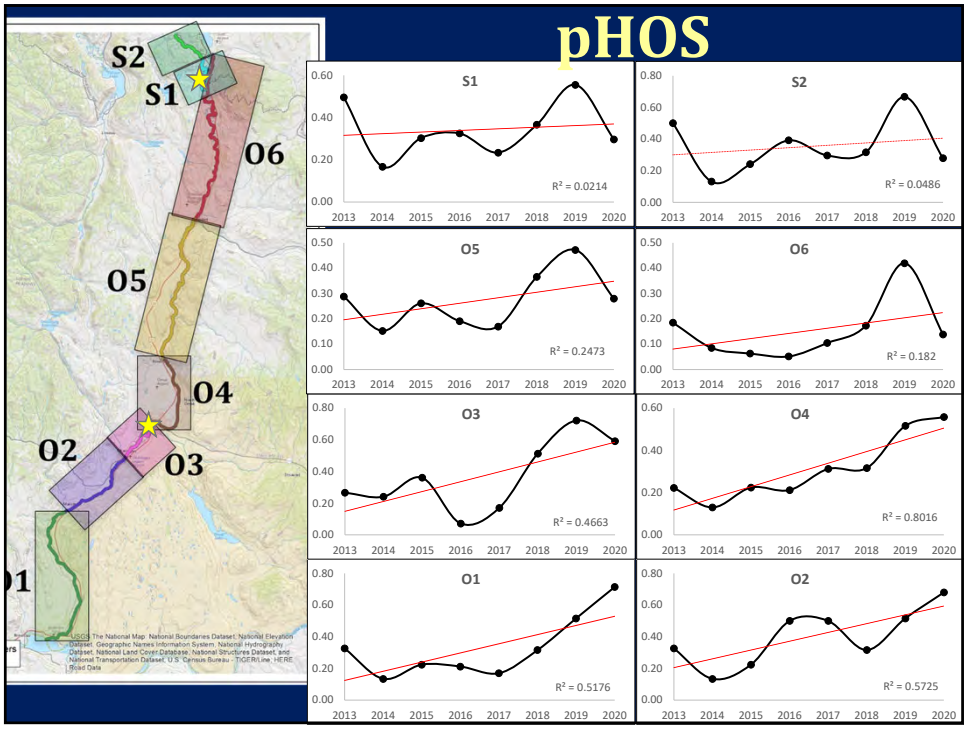

Spatial Distribution
S2
S1
Sim. pond
O6
O5
O4
Omak pond
O2
O3
O1
2020 Distribution of spawning
82%
S1
O6
O5
S2
O3
O4
O2


Spatial Distribution
S2
S1
Sim. pond
O6
O5
O4
Omak pond
O2
O3
O1
2020 Distribution of spawning
82%
S1
O6
O5
S2
O3
O4
O2
Average (2013-2019) Distribution of spawning
84% (± 0.06)
S1
O6
O5
O3
S2
O4
O2

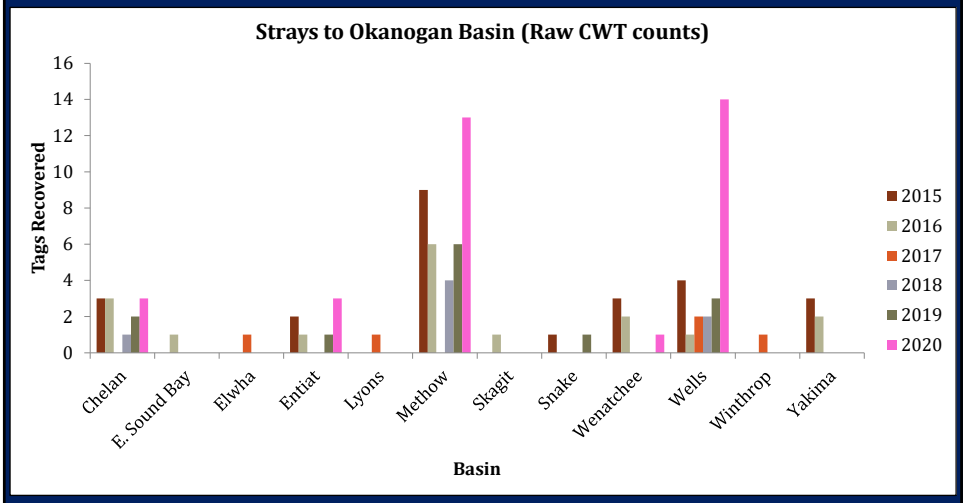

Spatial Distribution
S2
S1
Sim. pond
O6
O5
O4
Omak pond
O2
O3
O1
S1
S2
O5
O6
O3
O4
O1
O2
2013 2014 2015 2016 2017 2018 2019 2020


Spatial Distribution
Pre-CJHP (2006 – 2014) compared to CJHP returns (2015 – 2020)
S2
S1
Sim. pond
O6
O5
O4
Omak pond
O2
O3
O1
Δ Redds per Reach (%)
8%
4%
0%
-4%
-8%
3%
4%
-7%
-2%
O1 O2 O3 O4 O5 O6 S1 S2


Spawner composition
S2
S1
O6
O5
O4
O2
O3
O1
pHOS
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.71
0.68
0.59
0.56
0.28
0.14
0.30
0.28
0.28
O1
O2
O3
O4
O5
O6
S1
S2
Total
Average (2013-2019)
2020


pHOS
S2
S1
O6
O5
O4
O2
O3
O1
S1
R² = 0.0214
S2
R² = 0.0486
O5
R² = 0.2473
O6
R² = 0.182
O3
R² = 0.4663
O4
R² = 0.8016
O1
R² = 0.5176
O2
R² = 0.5725
2013
2014
2015
2016
2017
2018
2019
2020

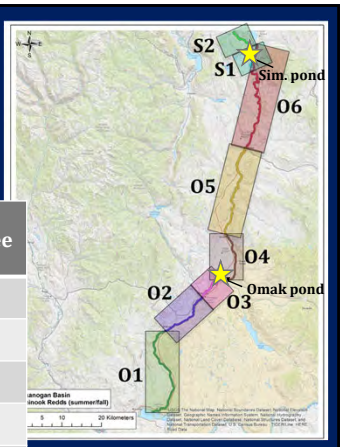
CWT Recoveries



Stray rate-into basin

(CWT-expansions)

Reach	Chelan	Entiat	Methow	Wells	Wenatchee
O1	0	0	0	0	0
O2	0	0	6	18	0
O3	5	17	11	33	5
O4	8	0	0	8	0
O5	5	0	24	10	0
O6	0	0	10	5	0
S1	0	0	4	4	0
S2	0	0	6	0	0
Grand Total	18	17	61	78	5
Percent of spawning population	**<1%**	**<1%**	**<1%**	**<1%**	**<1%**



Strays comprise *1.7%* of spawning population

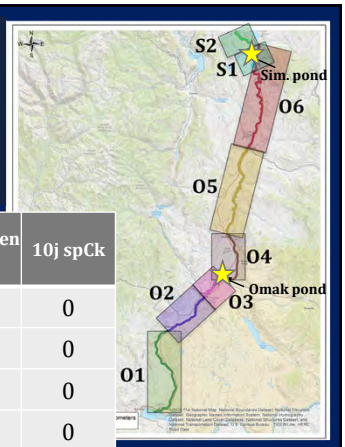
CJHP strays to out-of-basin

Year	Escapement	Chelan	Cowlitz	Methow	Okanogan	Similkameen	Homing	Straying
2014	241	0	0	0	121	120	100.0%	0.0%
2015	1789	4	0	0	687	1097	99.8%	0.2%
2016	2391	4	0	4	328	2005	99.7%	0.3%
2017	576	11	3	0	370	192	97.5%	2.5%
2018	191	4	0	4	116	68	95.6%	4.4%
2019	1460	12	0	0	846	602	99.2%	0.8%

*RMIS query data from 24 March 2020

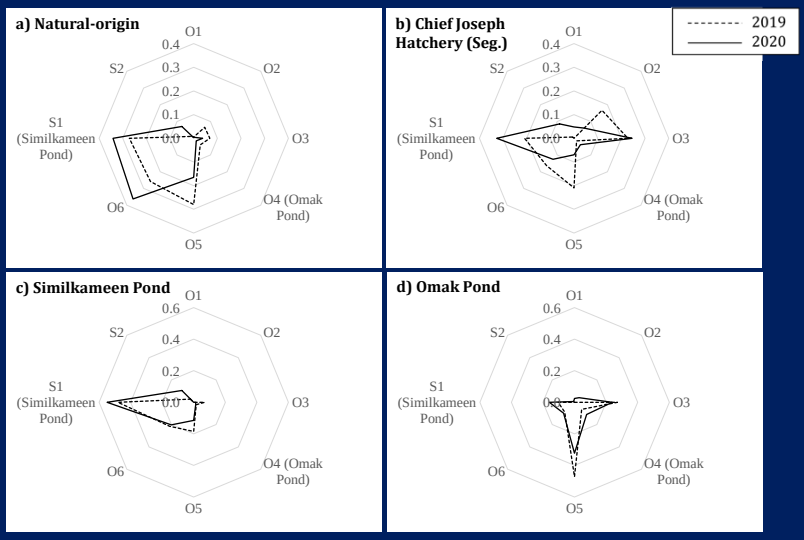
CJHP-origin returns to the Okanogan spawning grounds

(CWT expansions)

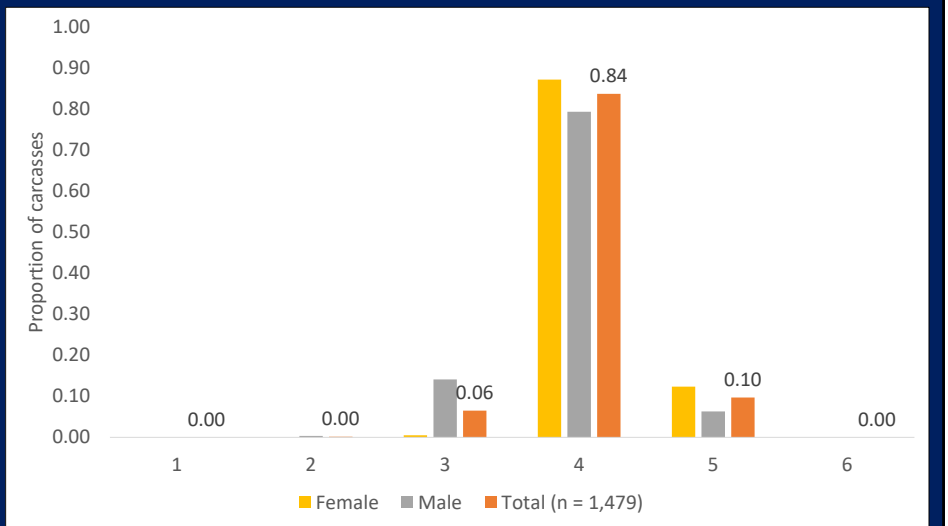


Reach	CJH (Seg.)	Omak Pond	Similkameen Pond	10j spCk
O1	28	20	0	0
O2	36	34	0	0
O3	145	194	17	0
O4	23	88	26	0
O5	41	262	169	0
O6	74	80	296	0
S1	193	130	807	4
S2	51	6	156	0
Grand Total	589	813	1470	4
Percent of spawning population	5.3%	7.4%	13.3%	<1%

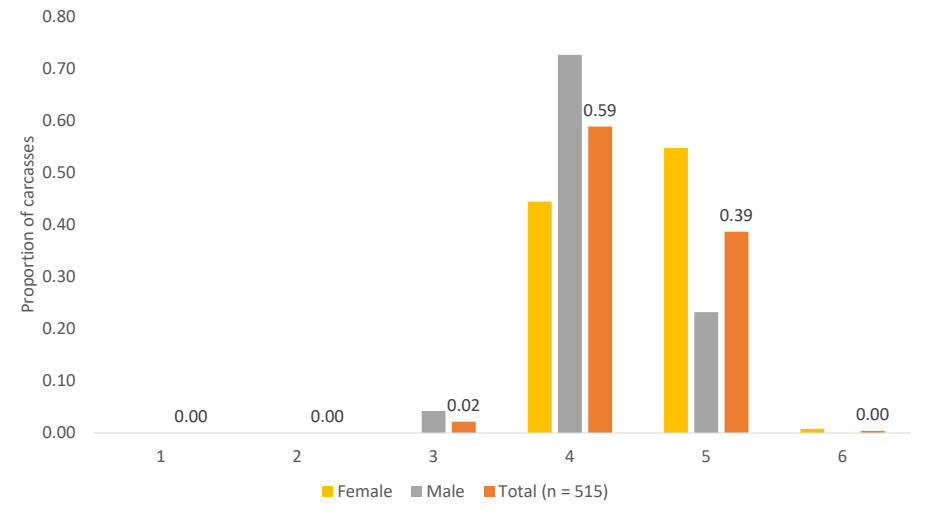
Spawner Distribution



Natural-origin spawner Age Structure



Hatchery-origin spawner Age Structure

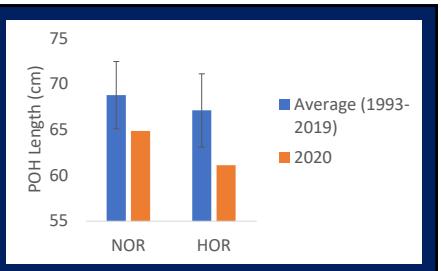


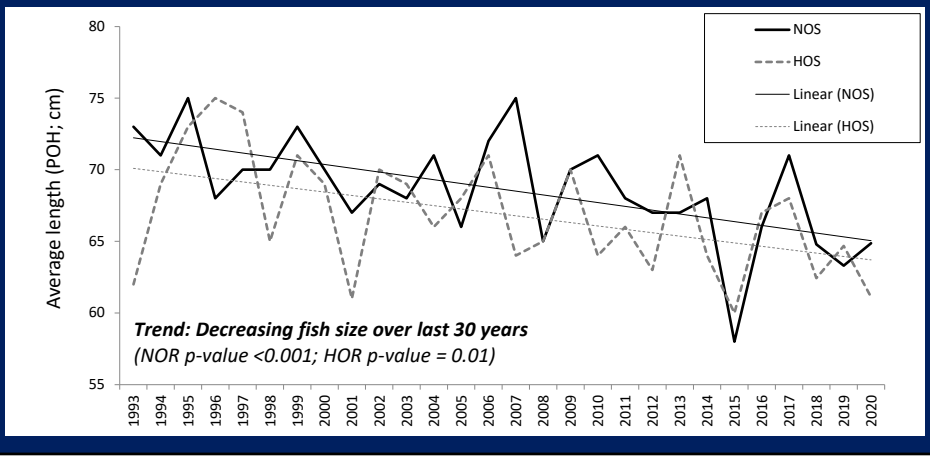
2020 Jacks

	Minijacks	Jacks	Adults	Total	Jack Rate
HOS	0	11	504	515	**2%**
NOS	2	96	1381	1479	**7%**

HOS Age Sample Rate 5%
NOS Age Sample Rate 13%

Length trend





Spawner Abundance
(USA portion of basin only)

	Redds	Spawners	HOS	NOS	pHOS
Okanogan	2,386	6,371	1,695	4,675	0.27
Similkameen	1,741	4,648	1,366	3,281	0.29
U.S. Total	4,127	11,019	3,061	7,957	0.28*

**Note: effectively 0.24*

Chinook escapement to Canada

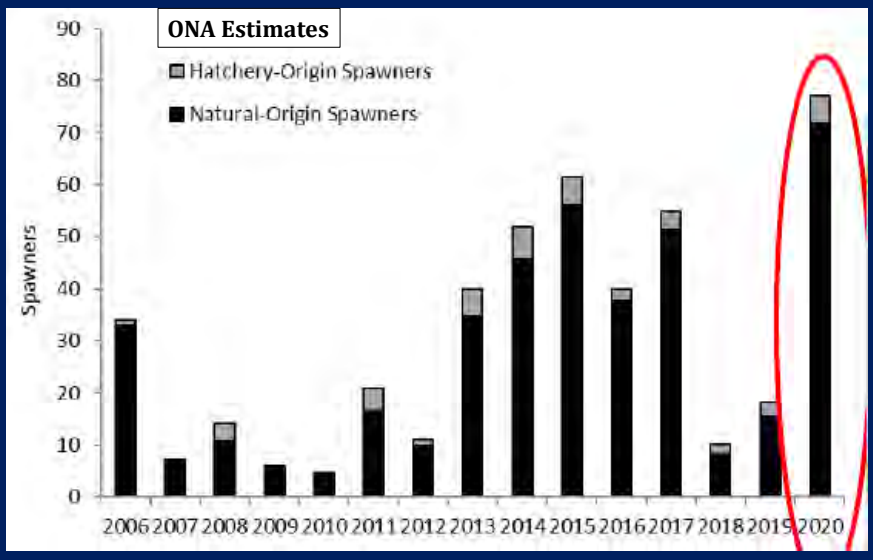
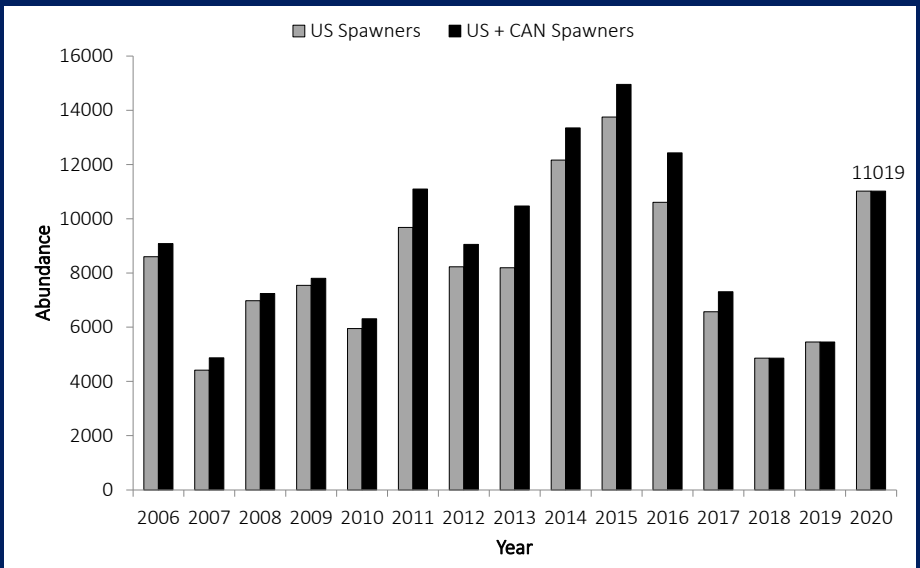
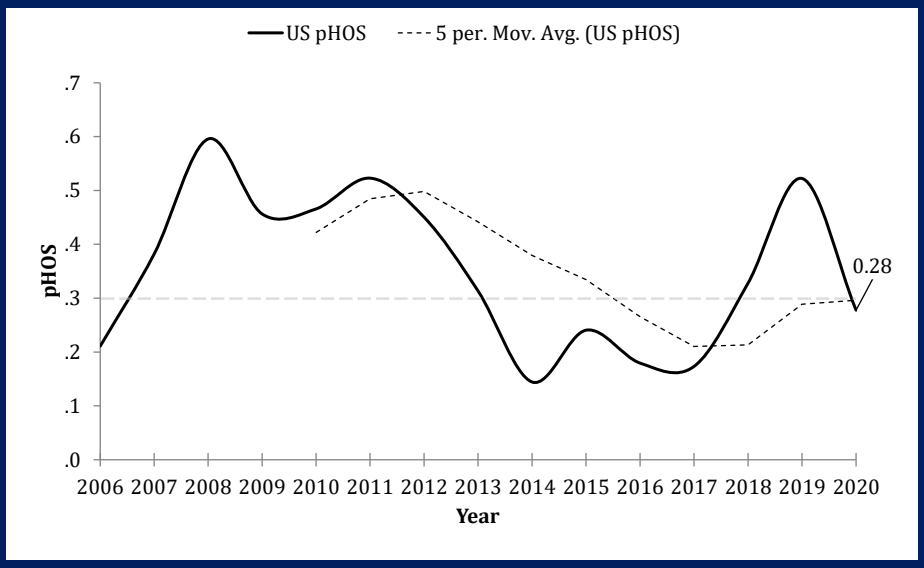


Figure courtesy of
Elinor McGrath, ONA

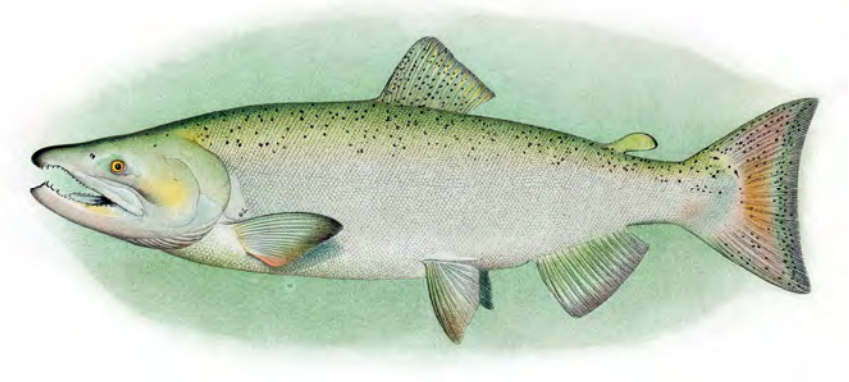
Spawner Abundance (U.S. + CAN)



pHOS


US pHOS
5 per. Mov. Avg. (US pHOS)
.7
.6
.5
.4
.3
.2
.1
.0
pHOS
0.28
2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Year


Grant County
PUBLIC UTILITY DISTRICT
BONNEVILLE POWER ADMINISTRATION
P.U.D.
CHELAN COUNTY
DOUGLAS COUNTY PUD
Okanagan Nation Alliance



Chief Joseph spring-Chinook M&E: §10(j) and segregated program

Matthew Laramie (USGS Ecologist) mlaramie@usgs.gov
Kirsten Brudevold (CJHP M&E Fisheries Biologist)

Current monitoring efforts

1. Environmental DNA (eDNA) monitoring
   a) Spatial distribution (adults)
   b) Confirm successful spawning (juveniles)
   c) Occupancy model to assess status and trends in occupancy (and detection probability)

2. Visual redd & carcass surveys
   a) Extent of spawning
   b) Carcass recoveries

3. Juvenile mark-recapture (OBMEP electro-fishing)
   a) Confirm successful spawning
   b) Juvenile population estimates
   c) Genetic analyses

4. Adult PIT tags (+ WDFW Video at Wells)
   a) Adult run estimate
   b) Run composition
   c) Adult spatial distribution

eDNA Monitoring Overview

- Early detection, especially those tributaries that receive little visual survey effort
- 27 sites in tributaries
- 8 sites in mainstem Okanogan
- *Adding 8 sites in Lake Okanagan tributaries in fall 2021 (more on this later)*

eDNA-based spatial distribution monitoring

eDNA Monitoring

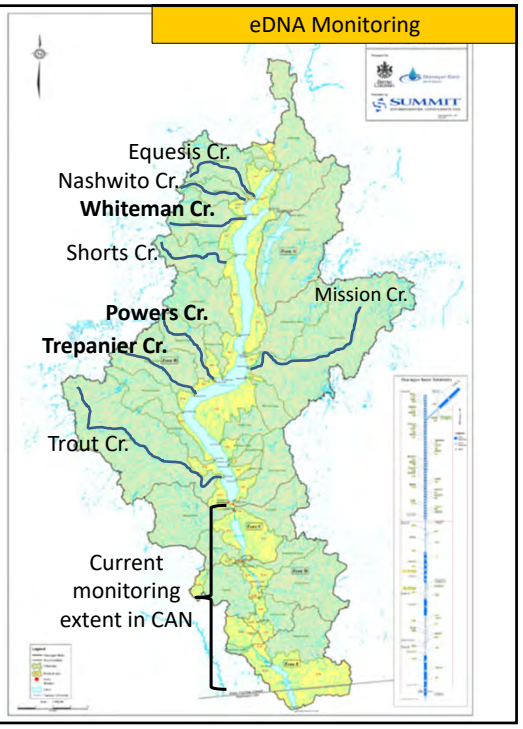
Site	Jun 2012	Aug 2012	Oct 2013	Sep 2014	2015	Sep 2016	Sep 2017	Mar 2018	Sep 2018	Mar 2019	Sep 2019	Mar 2020	Sep 2020	*Mar 2021*	*Sep 2021*
US Tributaries															
Aeneas Creek			-	-		-	+	-	-	-	-		x	x	x
Antoine Creek			-	+		+	-	-	+	-	+		x	x	x
Bonaparte Creek	-	+		-		-	+	-	+	-	-		x	x	x
Johnson Creek								-	+	-	-		x	x	x
Loup Loup Creek			-	+		+	+	-	+	+	+			x	x
Ninemile Creek	-	-		-		+		-		-	-		x	x	x
Omak Creek (near mouth)	+	+		+		+	+	-	+	-	+		x	x	x
Omak Creek (above falls)	-	-				+	+	-	+	-	-		x	x	x
Omak Creek (Mission bridge)											-		x	x	x
Salmon Creek (RKM 0.6)											-		x	x	x
Salmon Creek (RKM 2.9)											-		x	x	x
Salmon Creek (RKM 7.1)	+	+		+		+	+	-	+	+	+		x	x	x
Salmon Creek (RKM 17.3)											+		x	x	x
Salmon Creek (RKM 21.9)											-		x	x	x
Salmon Creek (RKM 25.5)											-		x	x	x
Siwash Creek			+					-		-			x	x	x
Tonasket Creek			+			-		-		-			x	x	x
Tunk Creek			-			+	+	-	+	-	+		x	x	x
Wanacut Creek			-			-	+	-		-			x	x	x
Canada Tributaries															
Inkaneep Creek	-	+		-		-	-	-			-			x	x
Shatford Creek								-			+			x	x
Shingle Creek (Lower)	-	+		+		-	+	-			-			x	x
Shingle Creek (Upper)								-			+			x	x
Shuttleworth Creek	-	-		-		-		-			-			x	x
Vaseux Creek	-	+		+		+	+	-			-			x	x
Mission Creek															x
Whiteman Creek															x
Equesis Creek															x
Shorts Creek															x
Naswhito Creek															x
Powers Creek															x
Trepanier Creek															x
Trout Creek															x

No sampling due to COVID

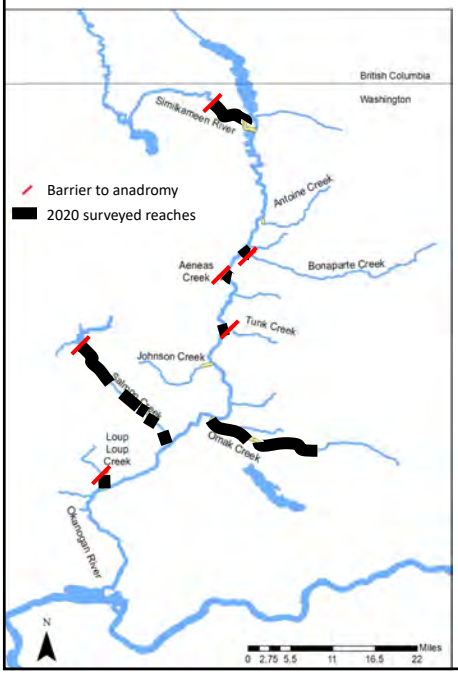
Lake Okanagan Habitat

- Whiteman Creek – 1 spring-Chinook observed in Sept 2020
- Powers Creek – 1 spring-Chinook carcass collected in 2020
- Trepanier Creek – 1 spring-Chinook observed in 2020

eDNA Monitoring



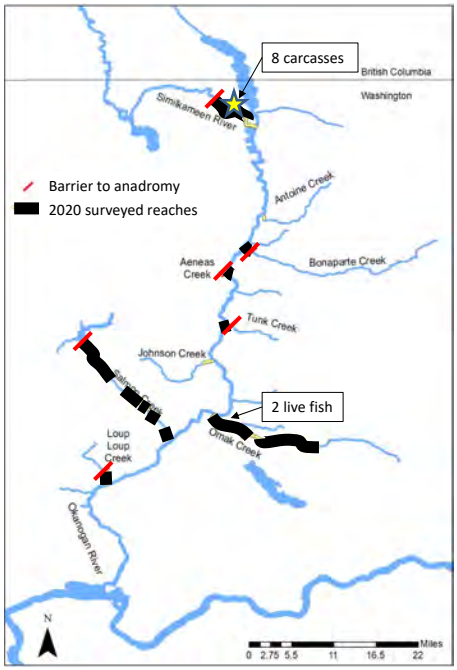
Visual redd & carcass surveys



Visual survey effort for redds and carcasses

Stream	Number of surveys	2020 Date(s)
Aeneas Creek	1	Oct 1
Bonaparte Creek	1	Oct 1
Loup Loup Creek	3	Aug 20 – Sep 22
Omak Creek (lower)	6	Aug 14 – Sep 24
Omak Creek (upper)	2	Aug 24
Salmon Creek (lower)	3	Aug 31 – Sep 21
Salmon Creek (upper)	3	Aug 27
Similkameen Canyon	4	Aug 14 – Sep 22
Tunk Creek	1	Sep 21

Visual redd & carcass surveys



Visual Redd Surveys

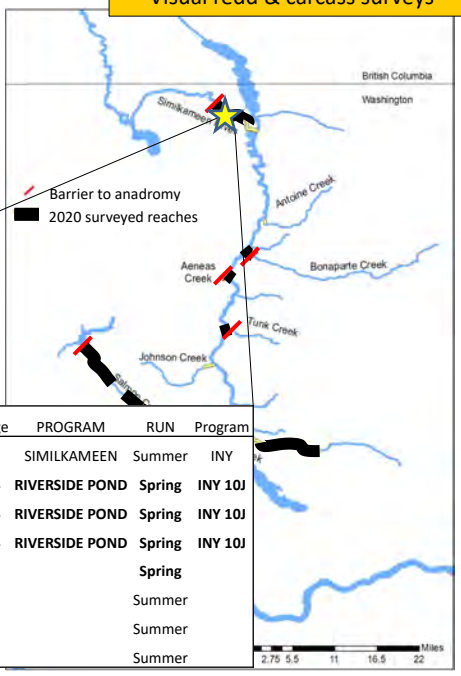
Take home:

- No redds observed in 2020
- 2 live fish in Lower Omak Creek
- High water in Salmon Creek confounded surveys
- Only carcasses recovered were in Similkameen River

Visual redd & carcass surveys

Carcass recoveries

- Collected 8 carcasses during pre-spawn floats in Similkameen Canyon (S2)
- Between Aug 14 to September 22,2020



Cap. Date	Adipose	CWT#	Brood Year	Hatchery of Orgin	Age	PROGRAM	RUN	Program
8/14/2020	Clipped	200127	2015	SIMILKAMEEN HATCHERY	5	SIMILKAMEEN	Summer	INY
8/21/2020	**Clipped**	**200135**	**2016**	**CHIEF JOSEPH HATCHERY**	**4**	**RIVERSIDE POND**	**Spring**	**INY 10J**
8/21/2020	**Clipped**	**200135**	**2016**	**CHIEF JOSEPH HATCHERY**	**4**	**RIVERSIDE POND**	**Spring**	**INY 10J**
8/28/2020	**Clipped**	**200135**	**2016**	**CHIEF JOSEPH HATCHERY**	**4**	**RIVERSIDE POND**	**Spring**	**INY 10J**
8/28/2020	**Present**	**NO TAG**					**Spring**	
8/28/2020	Present	NO TAG					Summer	
9/22/2020	Present	NO TAG					Summer	
9/22/2020	Clipped	NO TAG					Summer	

Juvenile mark-recapture (OBMEP electro-fishing)

OBMEP Tributary Surveys

- Tributary mark-recapture (e-fishing) effort to determine outmigrant and population estimates for steelhead
- Focusing on steelhead, but encounter spring-Chinook
- Most suitable USA tributaries
- Several CAN tributaries surveyed by coordination with ONA

Juvenile mark-recapture (OBMEP electro-fishing)

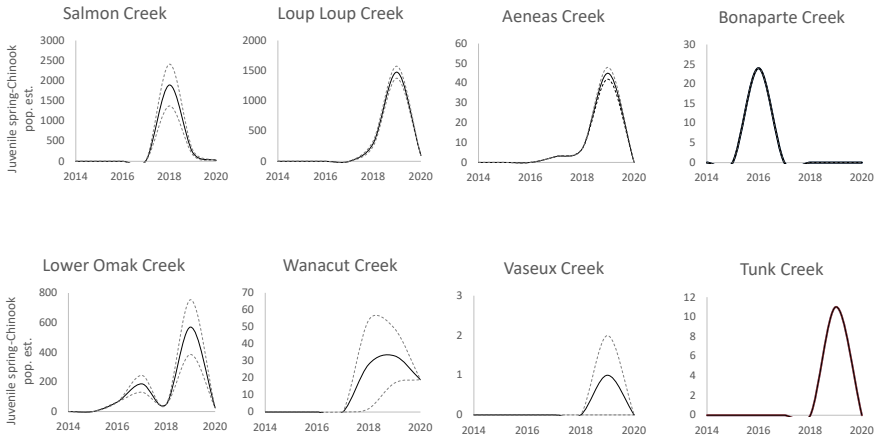
OBMEP Tributary Surveys

2020 Juvenile Spring-Chinook
(Fork length range: 68 - 132mm)

- Lower Omak Creek 2 captures (9/21)
- Wanacut Creek 2 captures (9/23)
- Loup Loup Creek 13 captures (9/30 – 10/1)
- Salmon Creek 1 capture (10/6)

Juvenile mark-recapture (OBMEP electro-fishing)

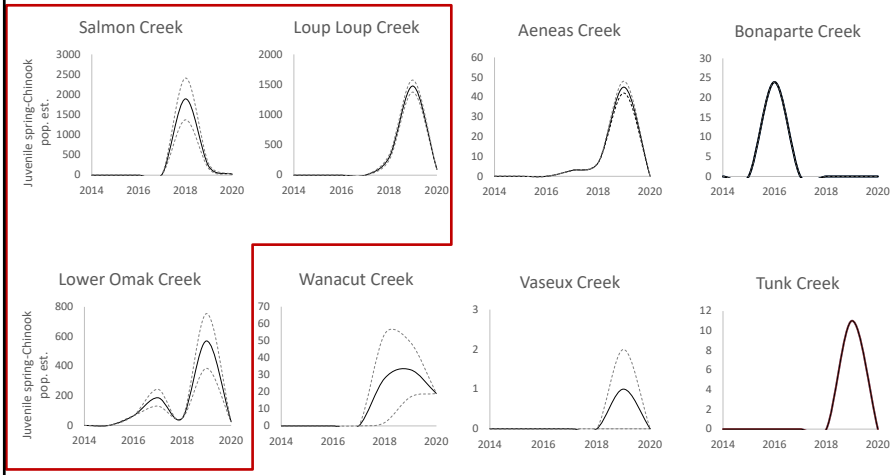
OBMEP Tributary population estimates



Population estimate
95% Confidence interval

Juvenile mark-recapture (OBMEP electro-fishing)

OBMEP Tributary population estimates



Population estimate
95% Confidence interval

2020: Significantly fewer spring-Chinook encountered

Juvenile mark-recapture (OBMEP electro-fishing)

2018 Genetic analyses
Juvenile Chinook, n = 92

92 juvenile fin clips collected in fall 2018 during OBMEP electro-fishing efforts

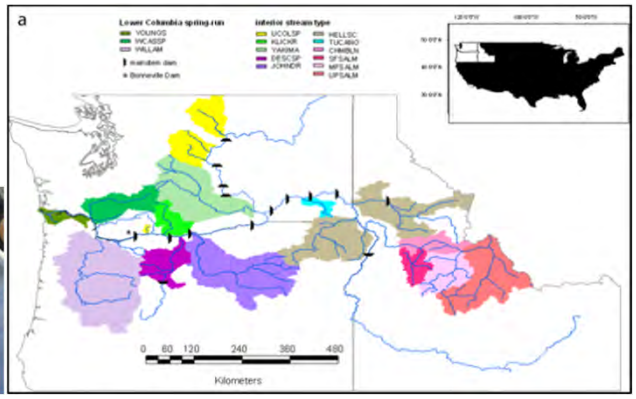
Genetic analyses conducted by CRITFC (Hagerman, Idaho)

1. Genetic stock identification, or GSI
2. Parental-based tagging, or PBT
3. Siblingship assignments

Juvenile mark-recapture (OBMEP electro-fishing)

Genetic stock identification (GSI)

- 71 samples assigned as Upper-Columbia spring-Chinook
- 1 sample assigned as Upper-Columbia summer/fall-Chinook
- 1 sample assigned as John Day River
- 21 samples failed to assign



Parental-based tagging, or PBT

- No fish could be assigned with PBT - all fish are putatively natural-origin

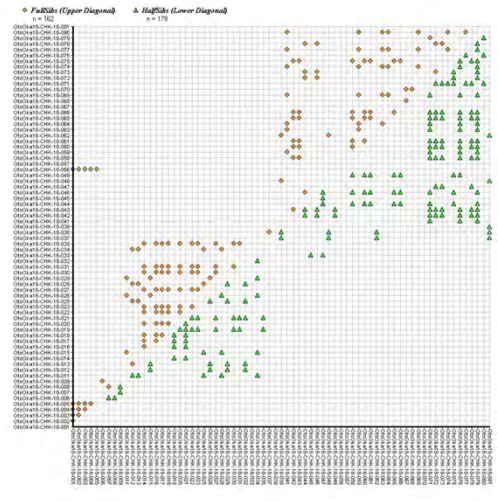
PBT tag rates

Hatchery Name	2013	2014	2015	2016	2017
Chief Joseph Hatchery (Spring)		0.89	1.00	0.98	0.93
Chief Joseph Hatchery (Summer/Fall) - Integrated	0.70	0.89	0.90	0.99	0.77
Chief Joseph Hatchery (Summer/Fall) - Segregated	0.89	0.44	0.96	0.99	0.92

Juvenile mark-recapture (OBMEP electro-fishing)

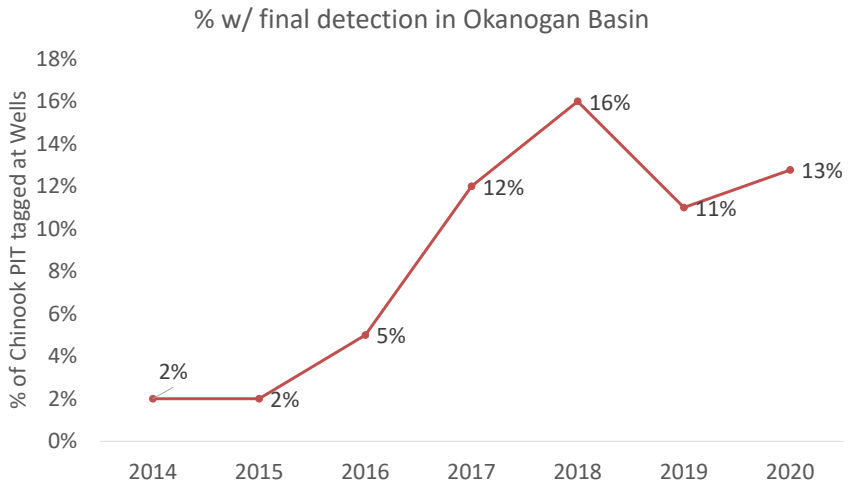
Siblingship assignments

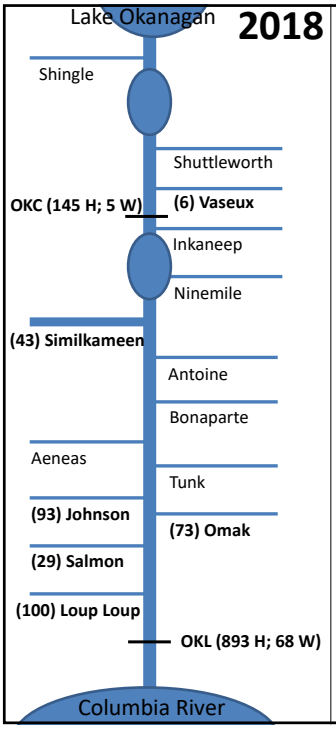
- Sibship reconstruction analysis estimated that the samples we sent them (n = 71) represents approximately 20 spawners (12 – 38; 95% CI)
- Highly related, from small number of spawners
- 23 unique families with 1-11 full sibling members



Adult PIT tagging

Okanogan River spring Chinook PIT tagged at Wells Dam



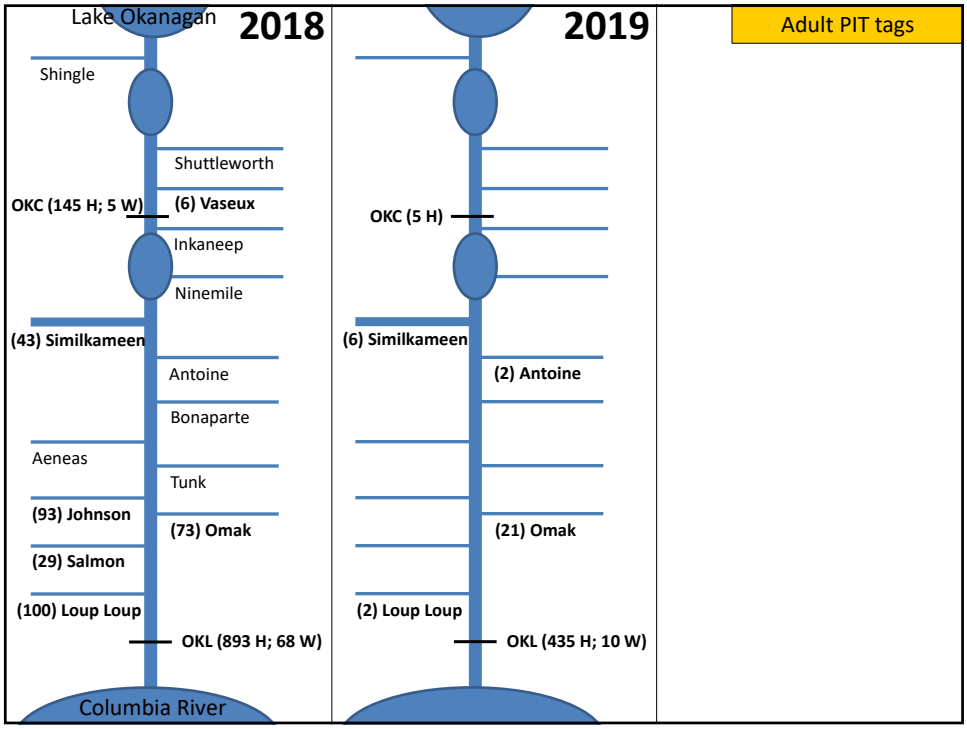


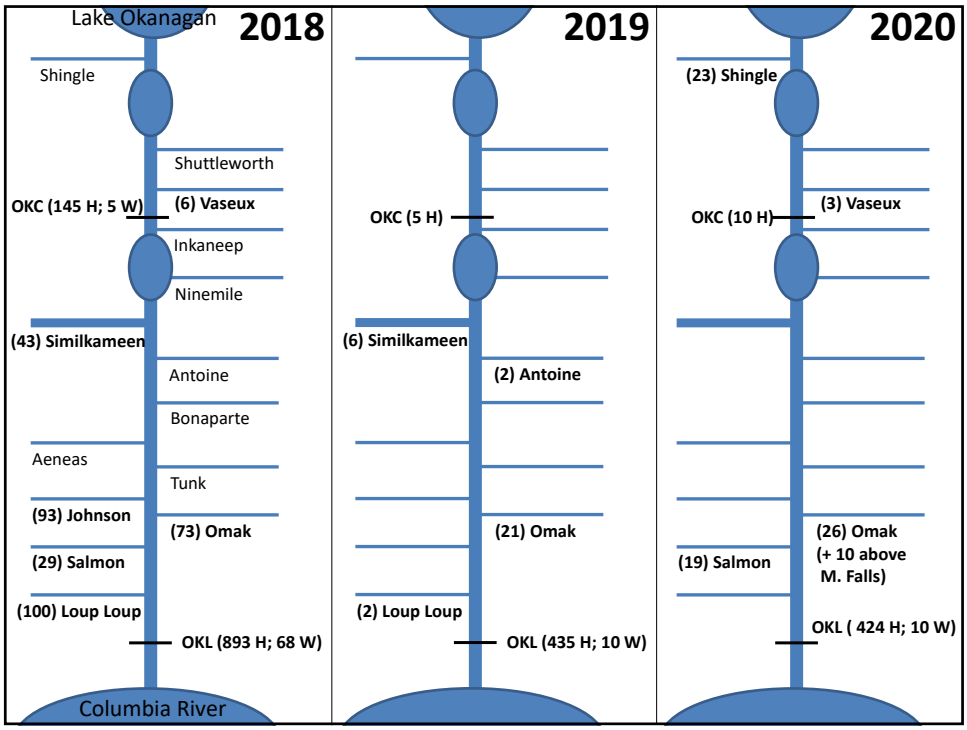
Adult PIT tags

Adult spring-Chinook returns to tributaries (last detections)

← Conceptual diagram of Okanogan Basin

- (*n*) indicates estimated adult spring-Chinook based on PIT expansions (for WDFW Wells tag group)
- Mostly 10j returns, with a few wild returns


Lake Okanagan
2018
2019
Adult PIT tags
Shingle
Shuttleworth
OKC (145 H; 5 W)
(6) Vaseux
OKC (5 H)
Inkaneep
Ninemile
(43) Similkameen
(6) Similkameen
Antoine
(2) Antoine
Bonaparte
Aeneas
Tunk
(93) Johnson
(73) Omak
(21) Omak
(29) Salmon
(100) Loup Loup
(2) Loup Loup
OKL (893 H; 68 W)
OKL (435 H; 10 W)
Columbia River


Lake Okanagan
2018
2019
2020
Shingle
(23) Shingle
Shuttleworth
OKC (145 H; 5 W)
(6) Vaseux
OKC (5 H)
OKC (10 H)
(3) Vaseux
Inkaneep
Ninemile
(43) Similkameen
(6) Similkameen
Antoine
(2) Antoine
Bonaparte
Aeneas
Tunk
(93) Johnson
(73) Omak
(21) Omak
(29) Salmon
(19) Salmon
(26) Omak
(+ 10 above
M. Falls)
(100) Loup Loup
(2) Loup Loup
OKL (893 H; 68 W)
OKL (435 H; 10 W)
OKL (424 H; 10 W)
Columbia River

Adult PIT tags

WDFW Spring Chinook Okanogan Run Estimate (includes returns to CJH)

Based on Wells video & PIT detections

Year	Hatchery Origin	Natural Origin	Unknown Origin	Run Estimate
2014	0	0	186	186
2015	0	0	204	204
2016	0	0	240	240
2017	0	0	653	653
2018	1401	73	0	1474
2019	518	14	0	532
2020	**1592**	**55**	**0**	**1647**

Note: 2020 Hatchery Origin values comprised of

- *706 10j (Riverside acclimation pond)*
- *886 CJH segregated*

Adult PIT tags

Comparison of 2020 In-season, end-of-season, and WDFW/Wells spring-Chinook run estimates

Program	In-season estimate	End-of-season estimate to Wells	WDFW run estimate
CJH Segregated	283	112	706
Okanogan 10j/Riverside	687	851	886
Combined	970	963	1592

Notes

Notes

Notes

Notes

Appendices

Historic Timeline for Chief Joseph Hatchery Program

The Funding Decision for Planning

- **In December 2001,** as part of the solicitation associated with the Columbia Cascade Province, the Colville Tribes submitted a series of seven new proposals to address habitat restoration; fish propagation; fish harvest; and research, monitoring, and evaluation needs in the Okanogan subbasin.

- **In October 2002** the NWPCC recommended a total of four new proposals that included two of the original series of seven new proposals submitted by the Colville Tribes -- Proposal #29040 *Develop and Propagate Local Okanogan River Summer/Fall Chinook* and proposal #29033 *Design and Conduct Monitoring and Evaluation Associated with the Re-establishment of Okanogan Basin Natural Production.* The proposals were consolidated into one project titled *Chief Joseph Dam Hatchery Program (*Project # 2003-023-00).

- **In April 2003,** Bonneville agreed to fund development of the CJHP Master Plan and in July 2003, Bonneville negotiated a contract with the Colville Tribes to develop a CJHP Master Plan.

Completion of the Major Project Review Process (The Three-Step Review)

Step 1 – Conceptual Phase (Master Plan)

- **On May 26, 2004,** the Colville Tribes submitted the Master Plan. The spring Chinook components in the Master Plan were presented in a single separate chapter, all costs and facility requirements were presented as separate components. NWPCC staff determined that the inclusion of this additional information at the Step 1 Master Plan stage benefited both plan reviewers and decision-makers.

- **On June 9, 2004,** the NWPCC supported the staff recommendation that the spring Chinook component of the submitted CJHP Master Plan be reviewed by the ISRP.

- **On January 12, 2005,** the ISRP provided the NWPCC with its review of the CJHP Master Plan (ISRP Document 2005-02). The ISRP comments generally confirmed the content and the basis of the master plan for both the summer/fall and spring Chinook components, including support for the proposed research projects (i.e., a radio telemetry study to better understand the migration and spawn timing of the Okanogan summer/fall Chinook, and a study to test and develop live-capture, selective fishing gear for collection of local broodstock). The ISRP suggested revising the master plan to accommodate its comments. The ISRP raised issues that needed to be addressed as the project proceeded in its development. In summary, six issues were raised:
    1. A specific time frame process (i.e., decision tree) that outlines the expected range of the production scenarios
    2. Additional discussion on the proposal as it relates to alternative forms of mitigation
    3. Additional detail regarding the proposal and the relationship to the BAMP (Biological Assessment and Management Plan)
    4. Better integration with other NWPCC and basinwide documents (i.e., subbasin plans)
    5. Basic information regarding the in-basin and out-of-basin assumptions concerning survival, and

6. More detail on methods, designs (including controls), and hypotheses in the monitoring and evaluation plan

- **On March 15, 2005,** the NWPCC approved the Step 1 review of the *Chief Joseph Hatchery Program*, Project # 2003-023-00 and recommended conditions associated with Step 2. The specific language associated with the recommendations and approved budget was as follows:
    - The NWPCC approved the CJHP Step 1 Master Plan, including the spring Chinook component and the two research studies.
    - The NWPCC recommended that the Step 2 submittal include estimated costs, including a value engineering review. The submittal should also provide detail of any cost-share opportunities identified with the Bureau of Reclamation, public utility districts and irrigation districts.
    - The NWPCC recommended that additional information be included in the Step 2 submittal that fully addresses the issues raised by the ISRP.

Step 2 – Progress Review/Preliminary Phase

- **On November 12, 2007,** the Colville Tribes submitted the Step 2 documents addressing the conditions placed on this project as part of the Step 1 NWPCC decision. In addition, the Step 2 review included environmental review and preliminary design of the facility and out-year costs.

- **On March 7, 2008,** the ISRP provided its preliminary review (ISRP document 2008-2) of the Step 2 submittal. The ISRP requested additional information from the project sponsors including recommendations and modeling results from the Hatchery Scientific Review Group and a revision of the Master Plan to address issues raised in the ISRP's Step 1 and Step 2 reviews. The ISRP found that the Master Plan's primary deficiency was a lack of adequate linkage between the environmental assumptions and the objectives of the program. The ISRP thought the HSRG's new modeling capabilities would provide reasonable estimates of natural and hatchery recruitment consistent with limitations on habitat carrying capacity, hydrosystem operations, and downstream and marine harvest.

- **On July 3, 2008,** the Colville Tribes submitted its response to the ISRP's preliminary Step 2 review. The ISRP determined that additional detail was still needed to address the issues raised by the ISRP. The additional information was provided to the ISRP in August and November 2008 to complete the submittal for review.

- **On January 22, 2009,** the ISRP provided a "response requested" review (ISRP document 2009-2). The ISRP found that two of the six Step 1 issues were resolved, but four issues still required further attention before the ISRP could judge whether the project met scientific review.

- **On March 2, 2009,** the ISRP and the Colville Tribes met to discuss the recent ISRP review. The meeting provided an opportunity for the Colville Tribes to seek clarification of the ISRP's concerns, and on March 11, 2009, the Colville Tribes provided additional modeling results and other information sought by the ISRP.

- **On April 17, 2009,** the ISRP provided its final Step 2 review (ISRP 2009-12). The ISRP found that the Step 2 submittal "meets scientific review criteria." The ISRP stated that the Chief Joseph Hatchery Master Plan had progressed significantly from the Step 1 and earlier Step 2 plans. The

ISRP was impressed by the Colville Tribes' efforts to address the issues and their use of modeling to assist them in making plan refinements reflecting the best practices of the Fish and Wildlife Program and the Hatchery Scientific Review Group. The ISRP cautioned however that much uncertainty remains as to whether the salmon harvest and conservation goals could be reached. The scientists stressed the need for an adequate monitoring and evaluation (M&E) plan to address the uncertainties and to adaptively manage the CJHP.

- **On May 12, 2009** the NWPCC approved the Step 2 review of the Chief Joseph Hatchery Program and recommended with conditions the activities associated with Step 3. The specific action taken by the NWPCC is as follows:

    - That the NWPCC recommend that the Chief Joseph Hatchery Program proceed to Step 3-level activities.
    - That the NWPCC call for additional information to be developed that fully addresses the issues raised by the independent peer review for consideration during the Step 3 review.

Step 3 – Detailed/Final Phase and Final Science Review

- **On November 5, 2009,** the Colville Tribes briefed the ISRP and NWPCC staff on the Tribes' draft monitoring and evaluation (M&E) plan for the CJHP. In addition, the Colville Tribes provided an update of the progress made in the selective fishing research and development of a weir for the Okanogan River, as recommended by the ISRP. As part of this briefing the ISRP provided helpful comments on the M&E plan, and the Colville Tribes anticipated that the M&E plan for the Step 3 review submittal would be finalized in the near future.

- **On November 16, 2009** the NWPCC received the revised M&E plan. The submittal included the summer/fall Chinook and spring Chinook components addressing hatchery production, harvest and natural production. The submittal is intended to initiate the Step 3 review and address the issues identified by the ISRP in its final Step 2 review (ISRP document 2009-12).

- **On January 6, 2010** the NWPCC received the ISRP's review of the M&E plan. The ISRP found that the plan met scientific review criteria. The ISRP found that the essential decision framework associated with the M&E plan is based on the best available scientific information, applies state-of-the-art analytical tools, and reflects the scientific principles and standards of the NWPCC's Program and the Hatchery Scientific Review Group. The ISRP's comments evidenced an appreciation for the "healthy and helpful exchange" with the Colville Tribes as the CJHP Master Plan moved through the step review process. This relationship led to useful adaptation as the project moved through the step-review process, and is reflected in the extensive comments made by the ISRP in its final review. It is evident that the ISRP and the Colville Tribe appreciate the trust and respect of their interactions.

Environmental Review and Endangered Species Act

- **In May 2007,** the Draft Environmental Impact Statement (EIS) for the Chief Joseph Hatchery Program was published in the Federal Register. Public hearings on the draft EIS were held in June, 2007. The U.S. Army Corps of Engineers became a National Environmental Policy Act (NEPA) Cooperating Agency in April, 2008, since the hatchery is proposed on their land.

Final Design

- **The final designs were completed in November of 2009.** Documents were provided to the NWPCC in early April 2010 as part of the step-review process. The design included proposed new construction of an incubation and rearing facility to accommodate the summer/fall Chinook (2,000,000) and spring Chinook (900,000 yearling smolts) programs, provide adult holding facility, and an administrative office. There also will be four houses constructed for the employees on Washington Parks and Recreation Commission land. In addition, along the Okanogan River, three existing Oroville-Tonasket Irrigation District irrigation ponds, one tribe-owned acclimation pond, and two new ponds will be modified and/or constructed to acclimate, imprint, and volitionally release approximately 1.3 million summer/fall and spring Chinook smolts annually.

Construction Start-up

- **On March 19, 2010** construction bids were received, however finishing Corps of Engineers' 408 Review on effects to CJ Dam delayed the actual hatchery construction until 2011. Phased construction started with construction of hatchery housing and acclimation ponds in 2010.

Operational Start-up

- **In September 2013,** the hatchery was dedicated and initial operations started in Fall of 2013. CJHP staff began collecting broodstock for releases of subyearlings in 2014 and yearlings in 2015 and quickly ramped up smolt release numbers to more than two million (including spring Chinook).

Glossary of Terms and Variables

The following is a list of key terms and variables used in the CJHP:

- HOS = the number of hatchery-origin fish spawning naturally.
- NOS = the number of natural origin fish spawning naturally.
- NOB = the number of natural-origin fish used as hatchery broodstock.
- HOB = the number of hatchery origin fish used as hatchery broodstock.
- HORs = hatchery-origin recruits. The number of HORs equals the sum of HOS + HOB + hatchery-origin fish intercepted in fisheries.
- NORs = natural origin recruits. The number of NORs equals the sum of NOB, + NOS + natural-origin fish intercepted in fisheries.
- pHOS = proportion of natural spawners composed of HORs. Equals HOS/(NOS + HOS).
- pNOB = proportion of hatchery broodstock composed of NORs. Equals NOB/(HOB + NOB)
- PNI = proportion of natural influence on a composite hatchery-/natural-origin population. Can also be thought of as the percentage of time the genes of a composite population spend in the natural environment. Equals 1 - pNOB/(pNOB + pHOS).
- SAR = smolt to adult return.

Chief Joseph Hatchery Production Plan

Brood Year: 2021
Species: Summer Chinook
Stock: Okanogan
Origin: Wild
Program: Integrated

Planting Goal: 1,100,000
Pounds: 86,000

Egg Take Goal: 1,485,000

Adult Goal: 656
Assumed Fecundity *5,000*
Average Fecundity (BY15-BY20) *4,059*

Estimated Release Data:

Start Date:	End Date:	Num Released	fish per lb.	Wt. grams	Total weight (lb.)	Total weight (kg)	Life Stage	Release Site	Mark Type	Tagged
05/15/22	06/01/22	300,000	50.0	9.1	6,000	2,722	Sub-Yearlings	Omak	Ad Clipped	100% CWT
04/15/23	04/30/23	400,000	10.0	45.4	40,000	18,144	Yearlings	Similkameen	Ad Clipped	100% CWT
04/15/23	04/30/23	400,000	10.0	45.4	40,000	18,144	Yearlings	Omak	Ad Clipped	100% CWT

Notes:
Egg take goal includes 3% for culling.
Adult Goal includes 10% pre-spawn mortality
10% Green to Eyed egg mortality
Rearing mortality 10.7% for all groups

Rearing Summary:

Species	Source	Date	Number Green Eggs	Number Eyed Eggs	Number Ponded	Fed Fry	Released	Location
EA SU Chinook Sub	Okanogan	June	392,850	353,565	335,887	319,092	300,000	Omak
EA SU Chinook YR	Okanogan	April	523,800	471,420	447,849	425,457	400,000	Similkameen
EA SU Chinook YR	Okanogan	April	523,800	471,420	447,849	425,457	400,000	Omak

Chief Joseph Hatchery Production Plan

Brood Year: 2021
Species: Summer Chinook
Stock: Okanogan
Origin: Hatchery
Program: Segregated

Planting Goal: 900,000
Pounds: 58,000

Egg Take Goal: 1,240,000

Adult Goal: 552
Assumed Fecundity *5,000*
Average Fecundity (BY15-BY20) *3,873*

Estimated Release Data:

Start Date:	End Date:	Num Released	fish per lb.	Wt. grams	Total weight (lb.)	Total weight (kg)	Life Stage	Release Site	Mark Type	Tagged
05/15/22	06/01/22	400,000	50.0	9.1	8,000	3,629	Sub-Yearlings	CJ Hatchery	Ad Clipped	100k CWT
04/15/23	04/30/23	500,000	10.0	45.4	50,000	22,680	Yearlings	CJ Hatchery	Ad Clipped	100k CWT

Notes:
Egg take goal includes 5% for culling.
Adult Goal includes 10% pre-spawn mortality
10% Green to Eyed egg mortality
Rearing mortality is 9.7% for yearlings, 11.7% for sub-yearlings.

Rearing Summary:

Species	Source	Date	Number Green Eggs	Number Eyed Eggs	Number Ponded	Fed Fry	Released	Location
EA SU Chinook Sub	Okanogan	June	530,100	477,090	453,236	430,574	400,000	CJ Hatchery
EA SU Chinook YR	Okanogan	April	647,900	583,110	553,955	526,257	500,000	CJ Hatchery

Chief Joseph Hatchery Production Plan

Brood Year: 2021
Species: Spring Chinook
Stock: CJ Hatchery
Origin: Hatchery

Planting Goal: 700,000
Pounds: 46,667

Egg Take Goal: 1,094,400

Adult Goal: 640
Assumed Fecundity *3,800*
Average Fecundity (BY15-BY20) *3,232*

Estimated Release Data:

Start Date:	End Date:	Num Released	fish per lb.	Wt. grams	Total weight (lb.)	Total weight (kg)	Life Stage	Release Site	Mark Type	Tagged
04/15/23	04/20/23	700,000	15.0	30.2	46,667	21,168	Yearlings	CJ Hatchery	Ad Clipped	200k CWT

Notes:
Egg take goal includes 20% for culling.
Adult Goal includes 10% pre-spawn mortality
10% Green to Eyed egg mortality
Rearing mortality is 6.5%

Rearing Summary:

Species	Source	Date	Number Green Eggs	Number Eyed Eggs	Number Ponded	Fed Fry	Released	Location
Spring Chinook	CJH Ladder	April	875,520	787,968	748,570	711,141	700,000	CJ Hatchery

Chief Joseph Hatchery Production Plan

Brood Year: 2021
Species: Spring Chinook
Stock: Met Comp
Origin: Hatchery/Wild

Planting Goal: 200,000
Pounds: 13,333

Egg Take Goal: 326,800

Adult Goal: 190

Estimated Release Data:

Start Date:	End Date:	Num Released	fish per lb.	Wt. grams	Total weight (lb.)	Total weight (kg)	Life Stage	Release Site	Mark Type	Tagged
04/15/23	04/30/23	200,000	15.0	30.2	13,333	6,048	Yearlings	Riverside Pond	None	100% CWT

Notes:
Egg take goal includes 20% for culling.
Adult Goal includes 10% pre-spawn mortality
10% Green to Eyed egg mortality
Rearing mortality is 10.5%

Rearing Summary:

Species	Source	Date	Number Green Eggs	Number Eyed Eggs	Number Ponded	Fed Fry	Released	Location
Spring Chinook	Winthrop NFH	April	261,440	235,296	223,531	212,355	200,000	Riverside

2020 CJHP APR Meeting Summary

Thursday April 23, 2020

2020 APR *DRAFT* Meeting Summary
Thursday, April 23, 2020

Thursday, April 23

Part 5 – Future Program Management and Annual Work Plan for 2020/2021

8:00 – 8:10 Objectives, Agenda Review, Actions to Complete. *Casey B. CCT, Andrea P. CCT, DJWA*

8:10 – 9:30 Future Program Management (2020 and Beyond). *CCT*

Review Management Framework *(Casey B. CCT, DJWA)*

- *Logic Path: Program Goals → Management Policy → Projected Outcomes*
- *Review 2019 ISIT updates: Adjustments to broodstock management and terminal harvest after July 15th Wells Dam counts were available*
- *2019 Outcomes versus Management Targets/ Plans for 2020*
- *ISIT Updates – Key Assumptions, 2020 Management Targets*

Presentation comments (Casey Baldwin)

Key assumptions about natural production – no changes this year.

Key assumptions about harvest – We updated the 5 year averages for harvest rates. We now are incorporating data on mark-selective harvests in the Columbia River into our key assumptions. Lower harvest rates for NORs. In 2019, there was more harvest on integrated fish than we would have liked to see. Fewer segregated fish harvested than expected, more ended up on spawning grounds.

Key assumptions about the hatchery – We're meeting most objectives except fecundity in both integrated and segregated programs. We haven't updated SARs. For distribution of hatchery fish above Wells, we had more segregated HORs on the spawning grounds than in the past. We changed the methodology on how to handle fish that are ad-clipped/no CWT. In past those were distributed among known CWT returns, but now those are counted as segregated fish. In past, we may have been underestimating the number of segregated fish on the spawning grounds.

Questions

Steve Smith – Is the harvest data in the pie charts (distribution of fish above Wells) from CWT or TAC harvest rate data?

Jeannie Heltzel – The pie charts show harvest above Wells in sport and tribal fisheries (terminal harvest) using harvest data from Andrea, Brian Dietz and WDFW.

Casey Baldwin –

In Season management – Program goal is to keep pHOS <30% for integrated hatchery fish and <5% for segregated fish. In the first few years of the program, we had a goal of 100% pNOB, but we have been adjusting that down in recent years, more in the 50-60% range to get more natural origin fish on the spawning grounds.

Results for 2019 run forecasts – In 2019, the preseason TAC forecast was 38,000, well below the actual run size. As a result, the TAC estimate was our lowest forecast, similar to previous years. Life cycle modeling estimate for NORs was a little high – the model uses static ocean survival based on the long term average, which is a bit optimistic during bad ocean condition years. Wells Dam count numbers were consistent with actual returns, which is good news, since this is the primary tool we use to make in season adjustments. The PIT tag forecast was pretty close in terms of total numbers of hatchery fish, but actual returns were opposite with forecast integrated and segregated abundances. Regression based on the July 15 Wells Dam count is still pretty accurate

Management targets for 2019 – Terminal harvest on integrated fish was higher than we would like, particularly in a low escapement year. Fewer segregated fish were harvested than we targeted.

Hatchery targets – there were fewer integrated and segregated hatchery returns to the ladder than our target, because it was not operated for surplus as much as in past, meaning lower removals.

Integrated program targets – Slightly fewer NOR brood than we targeted. Ended at 56% NOB, instead of 60% target. Segregated program targets – we intentionally used integrated fish in the segregated brood.

Escapement targets – NOR spawning escapement was pretty much right on target. There were fewer integrated HOS, which makes sense looking at the harvest rate on integrated fish. Effective pHOS was slightly higher than the target.

Steve Smith – For smolt releases, it looks like you dropped the subyearling program. Were these released in 2019?

Matt McDaniel – Yes, 2018 BY subs were dropped, meaning no 2019 releases. This was due to poor survival of broodstock, there were not enough fish on hand. The management program is to drop subyearlings first.

Steve Smith - How did 2019 brood do?

Matt McDaniel – We had good prespawn mortality, no issues with chillers, so we plan to release subyearlings this year from 2019 brood.

Jeannie Heltzel – Returns to hatchery in the Management Targets table should be relabeled as surplus, since they don't include fish used for brood.

Steve Smith – It would be helpful to add a 3rd column with management objectives for NOS, pHOS, etc.

Casey Baldwin – 2020 management targets are very similar to 2019 due to similar run forecasts. We plan to manage broodstock the same as in 2019.

Based on a single year projection for 2020, we would fail to meet all three biological targets for NOS, pHOS, and PNI. Based on the projected 5-year average, we would fail to achieve the NOS goal, but would achieve pHOS and PNI objectives.

We expect 2020 to be challenging, and we'll need to limit terminal harvest, sacrifice brood integrity, and expect low numbers of NOS and HOS on the spawning grounds, but we expect to

run the full integrated program because there should be enough NORs.

Casey Baldwin – I talked to Joe Jackson about how to coordinate with WDFW next year by discussing harvest earlier and more often. I proposed to Andrea and Kirk that we meet with Joe Jackson and Ryan Fortier with these tables to discuss what we predict and how we plan to operate so they can take that into account. WDFW's harvest plans will come up in the next section.

Harvest and Hatchery programs *(Steve S., Casey B.., Kirk T.)*

- *Summarize 2019 harvest information – from tables*
- *Review pertinent 2019 fishing regulations/management that affect CCT Chinook (some overlap with Casey's presentation on terminal fishery)*
- *Key trends in ocean and river management affecting CCT Chinook*
- *Potential harvest issues affecting CCT harvest and management objectives*

Presentation (Steve Smith)

Harvest summary for summer/fall chinook.

To look at total harvest, we need harvest data from Alaska and Canada, coastal fisheries, US v Oregon fisheries on mainstem Columbia, and terminal fisheries in mainstem Columbia.

In reports from the Pacific Salmon Commission, it's difficult to find data on Upper Columbia Chinook. The actual data doesn't seem to be reported anymore, just model outputs. NOAA folks sent me Excel files that give very good modeled results of preseason forecasts for harvest and post season modeling analysis. I don't know how much CWT data goes into that.

See Table 1 in the 2019 TAC harvest memo I provided to Andrea.

We had the lowest run in the last 10 years in 2019 due to poor ocean conditions. We saw declining harvests in all ocean and river fisheries, except the WA coastal fishery, which continues to harvest more fish, and WA sport fisheries above Priest Rapids are harvesting higher numbers of fish – this can be seen as positive because when the hatchery was being planned, the goal was to deliver more harvest to terminal and inland fisheries.

The Chinook agreement under the Pacific Salmon Treaty is to further reduce harvest rates in SE AK and BC fisheries, which will have a positive impact on inland returns. The reductions are not huge, but will provide a benefit. In SE AK, the agreement is to further reduce harvests by 1.5% in high abundance years and 7.5% in low years based on aggregate estimates. These are reductions on top of the original 30-40% reductions in the early 1980s. They are continuing to reduce harvest rates in the treaty process.

Casey Baldwin – The Wild Fish Conservancy has a lawsuit against NOAA for SE AK Chinook fisheries based on SRKW survival and the effect of the fishery on Chinook populations from southern BC and US.

Steve Smith – There has been a trend by both treaty and non-treaty fisherman to shift harvest to May -June instead of July – Sept. This makes summer Chinook more vulnerable, and is something to keep an eye on. We need to take a closer look at CWT results to look at timing of fisheries. Treaty fisherman are clearly shifting to avoid impacts on wild tule Chinook from the lower Columbia. As long as they feel there is "excessive" escapement that allows targeting on

summer chinook.

Sport fisheries in the lower Columbia closed in 2019, and again in 2020, mostly driven by treaty tribes' requirements.

Casey Baldwin – Treaty tribes might not be affecting that, but it is the way they allocate fish in low escapement years. I think it's mostly the relatively high rate of ocean non-treaty harvest consumes a high percentage of available non-treaty harvest on summer Chinook, then in the river, based on the Coho agreement, the majority of harvest is above PRD. 90% of harvest available in the River is supposed to take place above PRD, so WDFW closes the fishery because of incidental catch from the steelhead fishery.

Steve Smith – US v Oregon managers add ocean non-treaty harvest to run at the mouth, which should be counted as the non-treaty share of the harvest, as part of their share. That makes the run bigger, which then increases the harvest rates in US v Oregon.

A lawsuit was filed in April seeking to halt the SE AK summertime Chinook fishery. That fishery catches over 97% Chinook from other rivers. If successful, this will be positive for returning more summer Chinook to terminal areas.

Harvest summary for spring chinook

There are no ocean fisheries for spring Chinook. We've seen a declining trend in returns.

Sliding scale harvest management is based on an aggregate of the upriver count above Bonneville, the proportion of Snake River wild fish and the number of UCR wild fish. Harvest data is very detailed for the upriver run. Dam passage mortality can be variable and extreme from Bonneville through McNary. This could be from high flows and uncontrolled spill rates leading to passage issues, plus unreported harvest in Zone 6. There is very high pinniped mortality from harbor seals and sea lions below Bonneville. CCT harvest and brood collection is increasing due to the hatchery program. Nontreaty harvest is minimal and highly selective. Not a lot of mortality there. Managed well compared to other salmon populations.

Discussion

Casey Baldwin – The WDFW plan for summer Chinook is to close the lower river – it was closed above Priest last year. The allocation above Priest is in the 500 fish range. Last year they harvested 6,000 fish, and the majority were below Wells. Their plan is to start off closed and once the run materializes, open it back up at the normal time below Wells to target Chelan and Wells, between Rocky Reach and Wells Dam. WDFW is shooting for Aug 1 opener above Wells, but may try to open early. We would like to take the pressure off integrated fish by opening above the mouth of the Okanogan to help target segregated fish closer to the hatchery, instead of targeting integrated fish at the mouth. The goal is not necessarily to reduce overall harvest but to focus on increasing segregated harvest above Wells. WDFW is not keen on the idea due to the popularity of the fishery and economic benefits. Sockeye fishery is under a lot of pressure to have some Chinook retention, and it is predicted there will be a Sockeye season. This could take some pressure off WDFW, but a lot of people are asking to keep hatchery Chinook. It will be important to have an initial conversation with WDFW after this meeting showing them the model shows we are not expecting to meet PNI and pHOS targets, and try to put additional pressure on them to shape the fishery so it has less impact on integrated escapement.

Steve Smith – The s/f Chinook fisheries above PRD and Wells have doubled (in terms of the harvest rate) in recent years at the same time as we've had very low run sizes. This is concerning. It's great they are harvesting more fish in terminal fisheries, but they need to stop harvesting

more fish in the ocean.

Casey Baldwin – We need to get CWT data for 2019 and have it in hand for the fisheries below Wells in 2017 and 2018. WDFW's assumption is that they are focused on Wells, Chelan and Entiat, and the impacts to Okanogan fish are not happening below Wells. I think we have a strong argument to change management above Wells, particularly for the mouth of the Okanogan fishery.

RM&E program – Discuss PIT arrays – 9:40-10:15 (John Arterburn)

Problem: Our data analysis is currently based on the assumption that the last place our PIT arrays detect a fish is where they are spawning. John Rohrbach's analysis found Johnson Creek was a primary spawning area, which doesn't make sense if you know anything about the habitat. Our methodology is potentially overestimating tributary escapement because it was built for STHD. Our system is biased for those detections. Spring Chinook could be spawning in equal or greater numbers in the mainstem Okanogan or Similkameen systems.

Goal: Enhance PIT tag arrays in Okanogan to better detect spawning locations of spring Chinook I was tasked with coming up with potential locations and costs for installation of additional arrays in the Okanogan system and working with contractors to get a cost estimate for construction.

Proposal: Place a new PIT tag array between Johnson Creek (downstream end) and Peterson property (upstream end, near Tunk Creek). There is an island complex near the Peterson property that is a spawning location for steelhead and s/f Chinook, and could be for springers, too. Possibly place a second array at the confluence with the Similkameen (upstream end) and Antoine Creek (downstream end). Cost – $98k per array. We could build equipment in house to reduce cost, but we may not have the time available. There are avenues to fund this as long as we get the approval.

The lower array would likely capture most detections. That's the first spawning location on the mainstem upstream of Johnson Creek. If spring chinook are entering tribs looking for cool water spawning locations, cross the PIT array, back out of tributary and spawn in the mainstem before another detection point, the idea is to redetect fish in the mainstem once they back out of tribs and move upstream. Salmon, Omak, and Johnson Creeks are tribs with high rates of detection. We know that some fish do spawn in Omak Creek because redds have been detected. We don't think they spawn in Johnson Creek. That would reallocate fish in the analysis to the mainstem to make sure we don't have fish falling into unknown spawning areas before being redetected. There is potential for some additional fish to enter tribs and exit, but it's a small portion south of Johnson Creek.

If you want to put in secondary array, that would be somewhere between the natural confluence with the Similkameen on the upstream end, and Antoine Creek on the downstream end. Two arrays would provide really good coverage. One array would improve the analysis.

Casey Baldwin –Not knowing detection efficiency at OKL is a big problem. A selling point for adding arrays is that every array added to the system increases the overall detection ability of the system.

John Arterburn – Every additional location increases the accuracy of the models. Every array helps improve the value of our data, regardless of species.

Kirk Truscott – Could timing information be incorporated into the analysis to better understand whether PIT tag locations indicate spawning? Was this considered in John R.'s analysis? For springers with last detection at Johnson Creek, were those last detections when we would expect spawning to occur? In August, or May and June?

John Arterburn – I don't have the analysis in front of me to tell me the timing, I just know the analysis is based on the final detection. There very likely could be a timing aspect to support that conclusion.

Kirk Truscott – Do we have eDNA data for Johnson? And what time of the year? Multiple locations?

Matt Laramie – Yes, we do. We sampled in March and Sept in 2018 and 2019. The only positive was in fall of 2018. March samples would detect any juveniles from successful spawning in previous years, and we didn't detect this in Johnson Creek.

Kirk Truscott – What is the likelihood springers are successfully spawning in the mainstem in late August/early September given the water temperature regime at that time?

John Arterburn – Is it optimal? Probably not. Is it occurring? Maybe. These are hatchery fish, and we see steelhead spawning where there is no chance of survival. They are spawning in the Similkameen, and that's not very hospitable either, even though it's cooler. We know other species do use the mainstem Okanogan, but there are very few locations where the substrate is suitable.

Kirk Truscott – I think that would give us another detection point to eliminate Johnson Creek, but doesn't mean they spawn there.

John Arterburn - We wouldn't assign spawning to a specific point, more just the mainstem above Johnson Creek. There is another point at Zosel Dam. We could say the last detection was upstream of Johnson and downstream of Zosel.

Matt Laramie – As opposed to attributing it to spawning?

Kirk Truscott – Yes. I have a hard time believing they would still be alive in the mainstem Okanogan at the end of August to spawn. I think it's important we put another array on the lower Similkameen as well, this seems to be a more likely spawning location.

John Arterburn – I tried to specify there is value in another array upstream, which would allow us to truncate the area where they could be spawning. It would be very difficult to anchor PIT arrays in the lower Similkameen due to the sandy substrate. We also know the Similkameen is used as a cold water refugia, but fish may not necessarily spawn there. This is why we are suggesting an array on the mainstem OK between the Similkameen confluence and Antoine Creek, since it is logistically feasible. You could anchor in that part of the Okanogan, but you still couldn't say absolutely they went to the Similkameen.

Kirk Truscott – So you couldn't use the location you are talking about with the Zosel array? Or is that above or below the confluence?

John Arterburn – The natural confluence is below IHOT island, so below Zosel and below the cross channel. The primary place you could locate an array on the Similkameen would be upstream of the cross channel in the Similkameen near the acclimation pond, also where the gravel veneer sits over sand substrate.

Kirk – Would the cross channel be valuable?

John Arterburn – We could put in the cross channel but all you would pick up are fish exiting the

Similkameen and going upriver, duplicating Zosel, or you would pick up fish on the east side of Driscoll island, but wouldn't detect any fish taking the natural Similkameen channel. It gets really difficult with one array to isolate the Similkameen.

Matt Laramie – We don't see any spawning below the cross channel in the Similkameen.

John Arterburn – Right, it makes sense logically, but not technically because you would lose it in the first spring runoff.

Steve Smith – When you do habitat surveys, do you ever see areas of ground water popping up?

John Arterburn – Yes, various areas. Downstream of Wild Forks spring creek, the stream runs on the surface in spring, but goes below surface in summer and continues to flow into the Okanogan. It's a known holding area for summer/fall Chinook, and we assume it is also used by spring Chinook. It's not necessarily the best spawning area, but would provide staging for spawning somewhere else. There are no other areas with groundwater and spawning at the same locations except the lower Similkameen.

Matt Laramie – I'm looking for funding to nail down refugia in the basin, thermal infrared basin wide. Models using stream gages don't seem to replicate what fish are experiencing. We don't see a lot of pre-spawn mortality, so fish seem to be finding refugia to hold on while the gages record lethal temperatures.

Kirk Truscott – I think it would be important to look at Rorbach's analysis and look at timing of detections as well.

John Arterburn – We can do that. I could do that in a week. Do we want to proceed with doing an array, and how to we want to target funding?

Matt Laramie – Is the next step site feasibility?

John Arterburn – No, we just need a nod that this is the approach we want to use as opposed to redd surveys, then I think we can make arguments to funding agencies to build arrays. We just need commitment this is what we want to do.

Kirk Truscott – We have trib arrays – are they single or multiple arrays so we could get direction?

John Arterburn – Most are multiple. Mainstem arrays are largely single arrays due to the width of the river.

Kirk Truscott – So if we have multiple arrays and each is duplicative, the assumption if they hit Johnson Creek and don't move upstream is that it spawned or died in Johnson Creek. What if it hit the lower array and upper array and then the lower array?

John Arterburn – If the lower array was the last detection, we would allocate that to Johnson Creek. If we had a mainstem array and it was redetected there, your assumptions would change and you would reallocate to the mainstem unless it was redetected at another mainstem or trib site.

Kirk Truscott – I'm in favor of another array in the basin, but I'm not sure if it should be in the mainstem or tribs. If tribs are well-covered, I agree we should allocate additional funds to increasing detections in the mainstem.

John Arterburn – We feel we have complete coverage of tribs. There's nothing we could potentially do to improve those arrays.

Casey Baldwin – What are the annual maintenance costs?

John Arterburn – We currently have a contract with BPA to do O&M at PIT arrays, so operations

would be covered. For maintenance, if a mainstem array went down, if we had a catastrophic failure, we might need additional support for replacement equipment. Equipment has required almost no maintenance in the mainstem. The likelihood of losing an array is low.

Matt Laramie – Can you access the beach above the cross channel in the Similkameen?

John Arterburn - That's where the sand is. Closer to the bridge in Oroville, the substrate changes and you could hold an array there, but it's above where the primary spawning substrate is. If you put it up there, all you are going to detect is cold water refugia usage, not spawning locations.

Andrea Pearl - Isn't Zosel floating?

John Arterburn – No, it's not floating at Zosel, but the primary array is in the fishway. The floating array is in the forebay of the lake to detect juvenile fish, but would not detect adults and it hasn't been very productive.

Andrea Pearl – So detection of adults would have to be at the fishway, not the gates.

John Arterburn – Right. There are problems there with high water because they go through the dam not the fishway. Another site is at the other end of the lake, if they are truly going to Canada, that's the better site, particularly at high water.

Casey Baldwin – If the recommendation coming out of the APR is that we need another mainstem array, I wonder if there is a chance to fund this with carry forward M&E funding, or if we have to go external.

Kirk Truscott – We might have to look at that simultaneously. BPA is getting concerned with M&E costs, the CJ M&E program is at $1.2M a year, so we may see some resistance. We should pursue external funding if possible

Casey Baldwin – In the current MOA, these costs are minimal. We could use carry-forward funds to pay for arrays, assuming that maintenance costs will be minimal.

Kirk Truscott – We just need a good strong, concise rationale for why it is needed. We will also be battling three PUDs that cost share with us. Even though we may have BPA money, the three PUDs combined make up 30%, which isn't huge when you look at $180,000. John, would that be single or dual?

John Arterburn – If you want to do both sites, it would be roughly $200K, that would assume my staff would do installation and O&M. There are a whole lot of other options for outside funding. HCP monitoring committees have funded arrays in Canada, BIA funds, PST funds, etc., so there are other potential ways to go, we just have to strategize the best alternative.

We could package them together for cost sharing. Funding agencies love projects where they just purchase equipment and don't fund O&M.

John Arterburn – If we want this funded through BPA, we should tackle that question first, then see what those possibilities are. Those could happen in any timeframe. If we want BIA funding, those solicitations are in the spring.

Kirk Truscott – Have you formalized the data analysis and overestimate of trib spawning?

John Arterburn – I could sit with John Rohrbach and write it up for the proposal. The cost proposal was a year ago, so we probably need to talk to the consultant to see if there are budget revisions.

***Action – Andrea P.**: Timeframe for seeking funding depending on funding source. Completion of proposal, seeking funding, whether it falls into current year or not.*

Action: John A. – prepare write up with John R. showing that existing array may overestimate tributary spawning, including proposed locations for new arrays.

Action: John A. – discuss budget updates with consultant.

10:30 – 10:50 Canadian Chinook recovery

- *Summary Presentation on Pacific Salmon Treaty - Okanogan Transboundary Workgroup recommendations (Casey B.)*

Casey Baldwin – Poor status of Okanagan Chinook (Canada portion of population) triggered a review by the PSC. This is the only non-Alaska transboundary population. Casey participated in the work group. Last summer there were meetings and field visits, resulting in a report.

There are multiple management objectives for Okanogan/Okanagan Chinook, but the escapement objectives are inadequate – the target is 12,000 for Rock Island Dam. It is clear this is much too low given recent returns. PSC looks at returns over this number as overescapement and a wasted harvest opportunity. In order to change the PSC escapement objective, they need to revise their stock-recruitment analysis. Casey is working with PSC to provide data to help with this analysis. The goal is to work with the PSC so it becomes their analysis, not just our number.

Kirk Truscott – Elaborate on Canadians not having confidence in our analysis?

Casey Baldwin – They have standards and processes so that in order to change the escapement objective in the PST, it requires them to do an analysis. We can't just give them a stock recruit analysis with a new number. We will provide them the data, and they can do a stock-recruitment assessment. It's a bigger process due to the international treaty and the importance of agreeing on the methodologies for stock recruit analysis.

Harvest rates are based on indicator stocks and Wells Hatchery is currently the indicator stock. The question is how well does Wells represent the Okanogan in terms of harvest in the different fisheries (ocean, Columbia River)? The working group looked at indicators across various fisheries. There are differences based on the harvest location and age structure. Should the PSC use the Okanogan as an additional indicator stock? We provided advice to the Commission on how to move forward. We recommended they should continue to evaluate use of the Okanogan as an indicator stock, not just Wells.

We also discussed potentially establishing a supplementation program in Canada to provide adult returns to habitat restored in the Canadian Okanagan. We have been sending eggs up there, but don't have data on program success.

Another outcome was that Canada has to look at whether this is a sensitive stock and whether harvest is prohibiting recovery of the population. That means ocean harvest rates north of the border could also lead to support for less ocean harvest.

Steve Smith – For the comparison with Wells, was that based on CWT recoveries?

Casey Baldwin – Yes, the timeframe was based on Similkameen tags.

Matt Laramie – Based on the information request, what do you see being done to actually answer questions in Canada? What should we get out of ONA folks this season?

Casey Baldwin – They estimate Chinook spawners while doing sockeye surveys. The AOC estimate counting fish, not redds, is typically less than 100. We supplied 10-15K smolts/year for 2-

3 years, but because of the lake system, smolts may not get out at an efficient rate. Kirk and I were concerned that if we are taking NORs to generate hatchery fish and moving them north and they are losing them, it's not very efficient use of wild gametes. They need to prove fish can get out before we ramp up egg sharing. I would expect to see a robust assessment of outmigrant survival of fish we have already given them.

Kirk Truscott – We also talked about making an adult survival assessment. We know in some years, thousands of adult Chinook pass Zosel, but this didn't correspond to robust spawning escapement in Canada.

Casey Baldwin – For both juveniles and adults, we need an assessment of migration survival and behavior. We are concerned they have returning adults that go into the Similkameen because they can't get through Osoyoos. They are interested in acoustic or radio tracking adults past Zosel that don't show up on the spawning grounds.

John Arterburn – The vast majority of detections were when we did video counts. The vast majority went above Zosel and passed back downstream and spawned below Zosel. We don't have proof, but that's our best hypothesis.

Kirk Truscott – We need to find out if fish passed Zosel, did they move back because they are naïve fish, or because of environmental conditions?

John Arterburn – We don't have a lot of PIT tag data, but we do have a good array around the lake. If they pass Zosel, we would likely detect them again at BDS3 given the time of year, but we don't see that correlation. We see a higher detection rate at Zosel than BDS3. We have no evidence to suggest they go to Canada, but also none to prove the fall back theory.

10:50 – 12:00 and 12:30 – 2:30 Annual Work Plan for Anadromous Division to Support CJHP – Program Planning Exercise.

See updated summer/fall and spring Chinook work plans.

END 2020 APR

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Updated: March 24, 2021						
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The Chief Joseph Hatchery
2021 Annual Program Review

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