The Chief Joseph Hatchery
2020 Annual Program Review

Colville Tribes Fish & Wildlife Program
Colville Street
Nespelem, WA 98841

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Part 1 – Program Overview

Colville Confederated Tribes
Chief Joseph Hatchery Program

April 20, 2020

Chief Joseph Hatchery's –10 th Annual Program Review (APR)

Due to the current situation with the COVID-19 virus and the direction and specific guidelines that were issued by the Colville Tribes on suspension of events and gatherings, this year's meeting was cancelled.

The Colville Tribes' staff plan to conduct an internal work session to examine the key analytical assumptions, biological targets and the decision rules which guide our plans and activities. The internal meeting will be more focused on the Colville Tribes' staff work planning process. An informational packet is included with the Day 1 presentations in Part 3 as well as the 2020 hatchery production plan and notes from the 2019 APR meeting. If you have any questions about the material in the packet please contact Andrea Pearl, CJH M&E project leader at andrea.pearl@colvilletribes.com.

Chief Joseph Hatchery was in its 7th year of operation last year and we were excited to see the third year of adult Chinook returns. Unfortunately similar to last year, poor ocean conditions, predation, and harvest in other areas resulted in low returns to the Upper Columbia. We are all hopeful that conditions will improve and more fish will return to the Upper Columbia.

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 next years' Annual Program Review.

Sincerely,

Randall Friedlander, Director
Fish and Wildlife Department
Colville Confederated Tribes

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.

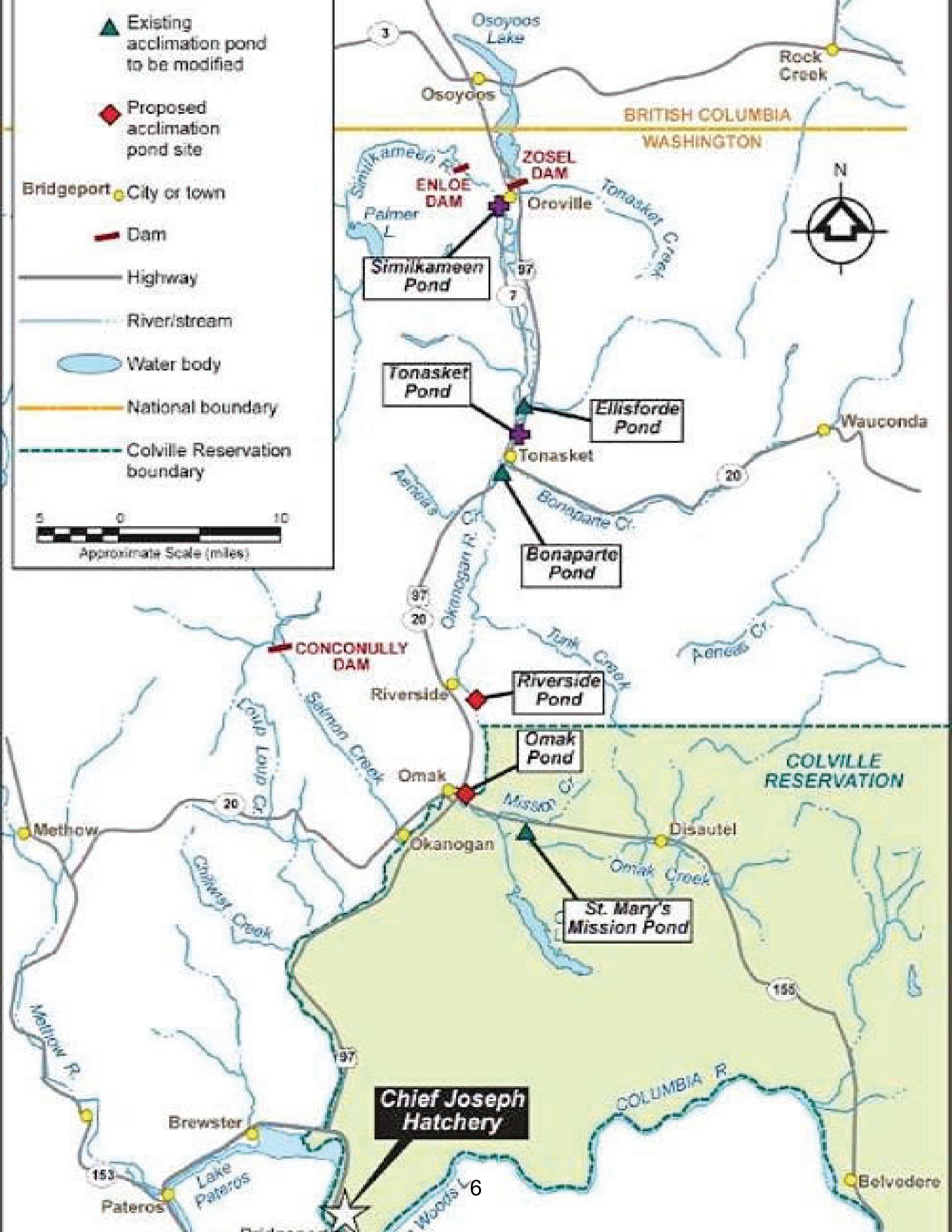
15. CLEANING WASTE POND

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

16. GENERATOR

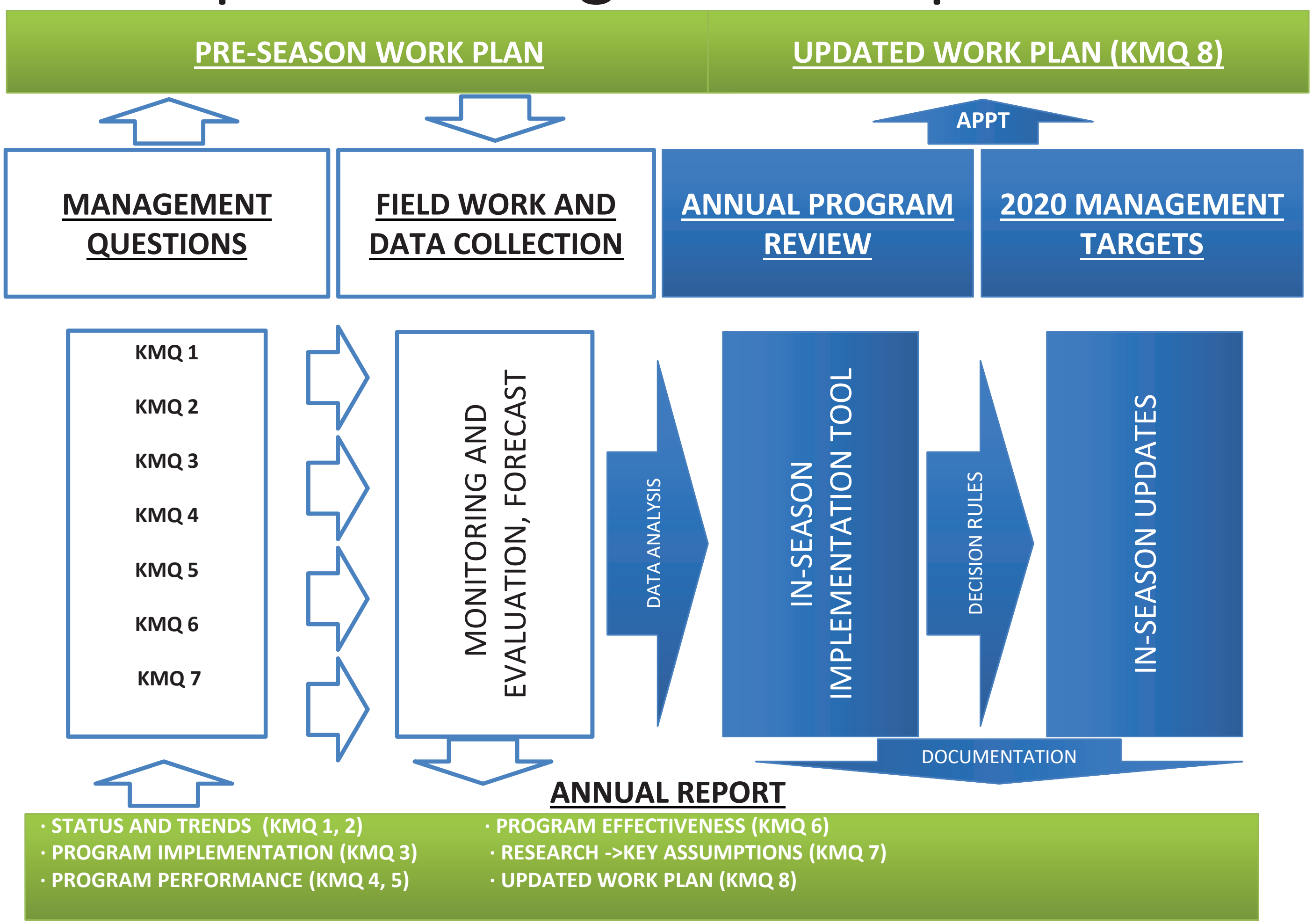
A generator is available on site to provide power in the event of failure of the main power source for any reason.

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

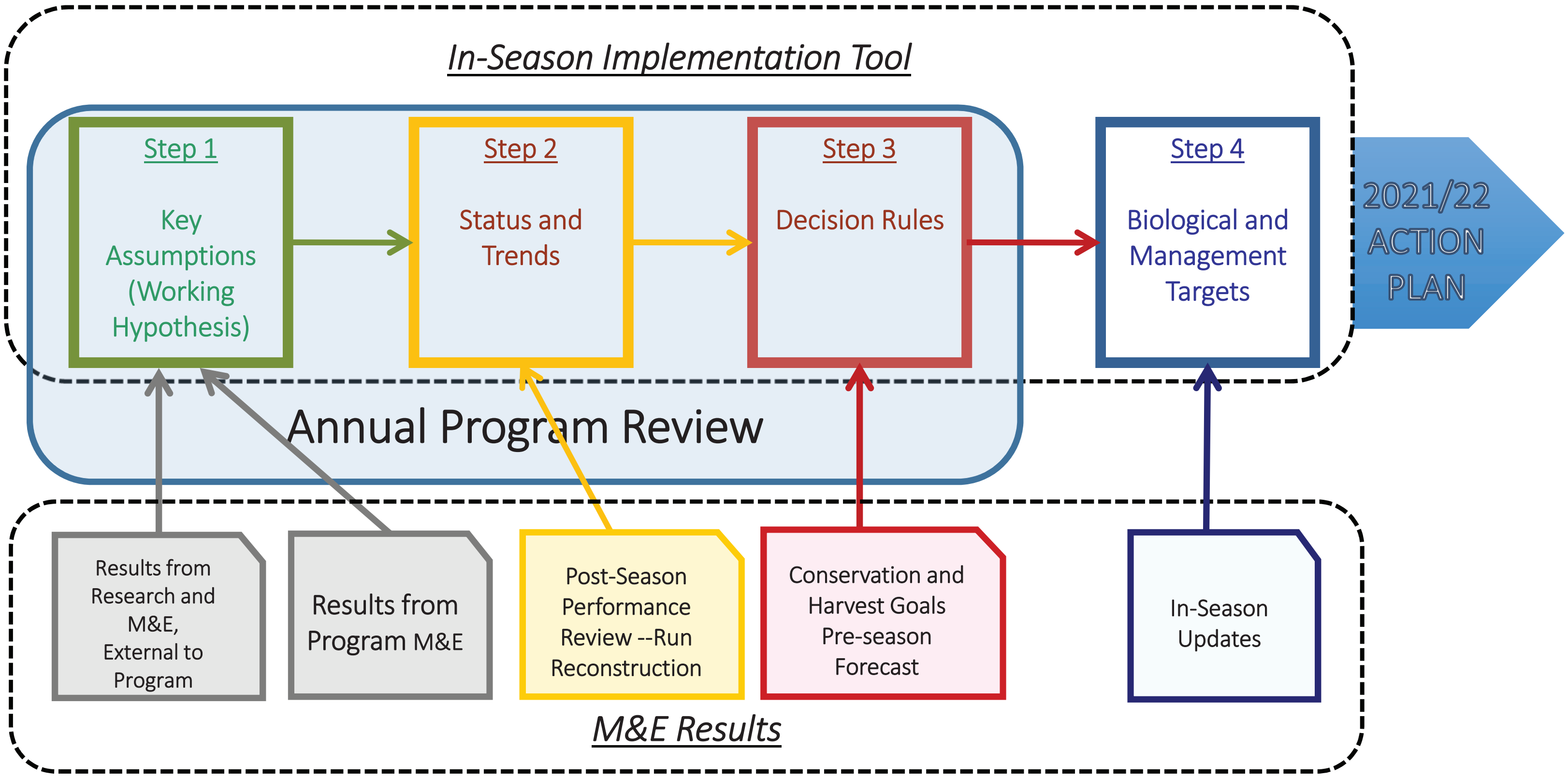


Existing acclimation pond to be modified
Proposed acclimation pond site
Bridgeport
City or town
Dam
Highway
River/stream
Water body
National boundary
Colville Reservation boundary
5 0 10
Approximate Scale (miles)
N
Osoyoos Lake
3
Osoyoos
Rock Creek
BRITISH COLUMBIA
WASHINGTON
Similkameen R.
ZOSEL DAM
ENLOE DAM
Oroville
Palmer L
Tonasket Creek
Similkameen Pond
97
7
Tonasket Pond
Ellisforde Pond
Wauconda
Tonasket
20
Aeneas Cr.
Bonaparte Cr.
Bonaparte Pond
Okanogan R.
97
20
Tunk Creek
Aeneas Cr.
CONCONULLY DAM
Salmon Creek
Loup Loup Cr.
Riverside
Riverside Pond
Omak Pond
COLVILLE RESERVATION
Omak
Mission Cr.
20
Methow
Okanogan
Disautel
Omak Creek
Chiliwist Creek
St. Mary's Mission Pond
155
Methow R.
97
COLUMBIA R.
Chief Joseph Hatchery
Brewster
153
Lake Pateros
Pateros
Belvedere

Adaptive Management Implemented

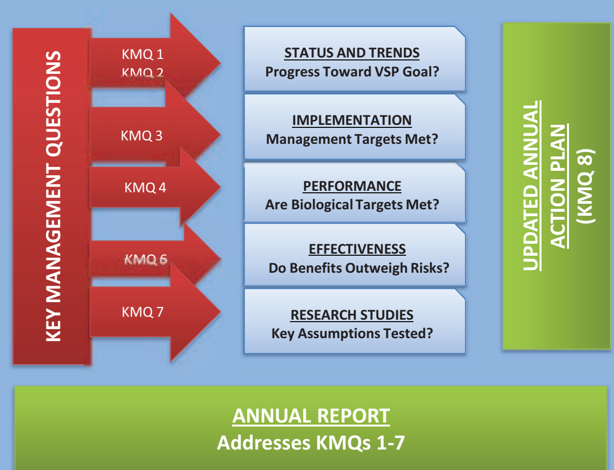


ISIT and the Annual Program Review



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: 2019 Year-in-Review

Population Status

Status and Trend of Okanogan summer/fall Chinook

Chief Joseph Hatchery
2020 Annual Program Review

Andrea Pearl
Colville Confederated Tribes
Sr. Fisheries Biologist

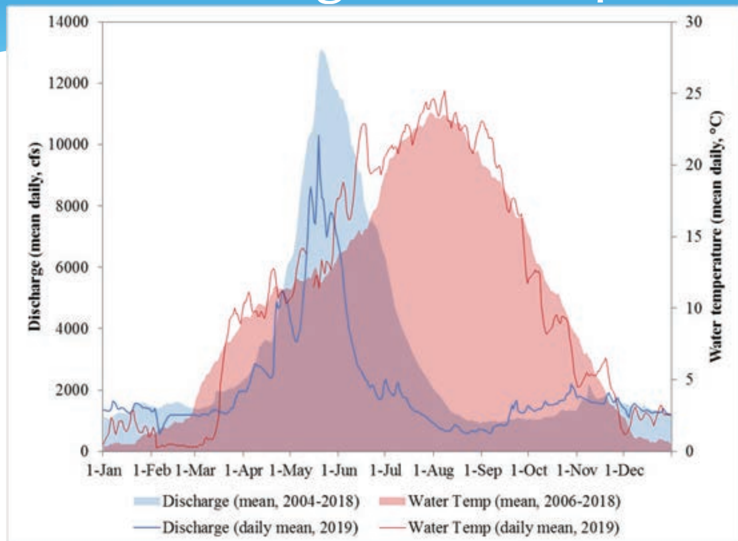
Grant County PUBLIC UTILITY DISTRICT
P.U.D. CHELAN COUNTY
DOUGLAS COUNTY PUD

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

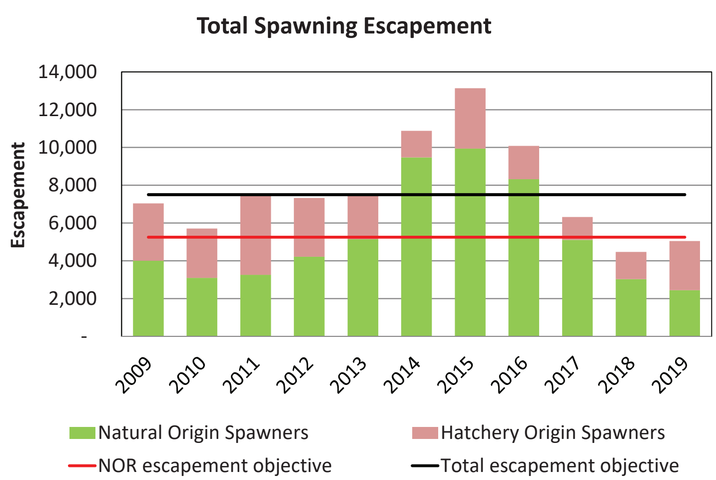
Viable Salmonid Population (VSP)

- 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



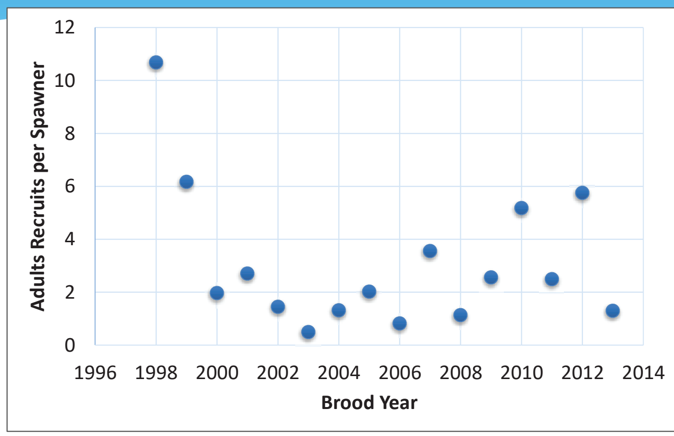
Abundance



5 yr mean
7,808

5,761

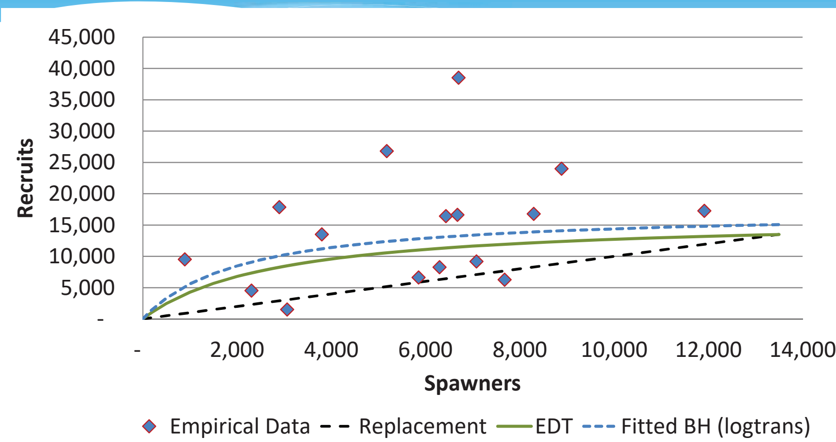
Productivity



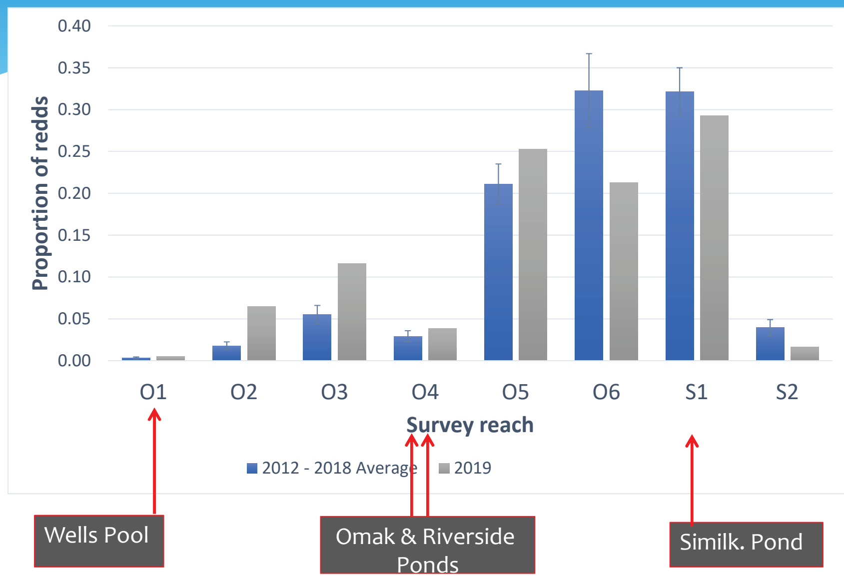
Overall Mean (1998-2012) = 3.1 R/S
10 Yr Mean (2002-2013) = 2.9 R/S
2 of 16 years < 1 R/S

Intrinsic Productivity

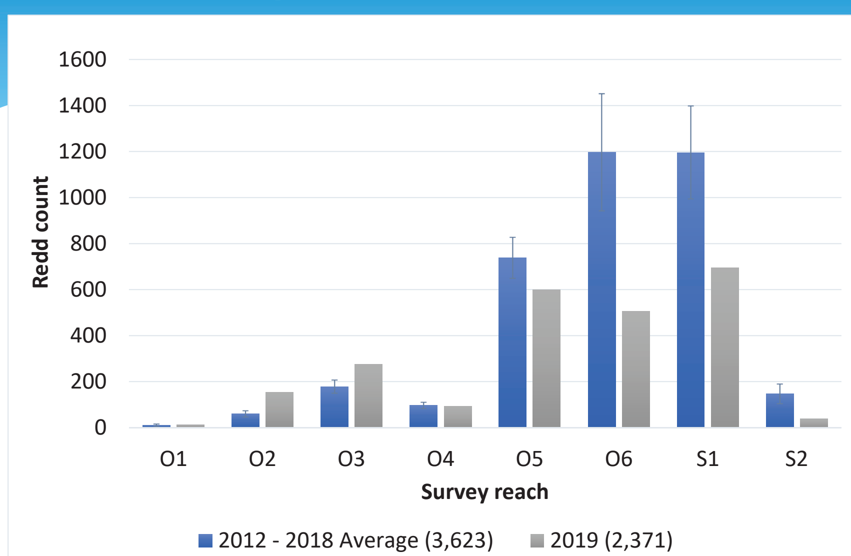
(Beverton-Holt modeled = 6.6) BY1998-2013



Spatial Structure



Spatial Structure



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.

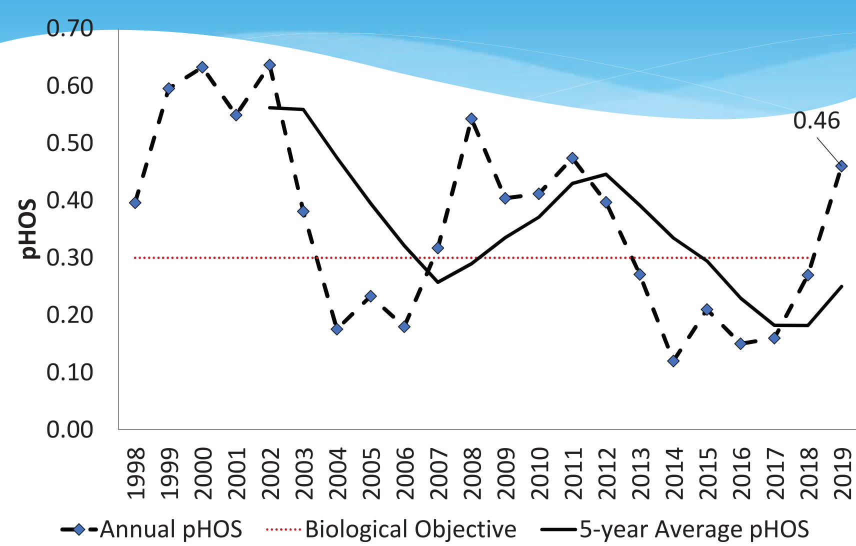
* PUD M&E program had a 10 yr recurrence interval for genetic evaluation.
  * What's the status of the Hatchery Committee and PUD's decision to conduct the 10 year study?

Diversity

2. Phenotypic (morphology and life history traits).
   * Adult run timing (2017; 4 yr olds)
   * Spawn timing (2018; 4&5 yr olds)
   * Age structure (2019; through age 6)
   * Morphometrics (length, fecundity, others)
   * Juvenile rearing strategies
     * Natural yearlings?
     * Transient rearing
     * True subyearling migrants

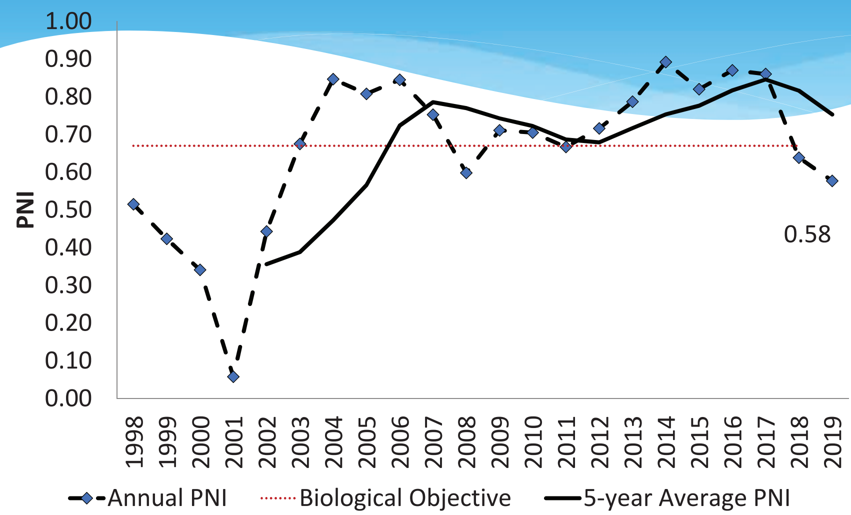
Diversity

3. Risk factors (spawner composition; pHOS)



Diversity

* Risk factors (spawner composition; PNI)



Conclusions

- Abundance: above the objective but trending down below objective in last four years
- 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 (O2 and O3)
- Diversity: First time we have seen pHOS levels above the objective since 2012 (5-year avg. trending up now). PNI below objective for second straight year (5-year avg. trending down still), timeline for region wide genetic evaluations uncertain

Part 3 – Review Operating Hypothesis: Year-in-Review

Management Framework

APR Part 3

Management Framework For Summer/Fall Chinook

- Review Logic Path for the Adaptive Management Process
- Review Key Assumptions
- 2019 Outcomes and 2020 Forecasts

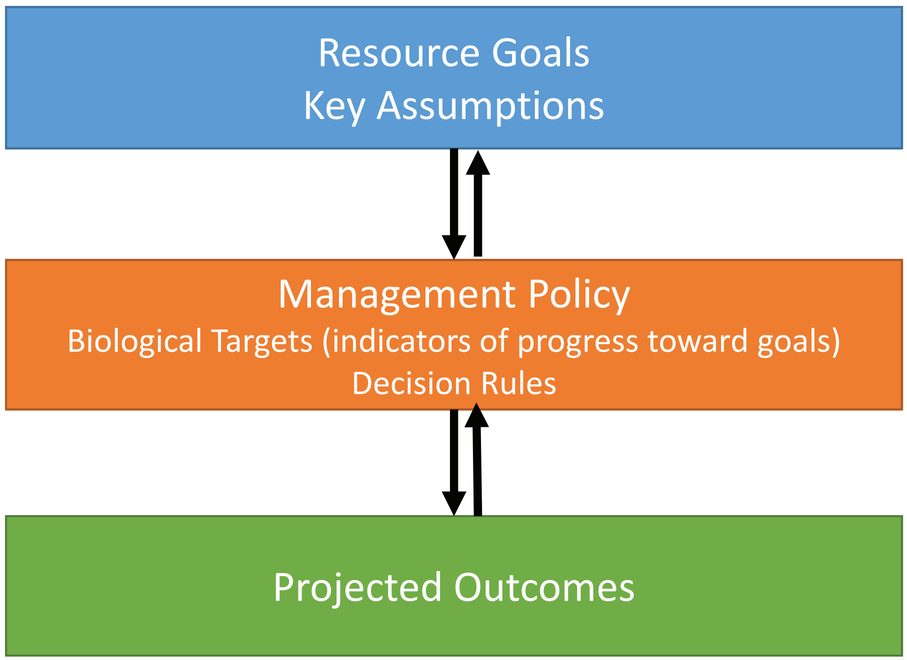
Components of Adaptive Management

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 (2020 pre-season = 1,605)
  - 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	5-year average	Current Conditions
Ocean (unmarked)	29.3%	29.3%
Lower Col. Zones 1-5 (unmarked)	1.7%	1.7%
Upper Col. Bonneville to Wells (unmarked)	26.6%	26.6%
NOR Terminal Induced Mortality Rate	5.2%	5.2%
HARVEST RATES-HORs		
Ocean (marked)	29.3%	29.3%
Lower Col. Zones 1-5 (marked)	3.6%	3.6%
Upper Col. Bonneville to Wells (marked)	30.6%	30.6%
Terminal Above Wells - Integrated	40.3%	40.3%
Terminal above Wells - Segregated	15.1%	15.1%

- TAC harvest rates used for ocean, Zones 1-5, and Upper Columbia to Wells fisheries
- RMIS (based on CWTs) data for terminal harvest
- NOR terminal harvest rate is estimated using CJHP program data
- Total exploitation rate is 52% for NORs and 72% for Integrated HORs.
- Low 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	Current Conditions
In-Hatchery Pre-spawning survival - NORs	76.5%	76.5%
Percent Females in Hatchery Brood - NORs	52.7%	50.0%
Eggs/Female - NORs	4,066	4,600
Egg to smolt survival-yearlings	83.1%	86.0%
Egg to smolt survival-subyearlings	82.0%	84.0%
Segregated Program In-Hatchery Assumptions	**5-year average**	**Current Conditions**
In-Hatchery Pre-spawning survival - HORs	79.1%	79.1%
Percent Females in Hatchery Brood - HORs	53.4%	50.0%
Eggs/Female - HORs	3,913	4,600
Egg to smolt survival-yearlings	86.9%	86.0%
Egg to smolt survival-subyearlings	76.9%	84.0%

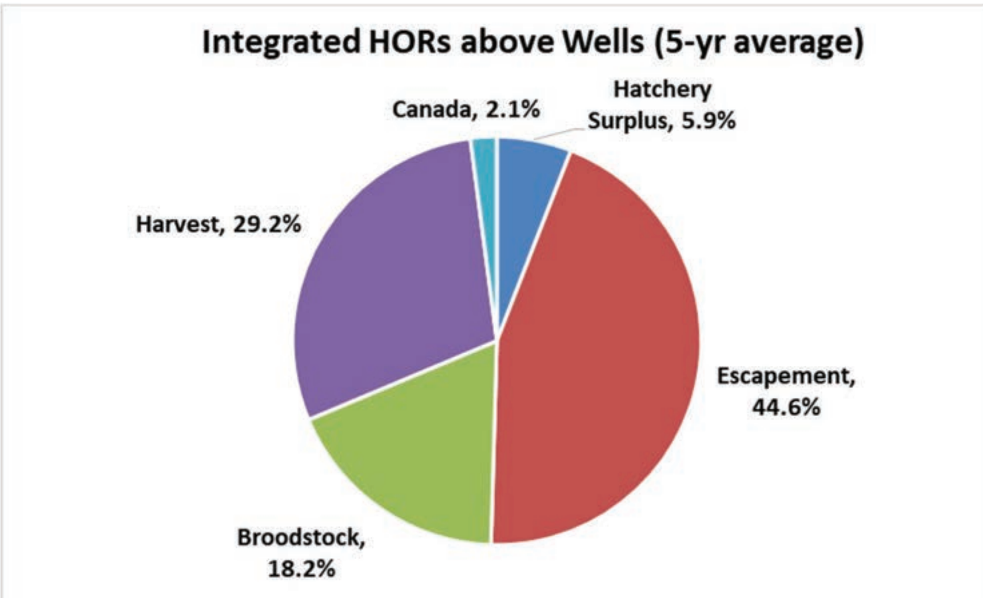
- Pre-spawn survival and fecundity are not meeting expectations
- Egg-to-smolt survival targets for yearling programs are meeting expectations

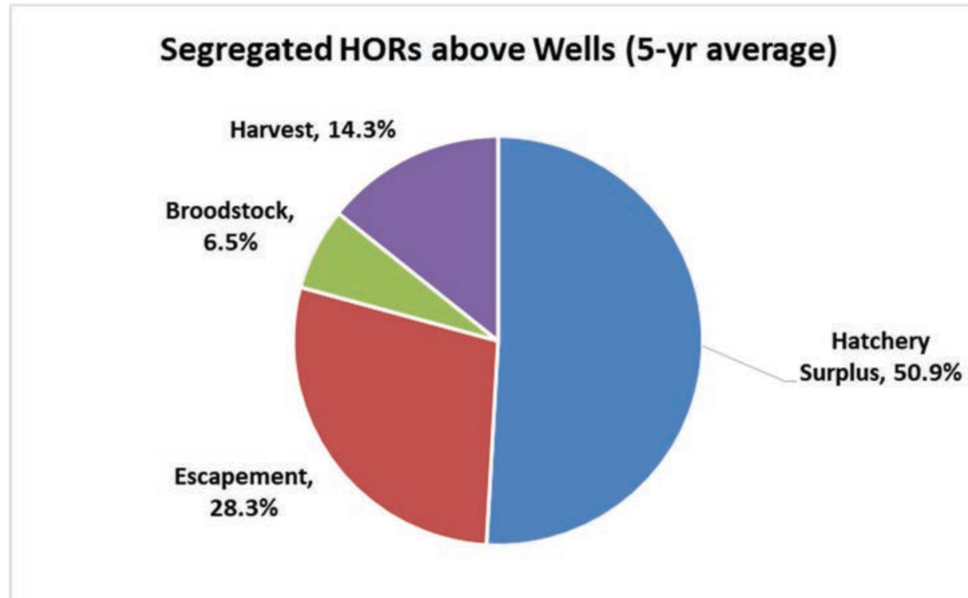
Key Assumptions - Hatchery

HATCHERY	5-year average	Current Conditions
SAR- integrated yearlings - BY	1.47%	1.47%
SAR- integrated subyearlings - BY	-	0.30%
SAR- segregated yearlings - BY	-	1.47%
SAR- segregated subyearlings - BY	-	0.30%
Stray Rate from Integr. Prog (to other basins)	1.11%	1.11%
Stray Rate from Segr. Prog (to other basins)	2.08%	2.08%
Relative Reproductive Success of HORs	80.00%	80.00%
Weir Efficiency	2.0%	2.0%
Fitness Floor (Smallest fitness multiplier)		50.0%

- Stray rate of CJ HORs (Int and Seg) to other streams and hatcheries is very low.

Key Assumptions - Hatchery





- ~6% of Integrated HORs returning to the CJ Hatchery helps the program meet pHOS target

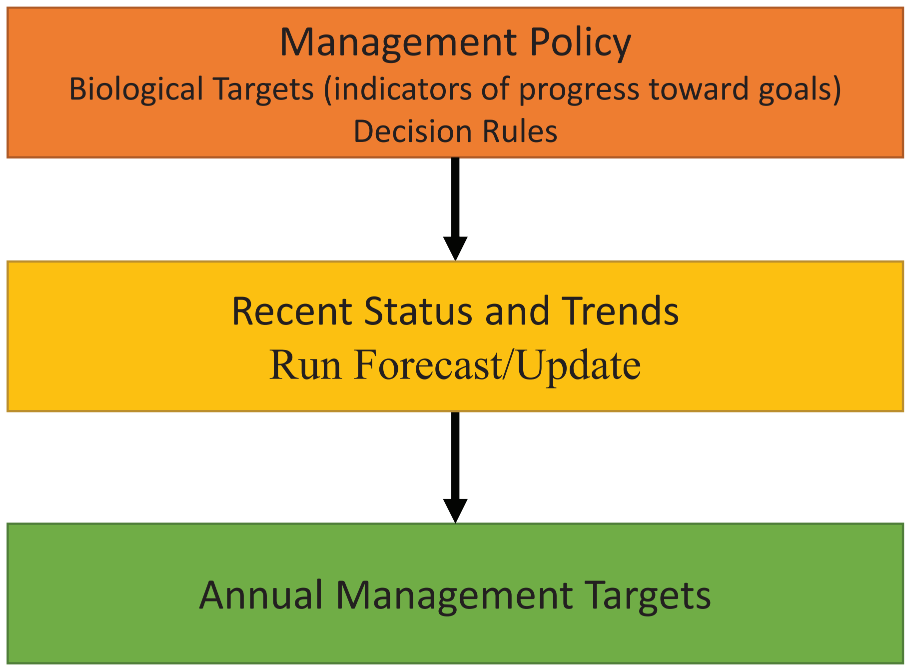
Components of Adaptive Management

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) 2020 TAC forecast is 38,300
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

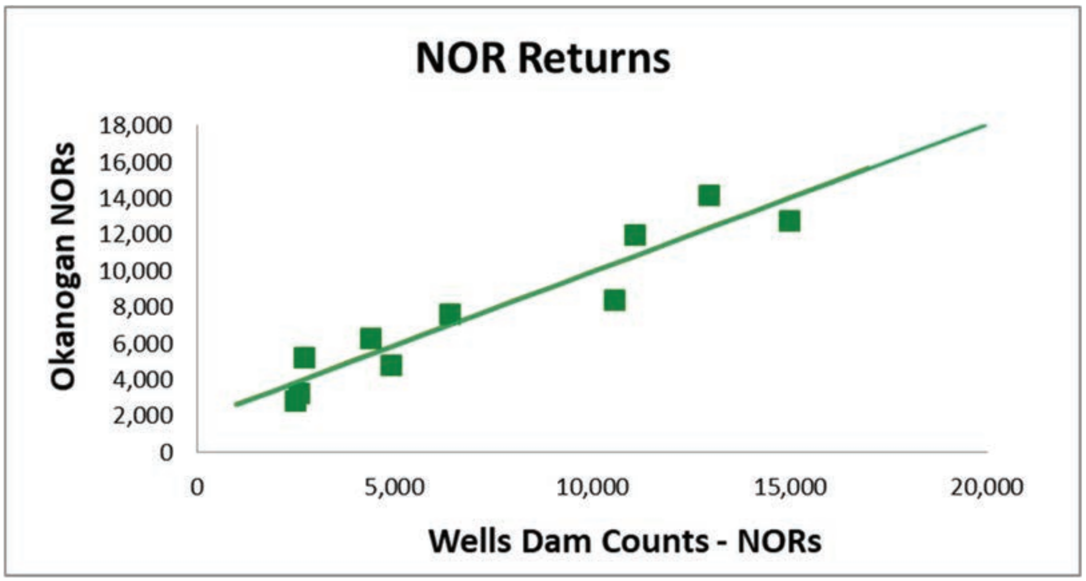
- In-season updates as PITs return to BON and Wells Dam

Wells Dam Run Forecast and Returns – 2019

<table>
<tr><th>2019 Forecasts and Returns</th><th>Preseason TAC Run Forecast (35,900 to BON)</th><th>Life Cycle Model Forecast</th><th>Forecast Based on 7/15 Wells Dam Counts</th><th>PIT Tag Forecast as of 7/15</th><th>Actual Returns</th></tr>
<tr><td>Okanogan NOR Forecast</td><td>2,597</td><td>5,999</td><td>3,143</td><td>NA</td><td>3,230</td></tr>
<tr><td>Okanogan HOR Forecast</td><td rowspan="2">1,875</td><td>3,073</td><td rowspan="2">5,332</td><td>2,377</td><td>3,577</td></tr>
<tr><td>CJH HOR Forecast</td><td>2,778</td><td>3,672</td><td>2,380</td></tr>
<tr><td>Total Return Forecast</td><td>4,472</td><td>11,851</td><td>8,474</td><td>6049 HORs</td><td>9,187</td></tr>
</table>

- July 15 Wells Dam counts did a great job of predicting NOR returns and overall HOR returns (using most recent five years of data).
- Less concurrence between July 15 HOR PIT update and final estimate

NOR Forecast based on July 15 Wells Dam Counts



Management Targets and Outcomes – 2019

Based on final Wells Dam run sizes of:

3,230 NORs
3,577 Integrated HORs
2,380 Segregated HORs

	Management Targets	2019 Performance Review Final Targets	2019 Actuals
Harvest*	Okan. HORs retained in Terminal Fisheries	715	1,190
	CJH HORs retained in Terminal Fisheries	476	344
	Incidental Loss of NORs	83	105
Hatchery and Weir*	Return of Okan. HORs to Hatchery	334	50
	Return of CJH HORs to Hatchery	1,523	745
	Okan. HORs retained at Weir	-	6
	CJH HORs retained at Weir	-	-
Integrated Hatchery Program	Natural Origin Brood (NOB)-Okan (collected)	439	419
	Hatch. Origin Brood (HOB)-Okan (collected)	293	250
	Projected Annual pNOB-Okan	60%	56%
	Cum pNOB	73%	73%
	Smolt Release-Okanogan	800,000 Yearl. 300,000 Subs	520,780 Yearl. 0 Subs
Segregated Hatchery Program	Hatch. Origin Brood (HOB) - Int	-	391
	Hatch. Origin Brood (HOB) - Seg (purse seine and ladder)	581	174
	Smolt Release-CJH	500,000 Yearl. 400,000 Subs	399,299 Yearl. 0 Subs
Natural Spawning Escapement	Nat. Origin Spawners (NOS)	2,437	2,436
	Hat. Origin Spawners (HOS) - Int	2,011	1,521
	Hat. Origin Spawners (HOS) - Seg	343	939
	Hat. Origin Spawners (HOS) - out-of-basin	NA	147
	Total Number of Spawners (excludes jacks)	4,791	5,043
	Effective pHOS	44%	46%
	PNI	0.58	0.55

Wells Dam Run Forecast – 2020

2020 Forecasts and Returns	Preseason TAC Run Forecast (38,300 to BON)	Life Cycle Model Forecast
Okanogan NOR Forecast	3,361	5,556
Okanogan HOR Forecast	3,071	3,226
CJH HOR Forecast	2,075	1,927
Total Return Forecast	8,507	10,708

- 2020 Preseason TAC estimate for summer Chinook at Bonneville is 38,300 (last year's was 35,900)
- Life Cycle model estimates for 2020 are based on SAR of 2% (NOR) and 1.5% (HOR), which may be too optimistic based on Ocean indicators and recent SAR patterns.

Management Targets for 2020

Based on 2020 preseason TAC forecast, with adjustments to extend to Wells Dam:

3,361 Okanogan NORs
3,071 Integrated HORs
2,075 Segregated HORs

	Management Targets	2020 Targets
Harvest*	Okan. HORs retained in Terminal Fisheries	614
	CJH HORs retained in Terminal Fisheries	415
	Incidental Loss of NORs	87
Hatchery and Weir*	Return of Okan. HORs to Hatchery	287
	Return of CJH HORs to Hatchery	1,328
	Okan. HORs retained at Weir	-
	CJH HORs retained at Weir	-
Integrated Hatchery Program	Natural Origin Brood (NOB)-Okan (collected)	439
	Hatch. Origin Brood (HOB)-Okan (collected)	293
	Projected Annual pNOB-Okan	60%
	Cum pNOB	67%
	Smolt Release-Okanogan	800,000 Yearl. 300,000 Subs
Segregated Hatchery Program	Hatch. Origin Brood (HOB) - Int	-
	Hatch. Origin Brood (HOB) - Seg (purse seine and ladder)	581
	Smolt Release-CJH	500,000 Yearl. 400,000 Subs
Natural Spawning Escapement	Nat. Origin Spawners (NOS)	2,552
	Hat. Origin Spawners (HOS) - Int	1,689
	Hat. Origin Spawners (HOS) - Seg	299
	Hat. Origin Spawners (HOS) - out-of-basin	NA
	Total Number of Spawners (excludes jacks)	4,540
	Effective pHOS	38%
	PNI	0.61

Expected outcomes if 2020 preseason run forecast is correct and management targets are met

STATUS OF BIOLOGICAL INDICATORS (5-year Running Averages)

	Program Biological Targets	Status in 2019 (5-year average)	Projected status in 2020 (single year prediction)	Projected status in 2020 (5-year average)
NOS	5,250	5,761	2,552	4,285
pHOS	30%	22%	38%	25%
PNI	0.67	0.77	0.61	0.73

Conclusions

- **2019, like 2018, was difficult**
  - Missed spawn escapement target
  - Missed PNI target
  - Missed pHOS target
  - Made brood collection # (sacrificed some integrity)
  - ~50% smolt release target
  - Ocean conditions returned to 'bad' for the 2019 outmigrating smolts

- **2020 will likely be difficult**
  - Continue to limit terminal harvest
  - Sacrifice brood integrity (60% pNOB in the integrated program and using segregated returns for the segregated program)
  - Expect under-escaped spawning grounds

- **Some good news:**
  - Forecast is for enough NORs to run full Integrated Program
  - Some long-term (5-yr mean) biological targets should still be met (pHOS, PNI)
    - Fortunately we were able to 'bank' some pHOS and PNI during the good years

Part 4 – Data Analysis and Presentation: 2019 Year-in-Review

Hatchery Program Harvest Surplus

Hatchery Production, Release Numbers, Broodstock Collection

Okanogan Temporary Weir

RM&E Summer/ Fall Chinook

RM&E Spring Chinook

2019 Harvest Review & 2020 Forecast

Brian Dietz-Biologist
Abe Best-Senior Technician

Colville Tribes Fish & Wildlife

The Goal

Colville Tribes' harvest program contributions

- *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*

The Questions

Key Management Questions the Harvest Program Attempts to Answer

- *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*

2019 TAC Returns

Post season actual

Columbia River Adult Salmon Returns: Actual and Forecasted

		2019 Forecast	2019 Return	2020 Forecast
Spring Chinook	**Upriver Total** *	**99,300**	**73,101**	**81,700**
	Upper Columbia	11,200	14,651	13,600
	Upper Columbia natural-origin	*2,100*	*1,668*	*2,300*
	Snake River Spring/Summer **	48,100	43,077	56,400
	Snake River natural-origin **	*8,200*	*7,480*	*9,600*
	Lower River Total	**58,200**	**36,707**	**54,100**
	Total Spring Chinook	**157,500**	**109,808**	**135,800**
	Area-specific detail			
	Willamette River	40,200	27,292	40,800
	Sandy River	5,500	3,260	5,200
	Select Areas***	8,200	2,548	4,300
	Cowlitz River	1,300	1,563	1,400
	Kalama River	1,400	997	1,000
	Lewis River	1,600	1,047	1,400
	Wind River***	2,800	1,598	2,000
	Drano Lake/Little White Salmon River***	5,600	3,571	4,600
	Hood River***	2,300	1,207	2,300
	Klickitat River***	1,100	404	1,800
	Deschutes River***	1,455	863	--
	John Day River***	--	2,170	2,800
	Umatilla River***	2,400	522	900
	Yakima River***	3,000	1,756	2,800
Summer Chinook	**Upper Columbia**	**36,340**	**34,619**	**38,300**
Sockeye	**Total Sockeye**	**94,400**	**63,222**	**246,300**
	Wenatchee	18,300	7,900	39,400
	Okanogan	74,500	54,300	201,800
	Yakima	1,300	600	2,500
	Deschutes	100	200	300
	Snake River	200	****	2,300

Summer Chinook Allocation

2019 CCT allocation with assumptions of ocean harvest

- *Initial CCT summer Chinook harvest allocation estimate based on the pre-season TAC run forecast of 36,340*
- *Revised CCT summer Chinook harvest allocation estimate was based on the final, TAC run update of 34,619*
  - *Actual CCT Summer Chinook Harvest Allocation 563*

Harvest Data-Spring Chinook

2019 CCT Summary-Columbia River and Icicle Creek May 27-June 30

2019 CCT Harvest Data - Columbia River and Icicle Creek

May 27 - June 30

	Spring Chinook													**Sockeye**	**Steelhead**					**Coho**
	HOR Adult Broodfish	NOR Adults Released	NOR Adults Harvested/Morts	NOR Jacks Released	NOR Jacks Harvested /Morts	10J Harvest	10J Adult Released	10J Jack Released	HOR Adults Harvested/Morts	HOR Adults Released	HOR Jacks Harvested	HOR Jacks Released	**SubTotal Harvest - Chinook Adults Only**		AD Present Harvested/ Morts ***	AD Present Released	AD Absent Harvested	AD Absent Released	**SubTotal Steelhead Harvested**	
Chief Joseph Hatchery Ladder Surplus	657	111	0	6	0	0	204	31	231	77	20	13	**231.0**	0	0	19	0	65	**0**	0
Chief Joseph Dam, Creel (May 27- June 30) Expanded with calculated release mortality . Includes 10J proportion	n/a	19.4	5.7	0	0	8.7	36.1	0	104.5	0	21.3	0	**118.9**	0	0	3	0	0	**0**	0
Icicle Creel Expanded	n/a	0	18.29	0	3.1	0	0	0	97.52	1.0	18.3	0	**115.8**	0	0	0	0	0	**0**	0
Sub Total of NOR Handling Mortality		1.1		0.1									**1.1**							
Adult Sub Total counted against allocation		20.5	24.0			8.7	2.4		202.0	0.78			**258.4**			0.2				
Sub Total of All Fish Handled	**657**	**131.5**	**24.0**	**6.1**	**3.1**	**8.7**	**240.1**	**31.3**	**433.0**	**78.0**	**59.6**	**13.1**	**465.7**	**0**	**0**	**22**	**0**	**65.1**	**0**	**0**
Grand Total of NOR Handling Mortality		1.1		0.1									**1.20**			**0.2**			**0.2**	
Grand Total of Fish Removed		**Spring Chinook 466.8**												**Sockeye Harvested 0**	**Steelhead Harvested 0.2**					**Coho 0**

Broodstock collected from the CJH Ladder.

64.8% of ad-present spring chinook at the CJH ladder are 10J

CJD Creel Effort, Rod and Reel 523 hours, estimated anglers 33

Harvest Data-Summer Chinook

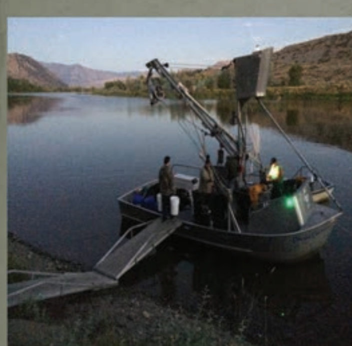
2019 CCT Summary – Columbia & Okanogan River: July 1 – December 15

2019 CCT Harvest Data - Columbia River and Okanogan River
July 1 - November 20

	Summer/Fall Chinook										Sockeye		Steelhead					Coho
	NOR Adult Broodfish *	HOR Adult Broodfish *	NOR Adults Released **	NOR Adults Harvested/Morts	NOR Jacks Released **	NOR Jacks Harvested/Morts	HOR Adults Harvested	HOR Adults Released	HOR Jacks Harvested	**SubTotal Harvest Chinook Adults Only**	Harvested	Sockeye Released	AD Present Harvested/Morts ***	AD Present Released	AD Absent Harvested	AD Absent Released	**SubTotal Steelhead Harvest**	
CCT F&W Purse Seine	490	772	1	0	182	0	6	300	95	**6**	**2,051**	**176**	0	0	0	0	**0**	**0**
CCT F&W Tangle Net++	n/a	n/a																
Tribal Member Net Fishermen	n/a	n/a																
CJD Tailrace Fishery (expanded; includes snag, dip net and hook and line effort and a calculated release mortality)	n/a	n/a	0	134.6	0	4.5	1,263.0	0	51.3	**1,397.5**	**2**	**0**	36	3	4.7	0	**40.7**	**0**
Sub Total of NOR Handling Mortality			0.01							**0.01**								
Adult Sub Total counted against allocation			0.01	134.6			1,269	3		**1,406.5**								
Chief Joseph Hatchery Ladder Surplus (Harvest subtotal includes fall Chinook)	n/a	n/a	14	0	1	0	1,404	1	41	**1,404**	**0**	**0**	0	0	0	0	**0**	**0**
CCT F&W Okanogan Weir	8	2	74	3	37	0	0	22	0		**0**	**15**	0	0	0	0	**0**	**0**
CCT F&W Beach Seine++																		
Sub Total of All Fish Handled	**498**	**774**	**89**	**137.6**	**220**	**5**	**2,673**	**326**	**187**	**2,810.5**	**2,053**	**191**	**36**	**3**	**4.7**	**0**	**40.7**	
Grand Total of NOR Handling Mortality			**0.9**		**2.2**					**3.09**		**1.9**		**0.03**		**0.0**	**0.03**	
Grand Total of Fish Removed	**Adult Summer/Fall Chinook** 2,811.4										**Sockeye Harvested** 2,054.9		**Steelhead Harvested** 40.7					**Coho** 0

Harvest Data

2019 Purse Seine fishing effort



Total # of salmon caught	4,039
Days fished	26
Number of sets	113
Average sets/day	4.3
Average set duration (in min)	21.8
Wells Sockeye count	49,862
Sockeye harvested	2,051
Wells summer Chinook count	23,290
HOR Chinook harvested	6
NOR Chinook released	1
NOR Chinook mortalities	0
NOR brood collected	519
HOR brood collected	893

Purse Seine Catch Comparison

Summer/Fall Chinook

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Days Fished	34	34	31	31	28	29	35	32	26
Number of Sets	167	149	120	98	79	122	145	150	113
Avg. sets/day	4.9	4.4	3.9	3.2	2.8	4.2	4.1	4.7	4.3
Avg. set duration (in Minutes)	17.9	30.4	21.9	21.8	12	15.8	20.4	20.2	21.8
Wells Summer Chinook Count	29,821	38,588	49,451	49,255	62,129	44,646	30,101	22,163	23,290
CCT Harvest Allocation	7,718	4,996	5,768	7,471	11,496	6,509	4,443	2,878	563
HOR Chinook Harvested	146	1,762	1,190	569	630	260	191	32	6
NOR Chinook Released	133	957	1,483	3,212	3,404	1,347	904	0	1
NOR Chinook Mortalities	0	1	0	13	75	0	2	0	0
NOR Brood Collected	98	136	427	530	572	532	573	286	519
HOR Brood Collected	0	0	300	384	494	441	543	701	893
Wells Encounter Rate	1.26%	7.40%	6.88%	9.56%	8.33%	5.78%	7.35%	4.60%	6.40%

CJH Ladder Surplus Data

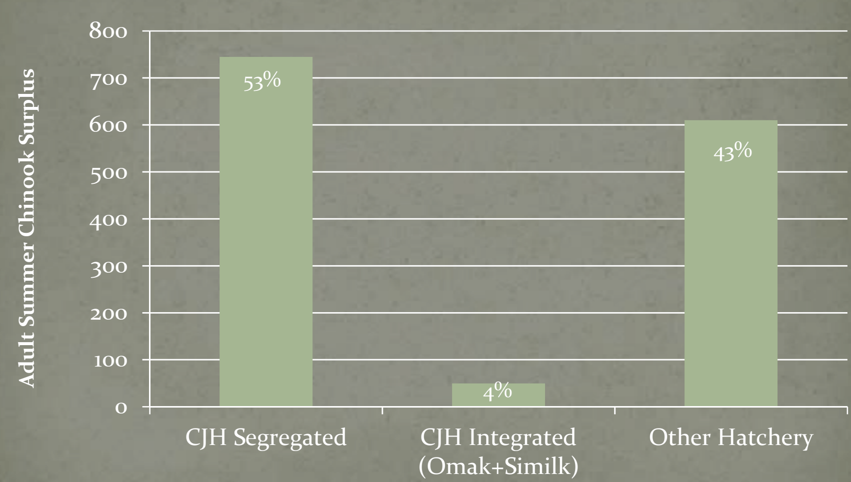
CJH volunteer ladder Chinook removal; June 15– September 12, 2019

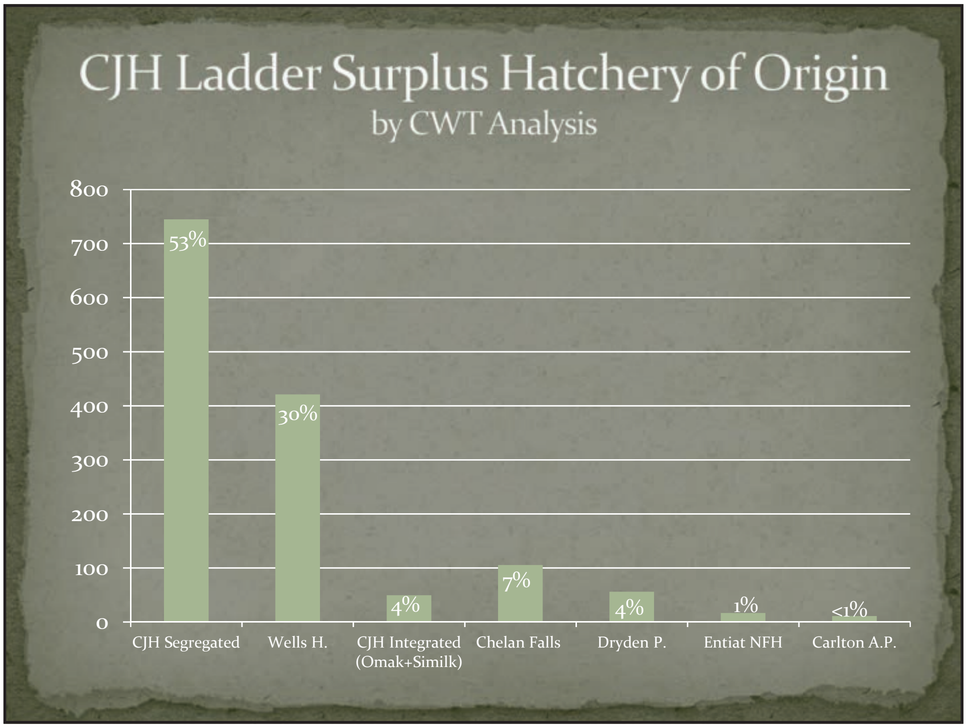
Month	Removed: HOR Adults	Removed: HOR Jacks *	Returned to Stream: HOR Adults	Returned to Stream: NOR Adults	Returned to Stream: NOR Jacks
Jun-19	-	-	1	1	1
Jul-19	534	29	-	6	1
Aug-19	870	12	-	7	-
Sep-19	-	-	-	-	-
Total - Summer	***1404***	***41***	***1***	***14***	***2***

*includes mini jacks

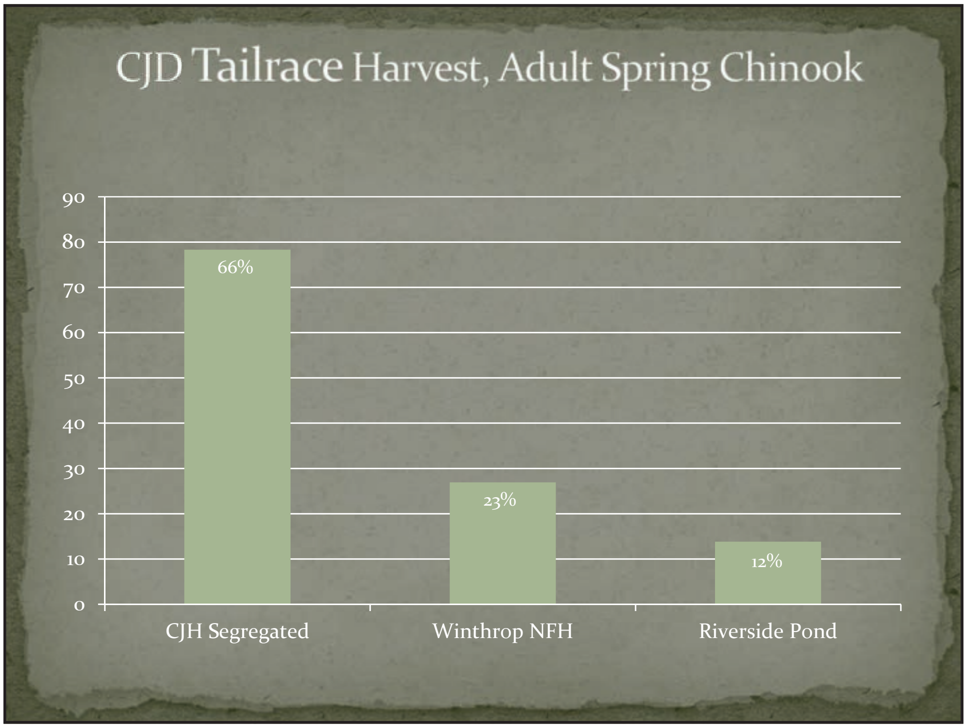
CJH Ladder Surplus Composition

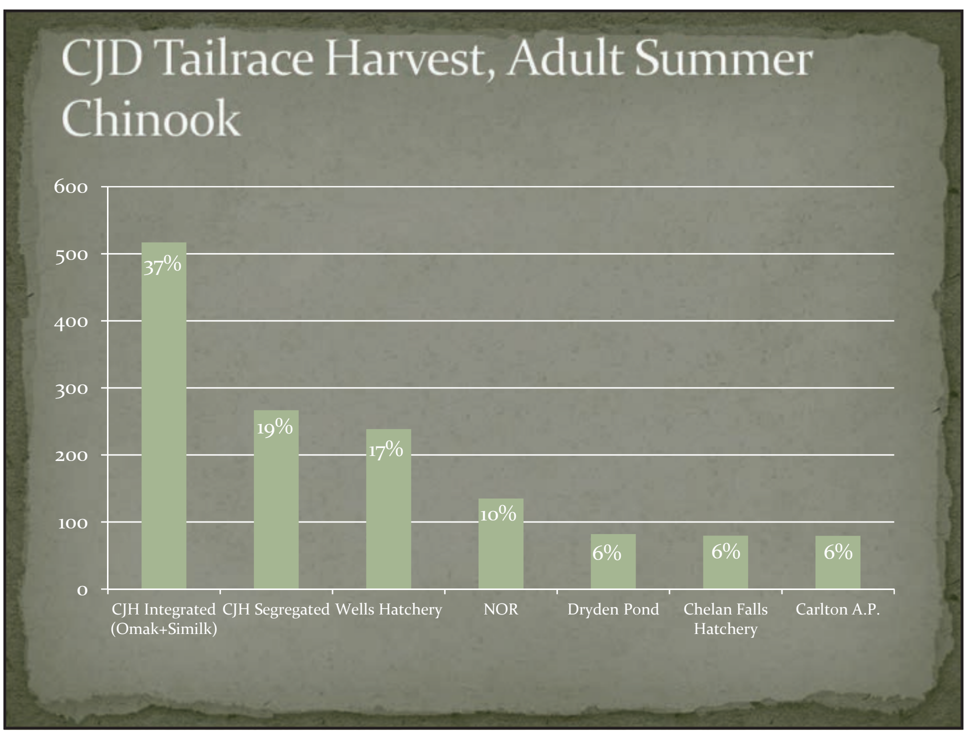
by CWT Analysis

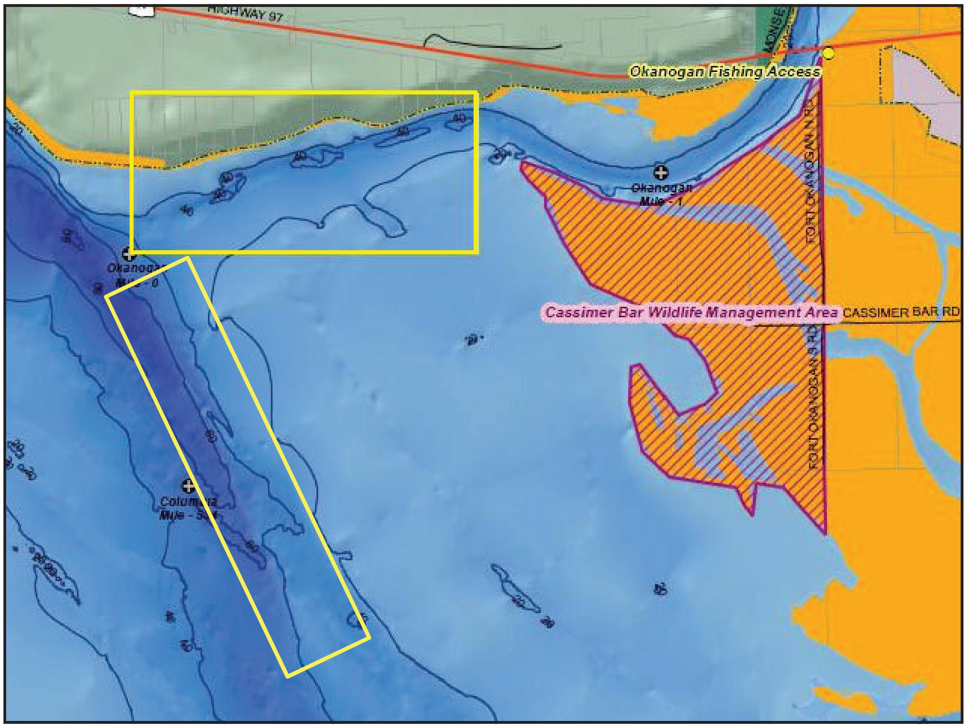


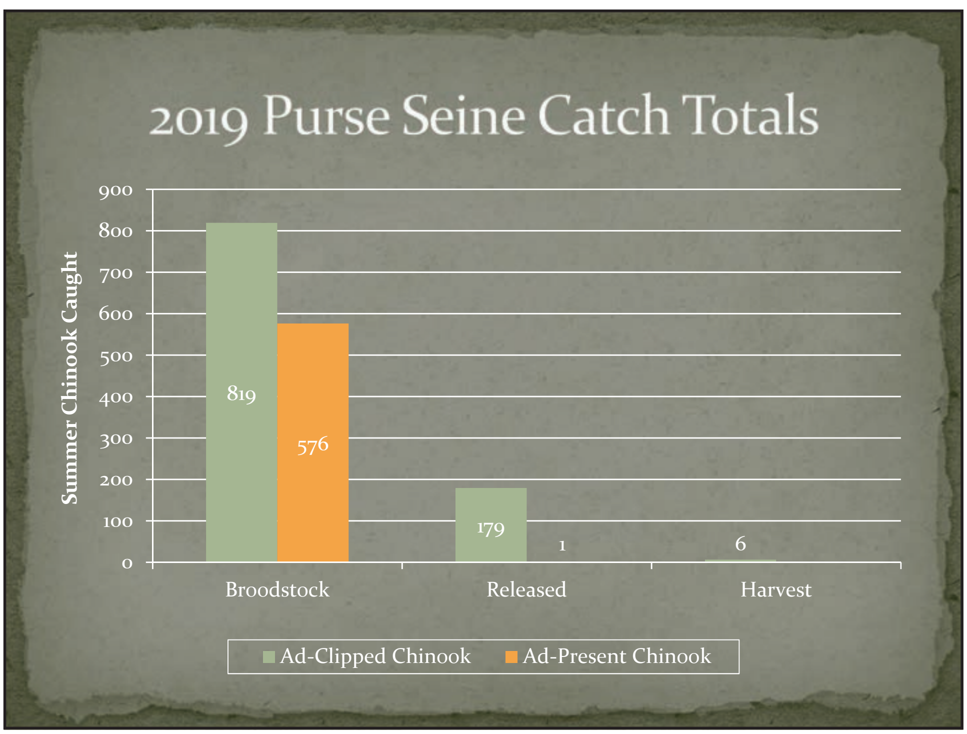

CJH Ladder Surplus Hatchery of Origin
by CWT Analysis
800
700
600
500
400
300
200
100
0
53%
30%
4%
7%
4%
1%
<1%
CJH Segregated
Wells H.
CJH Integrated (Omak+Similk)
Chelan Falls
Dryden P.
Entiat NFH
Carlton A.P.


CJD Creel


CJD Tailrace Harvest, Adult Spring Chinook
90
80
70
60
50
40
30
20
10
0
66%
23%
12%
CJH Segregated
Winthrop NFH
Riverside Pond


CJD Tailrace Harvest, Adult Summer Chinook
600
500
400
300
200
100
0
37%
19%
17%
10%
6%
6%
6%
CJH Integrated (Omak+Similk)
CJH Segregated
Wells Hatchery
NOR
Dryden Pond
Chelan Falls Hatchery
Carlton A.P.


HIGHWAY 97
Okanogan Fishing Access
Okanogan Mile - 1
Okanogan Mile - 0
Cassimer Bar Wildlife Management Area
CASSIMER BAR RD
FORT OKANOGAN N RD
FORT OKANOGAN S RD
Columbia Mile - 5


2019 Purse Seine Catch Totals
Summer Chinook Caught
900
800
700
600
500
400
300
200
100
0
819
576
179
1
6
Broodstock
Released
Harvest
Ad-Clipped Chinook
Ad-Present Chinook


ELLIOTT
CRESTLINER


Questions?

Colville Confederated Tribes
Chief Joseph Hatchery
2020 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 II

Andrea Pearl – Sr. Biologist

Integrated Summer Chinook
2019 Release Summary

Summer Chinook – Okanogan Stock

Life History	Brood Year	Release Date(s)	Site	Method	Size (fpp)	# Fish	Target
Integrated Yearling	2017	4/16/19 – 4/19/19	Omak AP (Okanogan R.)	Volitional	20.2	280,055	400,000
Integrated Yearling	2017	4/15/19	Similkameen AP	Volitional	20.5	240,725	400,000
			SUBTOTAL:			**520,780**	**800,000**
Integrated Sub-yearling*	2018	N/A	Omak AP (Okanogan R.)	N/A	N/A	0	300,000
			SUBTOTAL:			**0**	**300,000**
			GRAND TOTAL:			**520,780**	**1.1 M**

***Due to low egg take, there was no sub-yearling program for BY18**

Segregated Summer Chinook 2019 Release Summary

Summer Chinook – Okanogan Stock

Life History	Brood Year	Release Date(s)	Site	Method	Size (fpp)	# Fish	Target
Segregated Yearling	2017	4/15/19	CJH (Columbia R.)	Forced	18.7	399,299	500,000
				SUBTOTAL:		**399,299**	**500,000**
Segregated Sub-yearling*	2018	N/A	CJH (Columbia R.)	N/A	N/A	0	400,000
				SUBTOTAL:		**0**	**400,000**
				GRAND TOTAL:		**399,299**	**900,000**

***Due to low egg take, there was no sub-yearling program for BY18**

Summer Chinook 2019 Release Summary

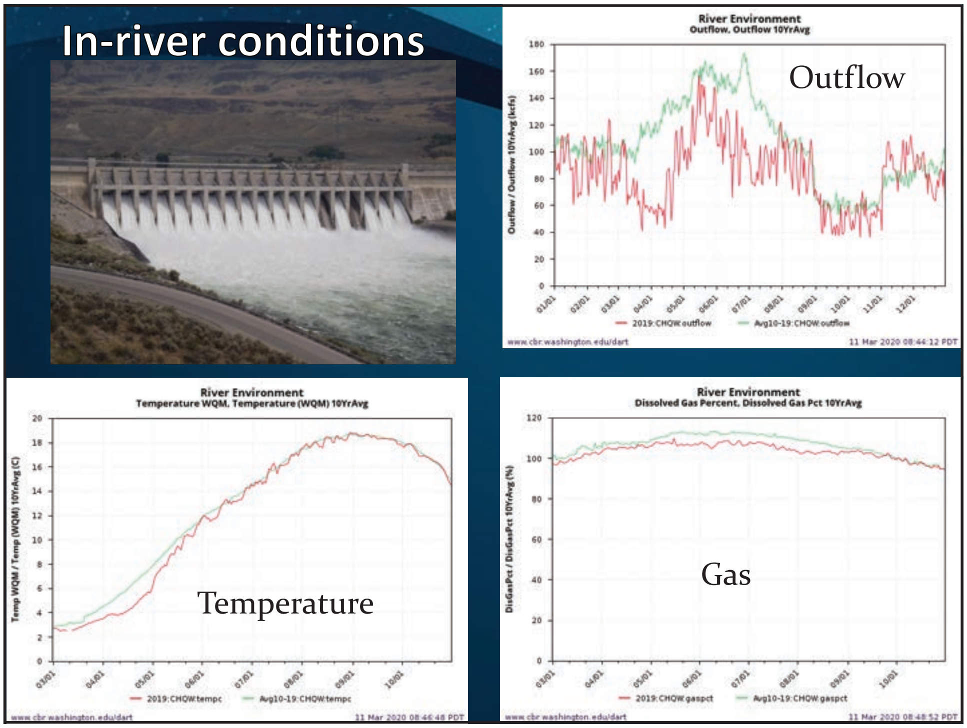
Summer Chinook – Okanogan Stock

Life History	Brood Year	Release Date(s)	Site	Method	Size (fpp)	# Fish	Target
Integrated Yearling	2017	4/16/19 – 4/19/19	Omak AP (Okanogan R.)	Volitional	20.2	280,055	400,000
Integrated Yearling	2017	4/15/19	Similkameen AP	Volitional	20.5	240,725	400,000
Segregated Yearling	2017	4/15/19	CJH (Columbia R.)	Forced	18.7	399,299	500,000
				SUBTOTAL:		**920,079**	**1.3 M**
Integrated Sub-yearling*	2018	N/A	Omak AP (Okanogan R.)	N/A	N/A	0	300,000
Segregated Sub-yearling*	2018	N/A	CJH (Columbia R.)	N/A	N/A	0	400,000
				SUBTOTAL:		**0**	**700,000**
				GRAND TOTAL:		**920,079**	**2.0 M**

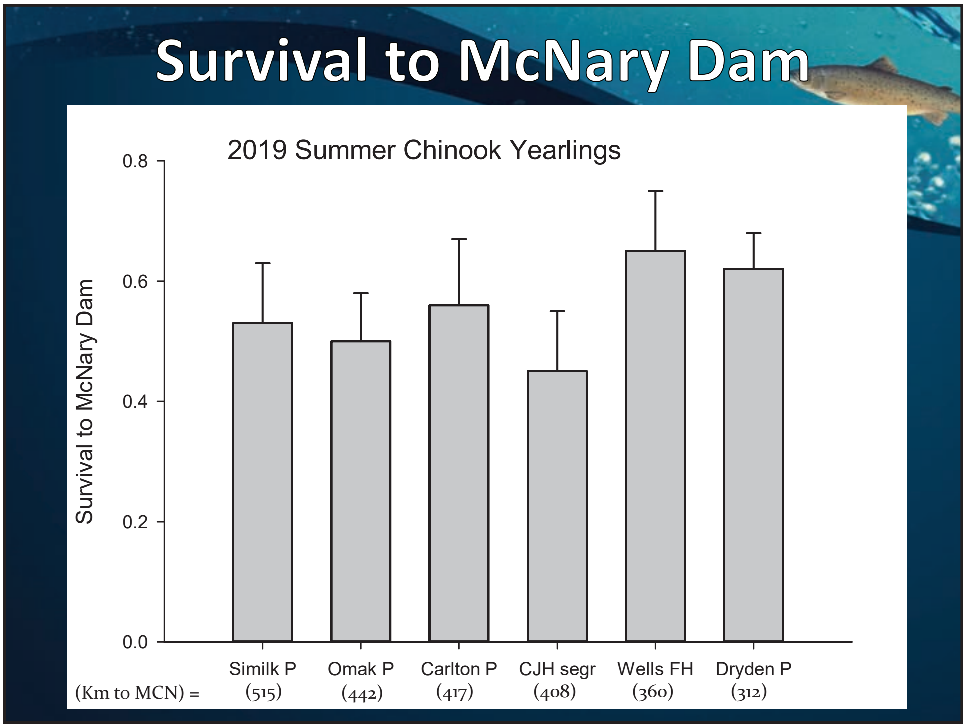
***Due to low egg take, there was no sub-yearling program for BY18**

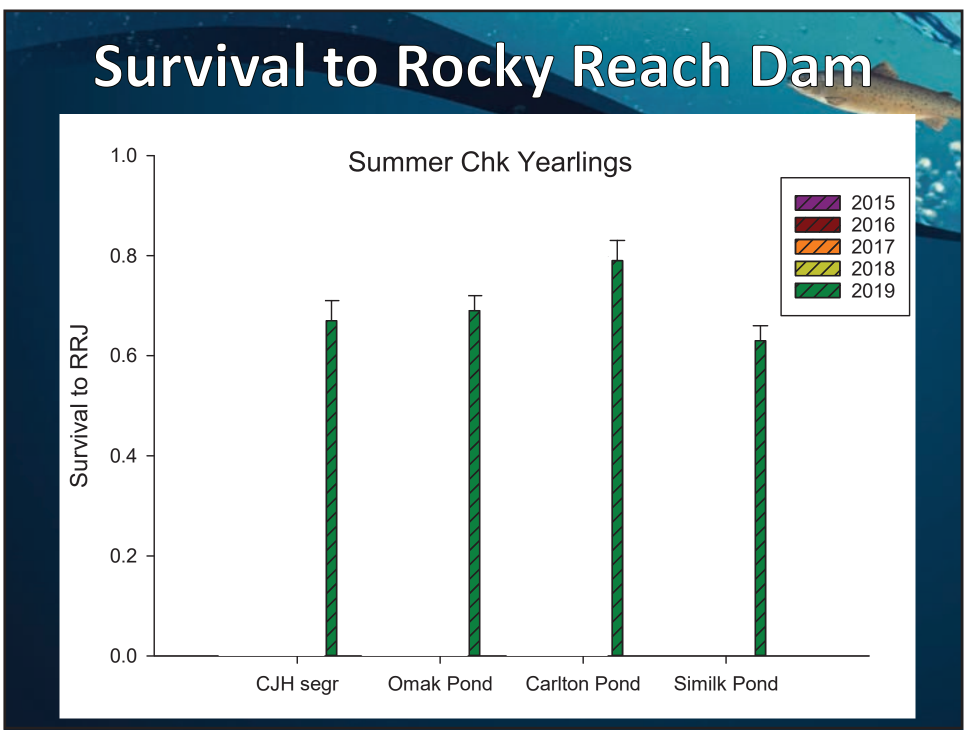

KQM 4: Are the hatchery post-release targets met for survival?


Methods: PIT tag mark-recapture using CJS model on DART
Passive Integrated Transponder (PIT) tags
mm
1
2

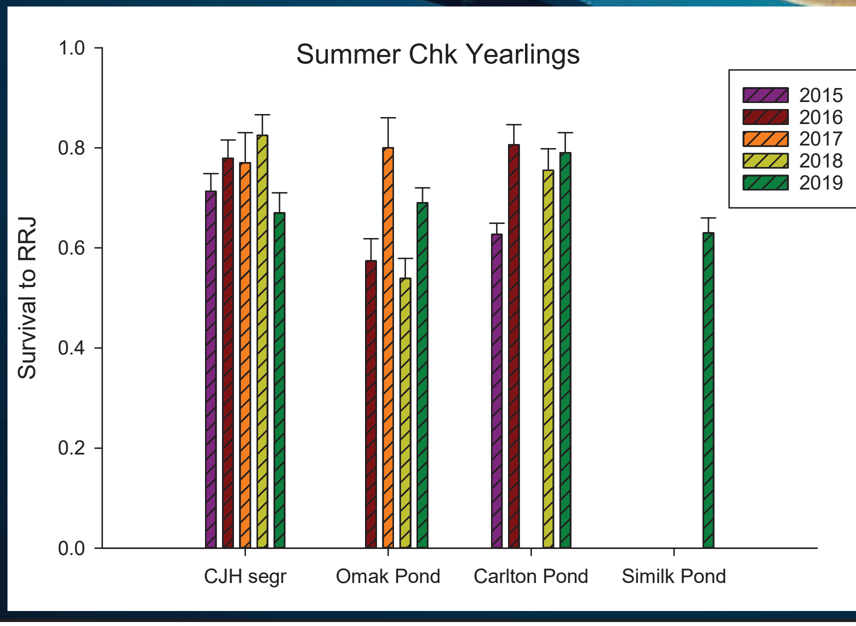

In-river conditions
River Environment
Outflow, Outflow 10YrAvg
Outflow
2019:CHQW:outflow
Avg10-19:CHQW:outflow
www.cbr.washington.edu/dart
11 Mar 2020 08:44:12 PDT
River Environment
Temperature WQM, Temperature (WQM) 10YrAvg
Temperature
2019:CHQW:tempc
Avg10-19:CHQW:tempc
www.cbr.washington.edu/dart
11 Mar 2020 08:46:48 PDT
River Environment
Dissolved Gas Percent, Dissolved Gas Pct 10YrAvg
Gas
2019:CHQW:gaspct
Avg10-19:CHQW:gaspct
www.cbr.washington.edu/dart
11 Mar 2020 08:48:52 PDT


Management Practices
• 2019 night release then 'force out' at CJH to reduce predation (SOP since 2016)
• Fish size and release timing were similar between years
• SumChk Yearlings ~ 20 FPP
• Spr Chk Yearlings ~ 20 FPP
• Yearlings released April 15-17


Survival to McNary Dam
2019 Summer Chinook Yearlings
Survival to McNary Dam
0.8
0.6
0.4
0.2
0.0
Similk P
Omak P
Carlton P
CJH segr
Wells FH
Dryden P
(Km to MCN) =
(515)
(442)
(417)
(408)
(360)
(312)


Survival to Rocky Reach Dam
Summer Chk Yearlings
Survival to RRJ
1.0
0.8
0.6
0.4
0.2
0.0
2015
2016
2017
2018
2019
CJH segr
Omak Pond
Carlton Pond
Similk Pond

Survival to Rocky Reach Dam



Summer Chinook Yearling In-river Survival Summary

- On the low end of normal/average
  - Segregated yearlings from CJH slightly lower survival compared to previous years, similar to other programs/release sites but less than Carlton.
  - Omak Pond- avg/normal
  - Similk Pond-first year, slightly less than Omak which makes sense based on location.
  - Generally less than downstream programs but not adjusted for distance and # dams.

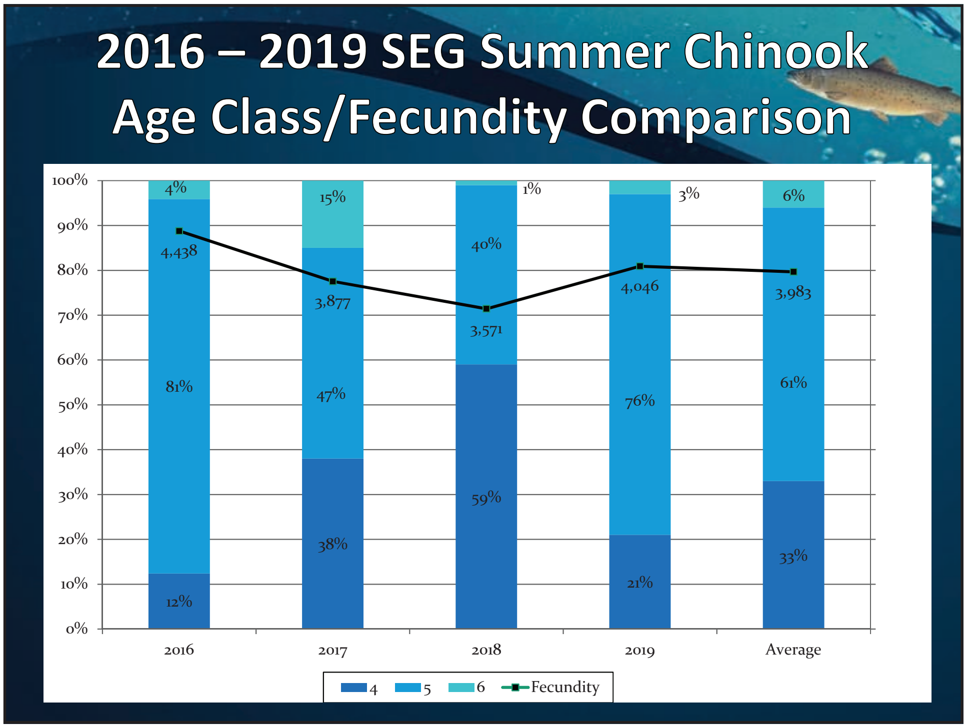
BY19 Summer Chinook Broodstock Survival to Spawn

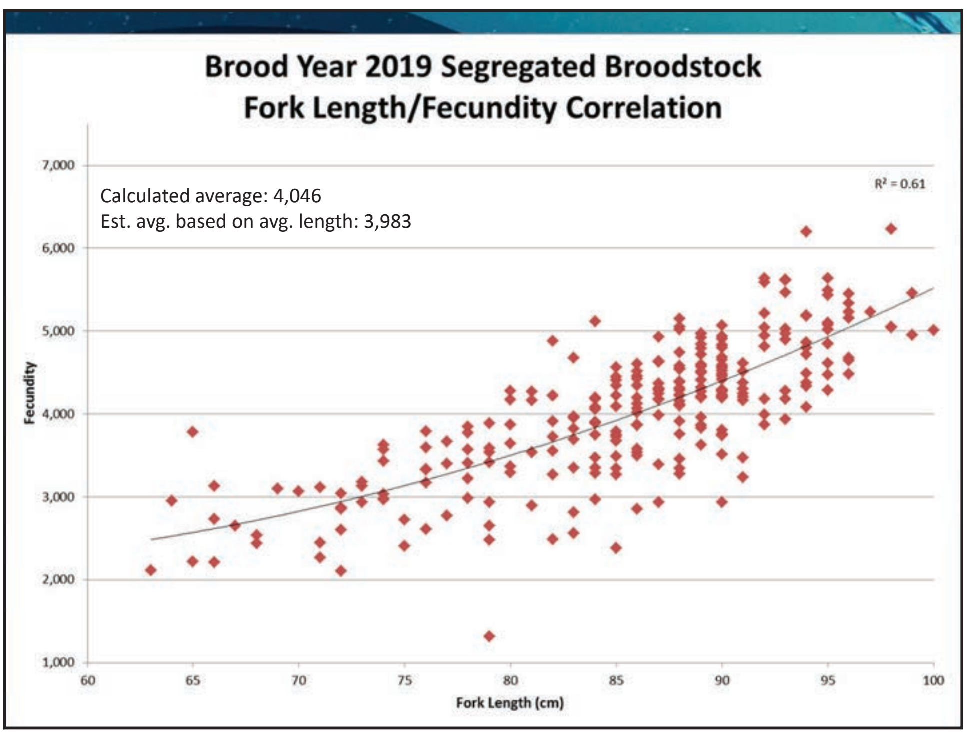
Integrated (NOR)			
	# Fish Spawned	# Brood Collected	% Survival to Spawn
Females	314	330	95.5%
Males / Jacks	273 / 37	284 / 56	96.2%
Total	**624**	**670**	**95.8%**
Segregated (HOR)			
	# Fish Spawned	# Brood Collected	% Survival to Spawn
Females	268	302	89.7%
Males / Jacks	198 / 16	220 / 31	89.6%
Total	**482**	**570**	**89.7%**

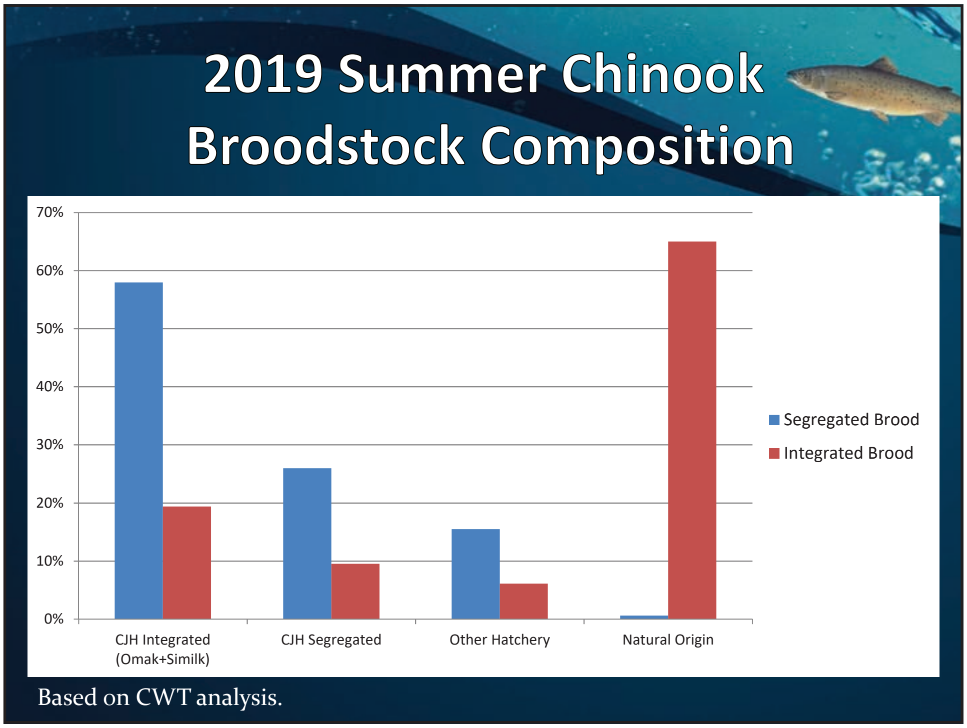
Bio-criteria standard for survival to spawn: 90%

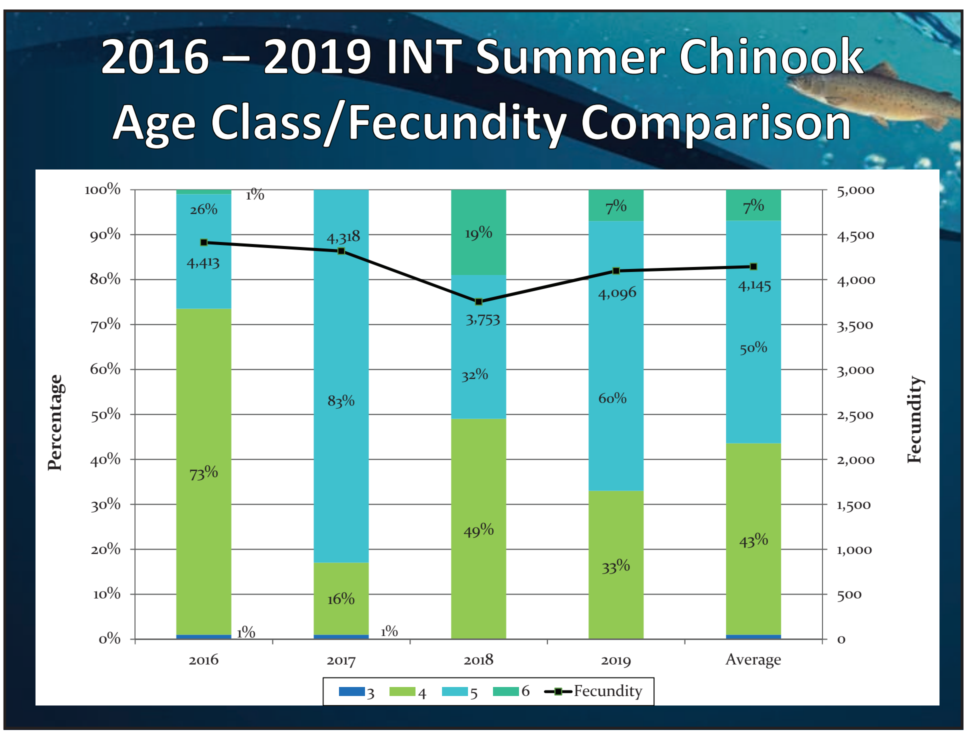
BY19 Summer Chinook Egg Take

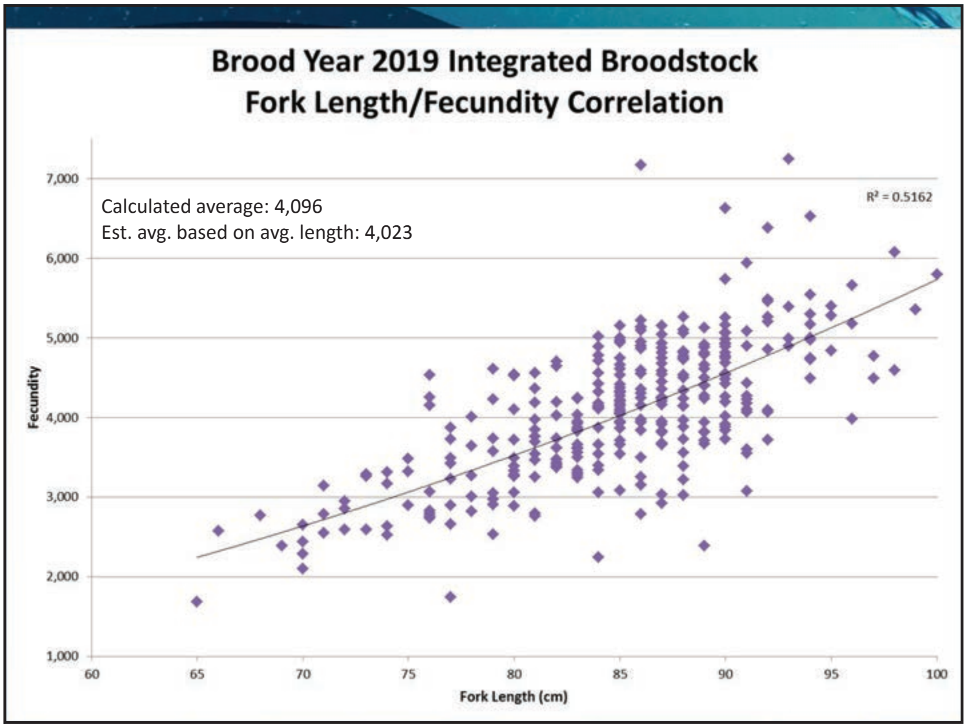
- **Integrated (NOR) Eyed-Egg Take Target: 1,296,405**
  - 1,055,830 total eyed eggs (81.4% of target)
- **Segregated (HOR) Eyed-Egg Take Target: 1,060,200**
  - 1,128,563 total eyed eggs (106.4% of target)
    *includes 195,873 eyed eggs received from Wells Hatchery
- **Contributing factors to reduced eyed egg take:**
  - Fecundity below expectations of 4,600
    - 4,096 actual for integrated
    - 4,046 actual for segregated


2016 – 2019 SEG Summer Chinook
Age Class/Fecundity Comparison
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2016
2017
2018
2019
Average
4%
81%
12%
4,438
15%
47%
38%
3,877
1%
40%
59%
3,571
3%
76%
21%
4,046
6%
61%
33%
3,983
4
5
6
Fecundity


Brood Year 2019 Segregated Broodstock
Fork Length/Fecundity Correlation
Calculated average: 4,046
Est. avg. based on avg. length: 3,983
R² = 0.61
Fecundity
Fork Length (cm)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
60
65
70
75
80
85
90
95
100


2019 Summer Chinook
Broodstock Composition
70%
60%
50%
40%
30%
20%
10%
0%
CJH Integrated (Omak+Similk)
CJH Segregated
Other Hatchery
Natural Origin
Segregated Brood
Integrated Brood
Based on CWT analysis.


2016 – 2019 INT Summer Chinook
Age Class/Fecundity Comparison
Percentage
Fecundity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1%
26%
4,413
73%
1%
4,318
83%
16%
1%
19%
3,753
32%
49%
7%
4,096
60%
33%
7%
4,145
50%
43%
2016
2017
2018
2019
Average
3
4
5
6
Fecundity



Integrated (NOR) Summer Chinook In-Hatchery Performance

Parameter	Assump-tion	Mean	# Years Target Met	BY 2019 (59% NOB)	BY 2018 (62% NOB)	BY 2017	BY 2016	BY 2015	BY 2014
Pre-spawn Survival	**90%**	76.0%	1/6	95.8%	72.5%	62.6%	88.7%	62.9%	73.5%
Eggs/Female	**4,600**	4,081	0/6	4,096	3,745	4,138 (4,234)	4,413 (4,309)	3,953	4,145
Percent Eggs Culled	**3%**	1.5%	5/6	0%	0.4%	0.7%	0%	1%	6.8%
Green-to-Eyed Survival	**90%**	81.8%	1/6	82.9%	67.7%	87.5%	85.8%	74.3%	92.8%
Eyed Egg-to-Fry Survival	**95%**	85.8%	1/5	N/A	54.4%	90.6%	90.0%	94.9%	98.9%
Egg-to-Smolt Survival – Yearlings	**86%**	84.3%**	2/4	N/A	39.4%*	87.1%	88.3%	85.7%	76.2%
Egg-to-Smolt Survival – Subyearlings	**84%**	78.9%	1/3	N/A	N/A	N/A	66.9%	90.3%	79.5%
Releases – Yearlings	**800,000**	**507,875** (63.5%)**	0/4	N/A	238,934*	520,780	678,233	343,840	488,647
Releases – Sub-yearlings	**300,000**	**196,641 (65.5%)**	0/3	N/A	N/A	N/A	216,804	175,771	197,349

***Current as of March 2, 2020.**
****Does not include BY18.**

Segregated (HOR) Summer Chinook In-Hatchery Performance

Parameter	Assump -tion	Mean	# Years Target Met	BY 2019	BY 2018	BY 2017	BY 2016	BY 2015	BY 2014
Pre-spawn Survival	**90%**	**79.1%**	0/6	89.7%	66.0%	79.0%	86.5%	74.3%	78.9%
Eggs/Female	**4,600**	**3,906**	0/6	4,046	3,571	3,877 (3,917)	4,438	3,631	3,878
Percent Eggs Culled	**3%**	**1.1%**	5/6	0%	0%	1.0%	0%	0.4%	5.6%
Green-to-Eyed Survival	**90%**	**81.3%**	1/6	87.2%	56.3%	87.6%	85.7%	81.3%	90.6%
Eyed Egg-to-Fry Survival	**95%**	**84.2%**	2/5	N/A	57.3%	90.1%	80.3%	95.0%	98.5%
Egg-to-Smolt Survival – Yearlings	**86%**	**90.0%****	3/4	N/A	42.2%*	87.3%	85.0%	93.4%	94.1%
Egg-to-Smolt Survival – Subyearlings	**84%**	**76.7%**	2/4	N/A	N/A	89.1%	51.7%	84.7%	77.2%
Releases – Yearlings	**500,000**	**374,261** (74.9%)**	0/4	N/A	190,671*	399,299	464,429	232,103	401,215
Releases – Sub-yearlings	**400,000**	**240,498 (60%)**	0/4	N/A	N/A	182,462	185,821	218,393	375,315

***Current as of March 2, 2020.**
****Does not include BY18.**

SEG vs INT Summer Chinook Mean In-Hatchery Performance

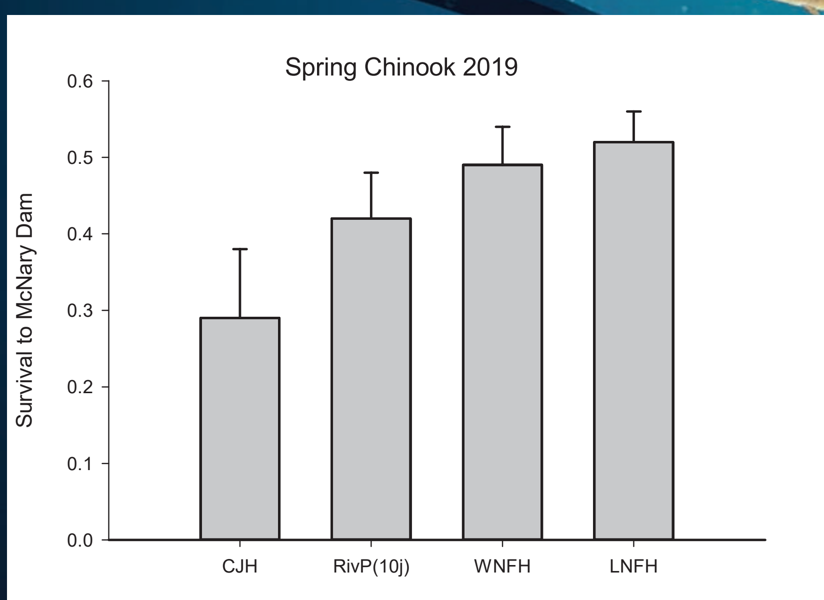
Parameter	Assumption	Segregated (HOR)	Integrated (NOR)	# Years Target Met Segregated	# Years Target Met Integrated
Pre-spawn Survival	**90%**	**79.1%**	**76.0%**	0/6	1/6
Eggs/Female	**4,600**	**3,906**	**4,081**	0/6	0/6
Percent Eggs Culled	**3%**	**1.1%**	**1.5%**	5/6	5/6
Green-to-Eyed Survival	**90%**	**81.3%**	**81.8%**	1/6	1/6
Eyed Egg-to-Fry Survival	**95%**	**86.6%**	**85.8%**	2/5	1/5
Egg-to-Smolt Survival – Yearlings	**86%**	**90.0%****	**84.3%****	3/4	2/4
Egg-to-Smolt Survival – Sub-yearlings	**84%**	**76.7%**	**78.9%**	2/4	1/3
Releases – Yearlings		**374,261* (74.9%)**	**507,875* (63.5%)**	0/4	0/4
Releases – Sub-yearlings		**240,498** (60%)**	**196,641** (65.5%)**	0/4	0/3

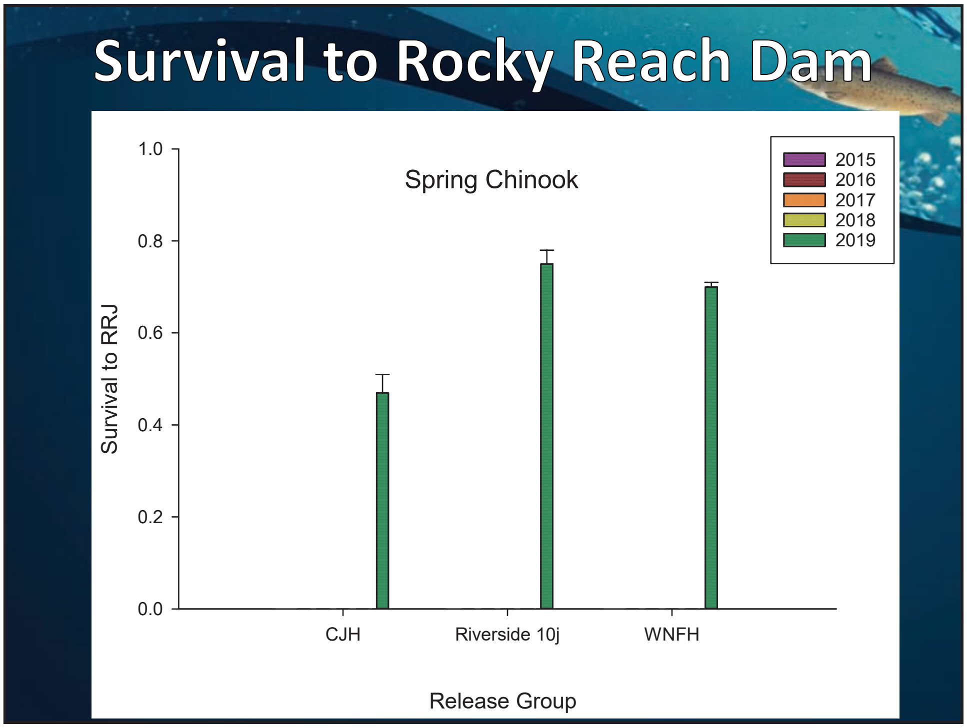
***Does not include BY18.**
****No INT sub-yearlings in BY17 and no sub-yearlings either program in BY18.**

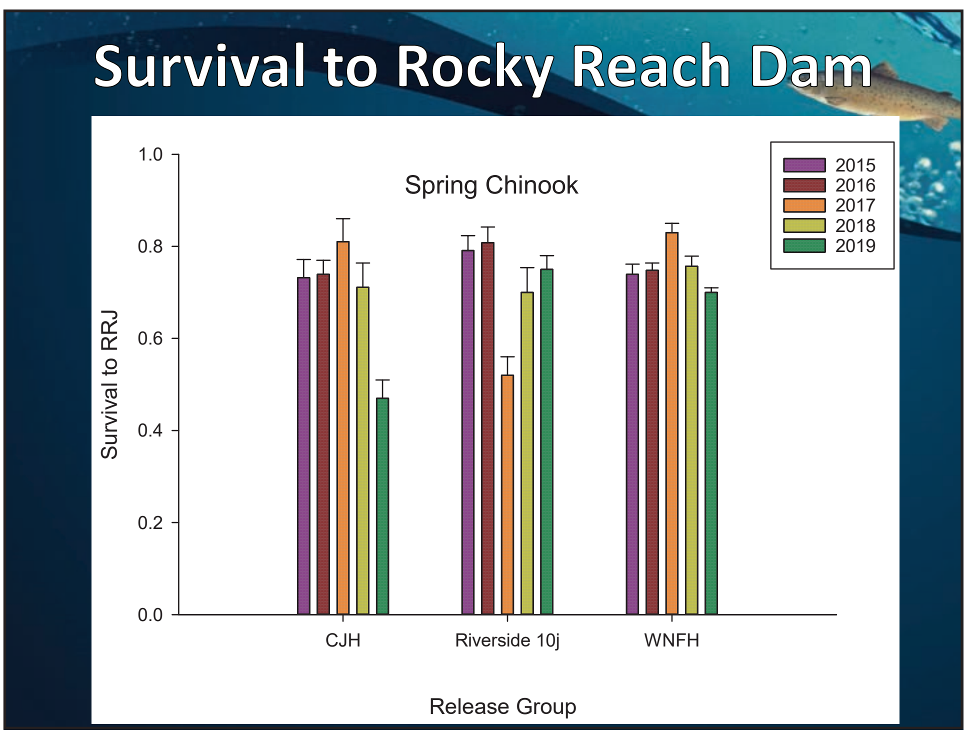
Spring Chinook 2019 Release Summary

Spring Chinook							
Stock	**Brood Year**	**Release Date(s)**	**Site**	**Method**	**Size (fpp)**	**# Fish**	**Target**
Leavenworth	2017	4/16/19	CJH (Columbia R.)	Forced	19.9	276,560	700,000
MetComp 10j	2017	4/15/19 – 4/18/19	Riverside AP (Okanogan R.)	Volitional	20.1	210,582	200,000
				TOTAL:		**487,142**	**900,000**

Survival to McNary Dam




Survival to Rocky Reach Dam
Spring Chinook
2015
2016
2017
2018
2019
Survival to RRJ
1.0
0.8
0.6
0.4
0.2
0.0
CJH
Riverside 10j
WNFH
Release Group


Survival to Rocky Reach Dam
Spring Chinook
2015
2016
2017
2018
2019
Survival to RRJ
1.0
0.8
0.6
0.4
0.2
0.0
CJH
Riverside 10j
WNFH
Release Group

Spring Chinook Yearling In-river Survival Summary

- ‘Good/normal’ survival from RivPond
- Low/poor survival from CJH

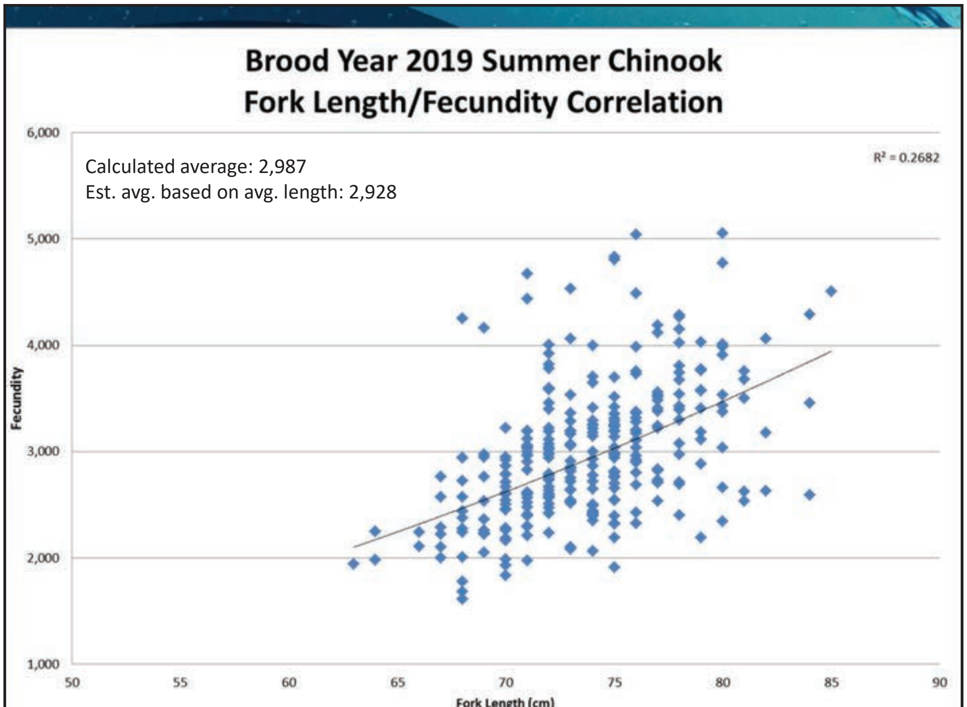

BY19 Spring Chinook Broodstock

Spring Chinook – CJH Stock			
	# Fish Spawned	# Brood Collected	% Survival to Spawn
Females	287	339	85.3%
Males / Jacks	227 / 5	318 / 8	71.2%
Total	**519**	**665**	**78.3%**

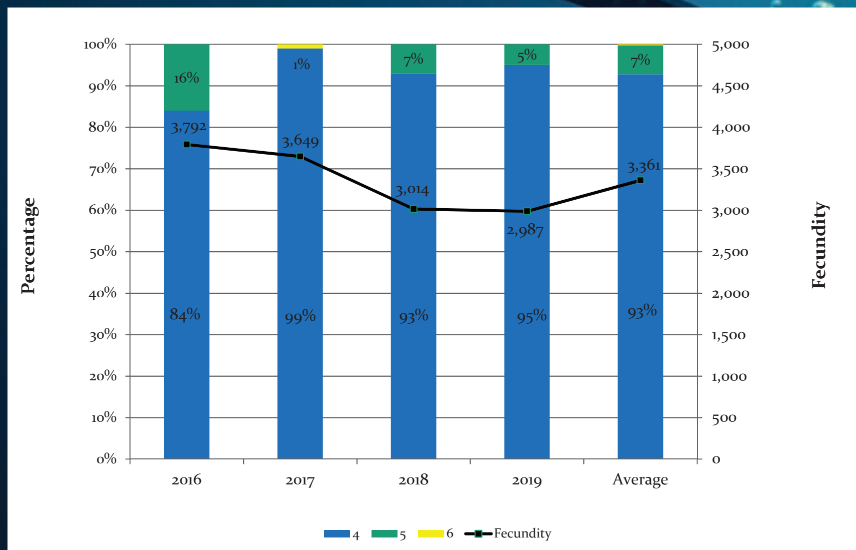
Bio-criteria standard for survival to spawn: 90%

BY19 Segregated Spring Chinook Egg Take

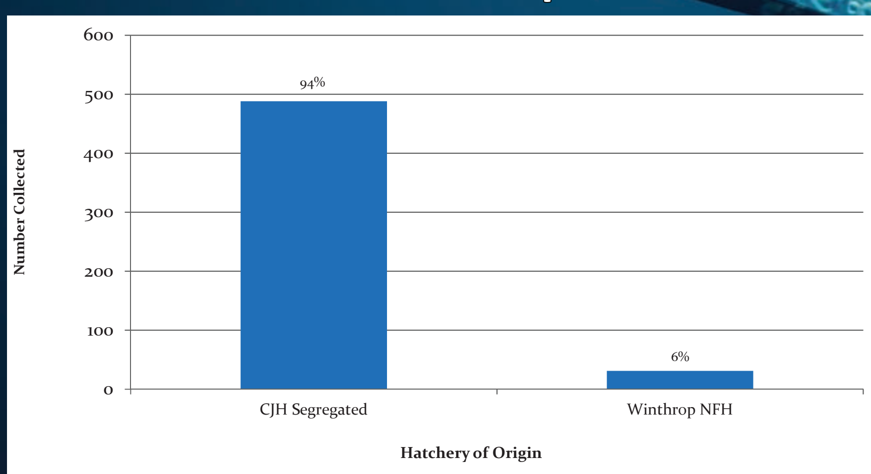
- **Eyed-Egg Take Target: 787,968**
  - 736,324 CJH eyed eggs (93.4% of target)
- **Fry:**
  - 106,278 fry transferred from Little White Salmon NFH
- **Contributing factors to reduced eyed egg take:**
  - Fecundity below expectations of 3,800 (actual 2,987)
  - Elevated pre-spawn mortality, especially in males, due to columnaris.



2016 – 2019 SEG Spring Chinook Age Class/Fecundity Comparison



2019 Spring Chinook Broodstock Composition



Based on CWT analysis.

Segregated Spring Chinook In-Hatchery Performance

Parameter	Assump-tion	Mean	# Years Targets Met	BY 2019 – CJH stock	BY 2018 – CJH stock	BY 2017 – CJH stock	BY 2016 – LNFH stock	BY 2015 – LNFH stock	BY 2014 – LNFH & CNFH stock	BY 2013 – LNFH stock
Pre-spawn Survival	**90%**	**73.5%**	2/7	78.3%	32.8%	85.3%	88.5%	98.1%	38.6%	92.9%
Eggs/Female	**3,800**	**3,320**	1/7	2,987	3,014	3,259	3,792	3,125	3,853	3,210
Percent Eggs culled	**20%**	**3.1%**	7/7	0.38%	0.01%	8.0%	0.03%	1.0%	3.0%	9.5%
Green-to-Eyed Survival	**90%**	**80.1%**	3/7	93.1%	90.6%	48.7%	58.1%	91.2%	89.6%	89.1%
Eyed Egg-to-Fry Survival	**95%**	**89.2%**	4/6	N/A	63.1%	78.2%	98.9%	98.7%	99.1%	97.1%
Egg-to-Smolt Survival	**84%**	**85.4%****	4/5	N/A	34.9%*	72.5%	90.2%	84.5%	88.8%	90.8%
Releases	**700,000**	**523,384** (74.8%)**	1/5	N/A	102,801*	276,560	555,636	743,996	526,136	514,596

***Current as of March 2, 2020.**
****Does not include BY18.**

MetComp 10j Spring Chinook In-Hatchery Performance

Parameter	Assump-tion	Mean	# Years Targets Met	BY 2018	BY 2017	BY 2016	BY 2015	BY 2014
Eyed Egg-to-Fry Survival	**95%**	**82.1%**	4/5	14.0%	99.0%	99.4%	99.1%	98.9%
Egg-to-Smolt Survival	**84%**	**95.5%****	4/4	8.1%*	95.3%	97.5%	96.3%	92.9%
Releases	**200,000**	**204,135** (100%)**	4/4	17,703*	210,582	200,827	201,821	203,311

***Current as of March 2, 2020.**
****Does not include BY18.**

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
  - 2/7 years for Segregated Spring Chinook
- **Fecundity**
  - 0/6 years for Integrated Summer Chinook
  - 0/6 years for Segregated Summer Chinook
  - 1/7 years for Segregated Spring Chinook (exceeded target by <75 eggs)
- 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 2020 Projected Releases

Summer Chinook – Okanogan Stock							
Life History	**Brood Year**	**Projected Release Date**	**Site**	**Method**	**Est. Size (fpp)**	**# Fish**	**Target**
Integrated Yearling	2018	4/15/2020	Omak AP (Okanogan R.)	Volitional	10.0	122,000	400,000
Integrated Yearling	2018	4/15/2020	Similkameen AP	Volitional	10.0	116,000	400,000
Segregated Yearling	2018	4/15/2020	CJH (Columbia R.)	Forced	10.0	190,000	500,000
				SUBTOTAL:		**428,000**	**1.3 M**
Integrated Sub-yearling	2019	5/15/2020	Omak AP (Okanogan R.)	Volitional	50.0	155,000	300,000
Segregated Sub-yearling	2019	5/15/2020	CJH (Columbia R.)	Forced	50.0	400,000	400,000
				SUBTOTAL:		**555,000**	**700,000**
				GRAND TOTAL:		**983,000**	**2.0 M**

Spring Chinook 2020 Projected Releases

Spring Chinook							
Stock	**Brood Year**	**Projected Release Date**	**Site**	**Method**	**Est. Size (fpp)**	**# Fish**	**Target**
Leavenworth	2018	4/15/2020	CJH (Columbia R.)	Forced	10.0	102,000	700,000
MetComp 10j	2018	4/15/2020	Riverside AP (Okanogan R.)	Volitional	20.0	17,500	200,000
				TOTAL:		**119,500**	**900,000**

Overview of Changes Made in 2018

- Sort/inoculate before putting into raceways
- Inoculations more precise – based on actual weight and not just estimated, administered with measured syringes.
- Broodstock sorted based on sex and program.
- Sort females prior to spawning, separate based on level of ripeness
- Only handle males to get enough ripe ones to match females.
- Spawn integrated and segregated on separate days – reduces potential confusion and employee fatigue.

Overview of Changes Made in 2018

- **Fertilization changes**
  - Fertilize in small buckets
  - Drain/rinse eggs in colanders

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 to Make in 2020

- **Broodstock:**
  - Monitor spring chinook for Columnaris regularly, prophylactic Chloramine-T treatments, Diquat when Columnaris detected.
- **Fertilization & Incubation:**
  - Bio rings in place of vexar as substrate.
  - Addition of milt activator during fertilization.
  - New chiller!!!

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

Are the program goals and Key Assumptions realistic?

<u>Do they need adjustment or are other management actions needed?</u>

- **Possible solutions:**
  - <u>PSM</u> – The need for a cooler water source is evident; we need cooler water during adult rearing to reduce Columnaris events.
  - <u>Fecundity</u> – 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.
  - <u>Production Goals</u> – do production goals need to be reevaluated?

Okanogan Adult Temporary Weir

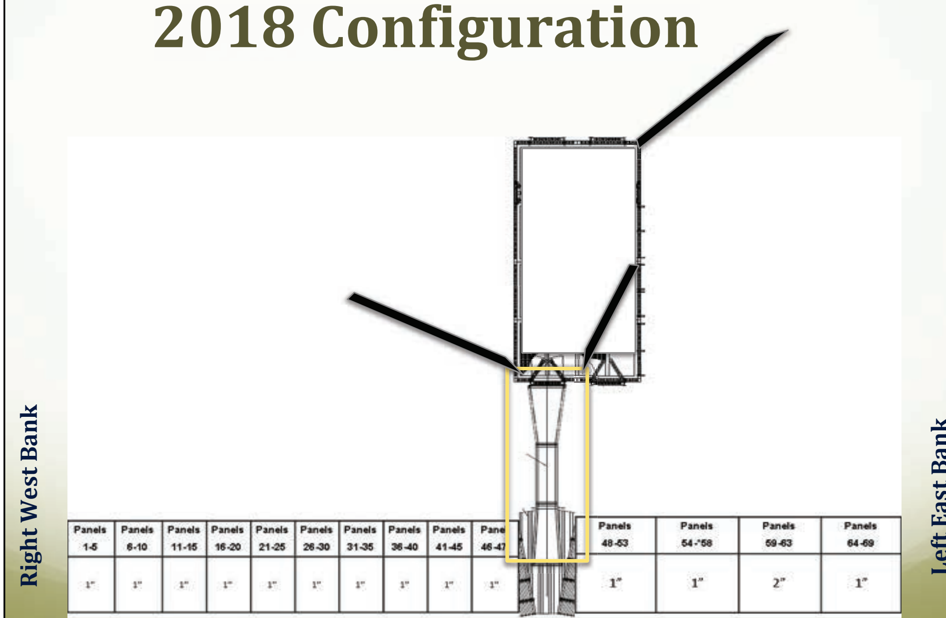
Objectives

- Install early July or August , operate through September under allowable flow (< 3,000 cfs) and temperature (<22.5 °C) conditions
- Adult management tool for broodstock needs, meet pHOS (<30%) and PNI (> .67) target
- Refine trap configuration to meet the CJHP's biological and brood-take goals
- Remove HOR summer/fall Chinook fish; fish from this "adult management" activity are destined for tribal member ceremonial and subsistence purposes
- Collect late arriving natural-origin broodstock summer/fall Chinook and transport safely to the hatchery
- Document weir effects and conduct observations around vicinity of the weir for species composition, abundance, health, and timing to inform management decisions and future program operations

2019 Operation

- Deployed on July 15th at 1,540 cfs flow @ Malott
- Completed July 19th with underwater video system
- Daily monitoring activities began following week
- Trapping began on August 26th
  - High density of algae, nutrient productivity in system
  - Limited trapping throughout season
  - 5 total trapping days (8/26-9/11)
  - Ended on September 11th 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

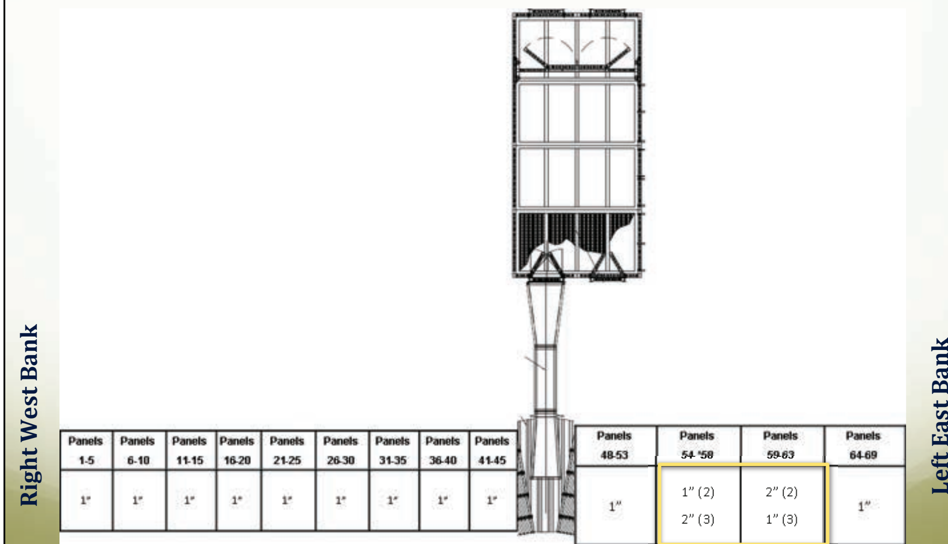
2018 Configuration



2019 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
  - Collection goal was low by the time we started trapping
- Moved the video cables from the weir panels to an aerial cable system

2019 Configuration

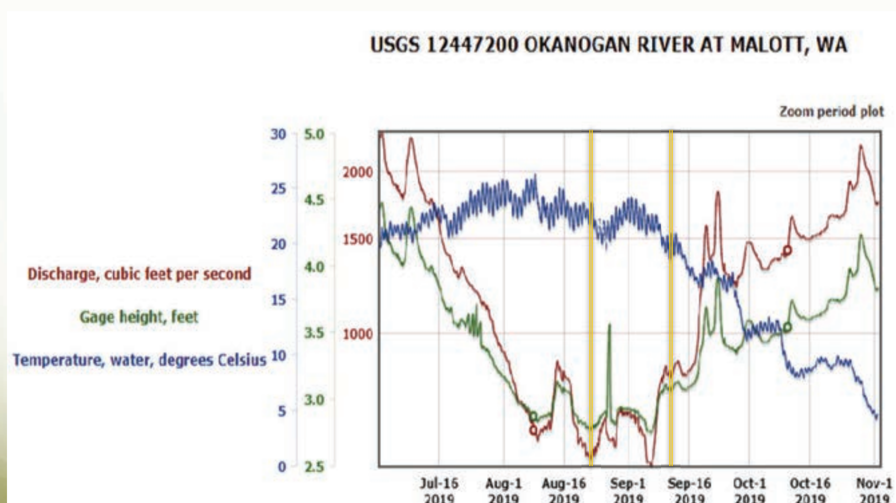


2019

Daily Monitoring Activities

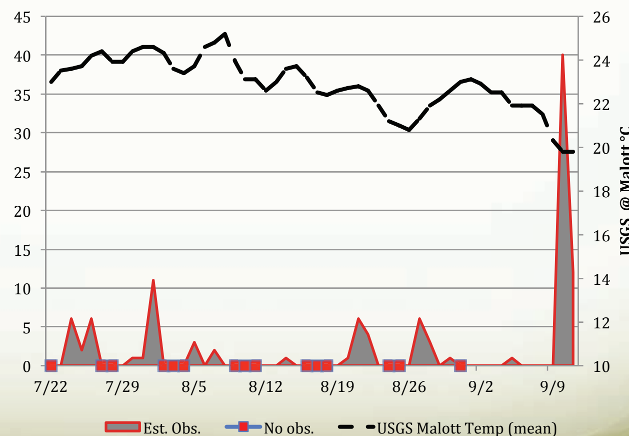
- **Daily maintenance-** debris, **algae**, carcass removal, cameras, lights
- **Water quality:** temperature, dissolved oxygen, and turbidity
- **Water velocity and head differential***
- **Direct observations** (estimates)
  - Tower- 3x/day, 5 minutes, morning, afternoon, evening
  - Bank- about .8 river km downstream, 2x/day, 10 minutes
- **Mortalities**
  - Collected, assessed, biological information
    - 8 total Chinook (3 NOR, 5 HOR)
  - 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

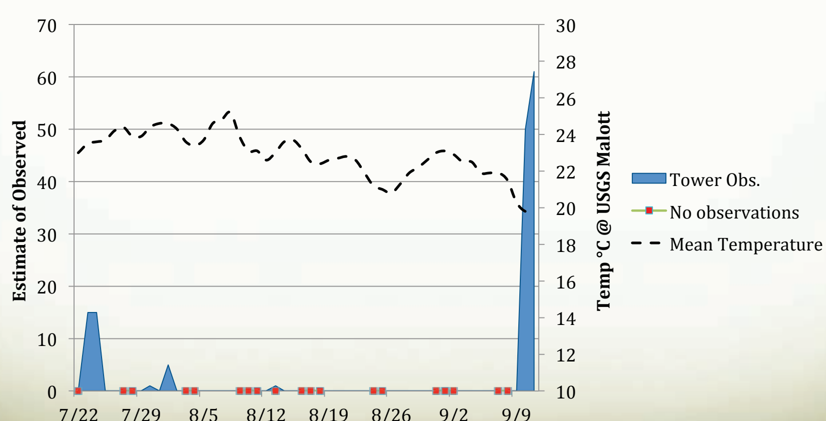


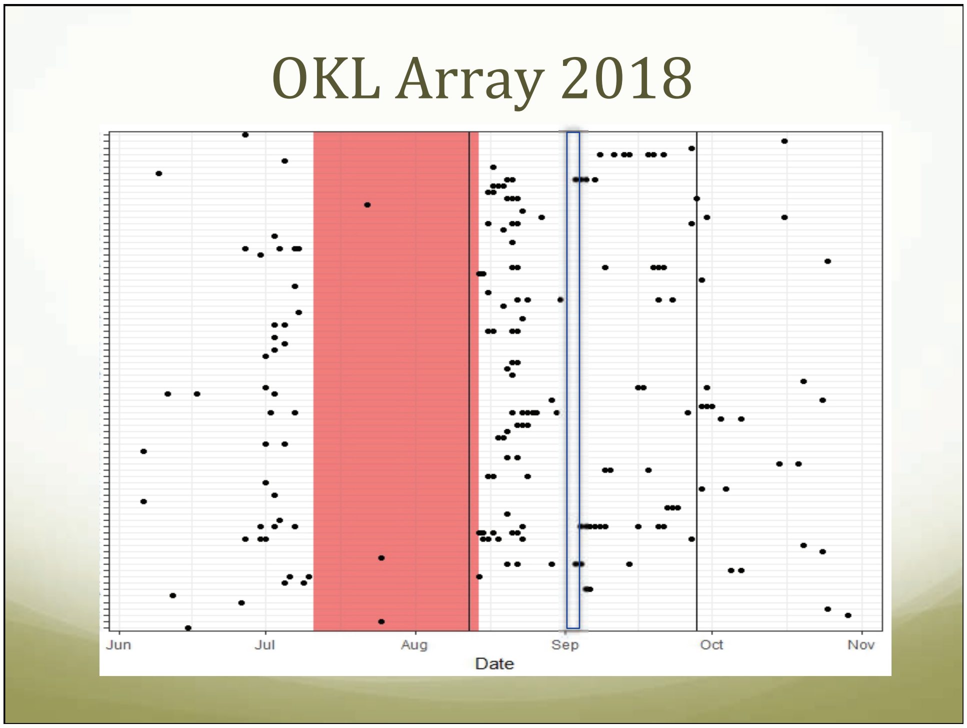
https://nwis.waterdata.usgs.gov/wa/nwis/uv?

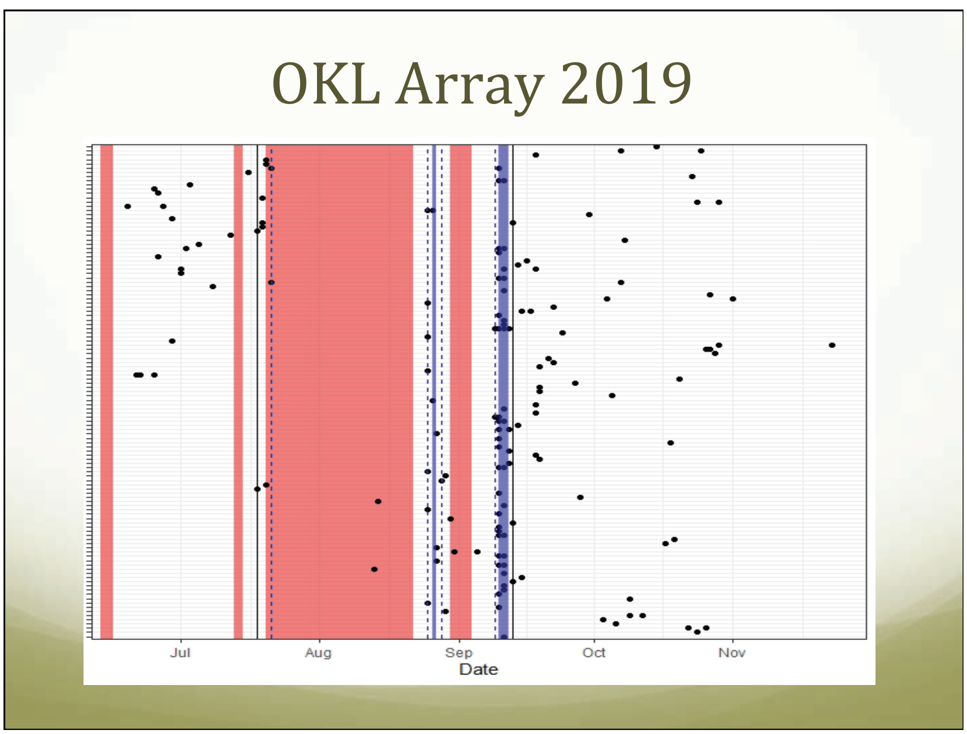
Bank Observations



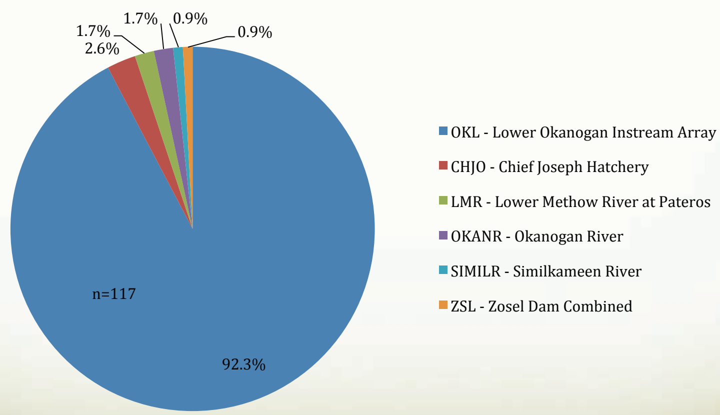
Tower Observations



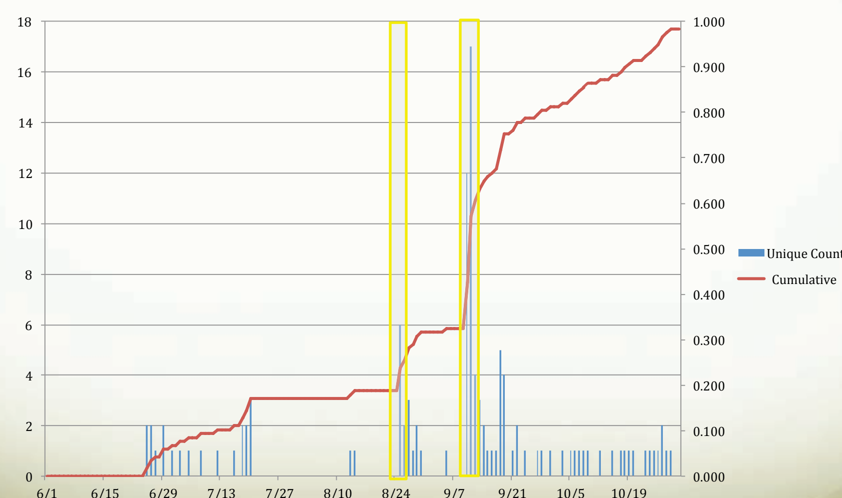

OKL Array 2018
Jun
Jul
Aug
Sep
Oct
Nov
Date


OKL Array 2019
Jul
Aug
Sep
Oct
Nov
Date

Last Detection Site



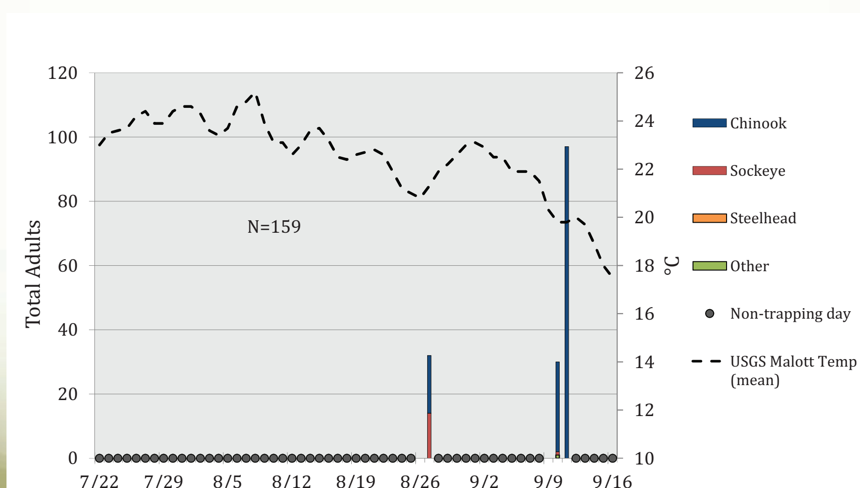
Last Detection OKL



Trapping Operations

- Trapping began on August 26th, ended on Sept. 11th
- 5 total days
- 143 adult summer Chinook
  - 74 NOR released
  - 8 NOR brood, 2 HOR brood
  - 22 HOR released
  - 37 jacks
- 15 adult sockeye (all in August)
- No steelhead

Daily Trapped



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

[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

2019 Conclusions

- Flow not an issue for deployment- earliest to date
  - Installed in early July at 1,540 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 15% had migrated past the weir before the weir was functional on July 19th
- With a low return forecast, decided not use for adult management purposes in 2019
  - All HOR's allowed to escape to the spawning grounds unless taken for brood
- Continued to collect NOR's for broodstock
  - Only females
- Use similar trap location in 2020
  - Provided enough water in trap box
  - Just above riffle zone and out of the pool


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

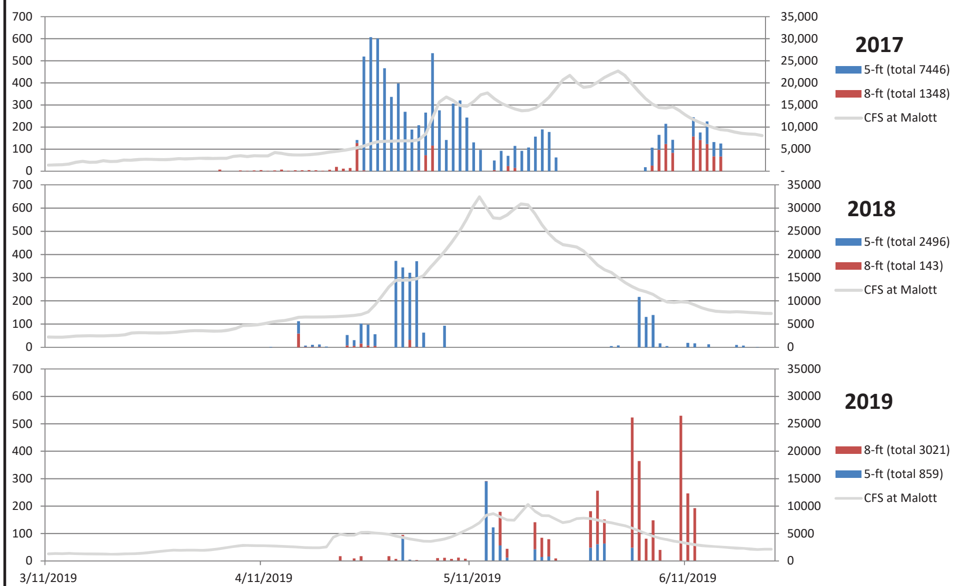
Screw Trap, PIT tags, Juvenile Monitoring, and Natural Production
KMQ 1 – Current Status and Recent Historical Trend
KMQ 5 – Are assumptions about natural production valid?

Our Screw Trap configuration was the same as in years past – an 8-ft cone that typically fishes at the margin of the thalweg, and a 5-ft cone that fishes along the bank at flows over ~5,000 cfs

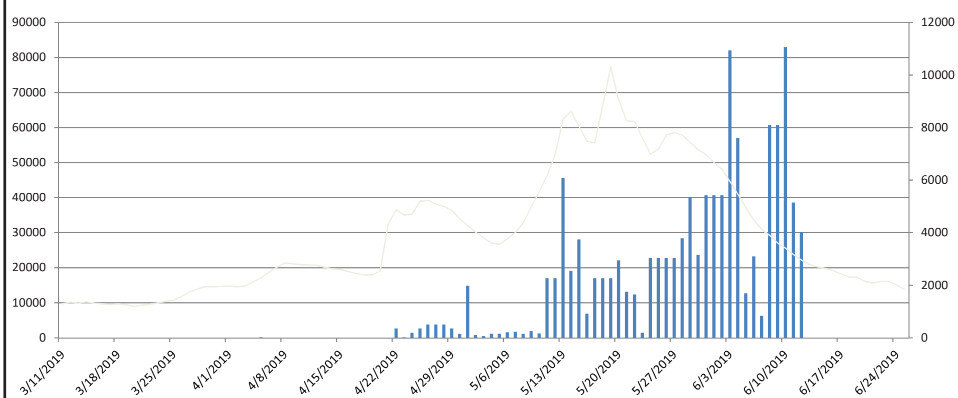
Primo, A-#1 spawning habitat

Location of RST

Peak flow was relatively low in 2019. So was total catch, and curtailed staff availability

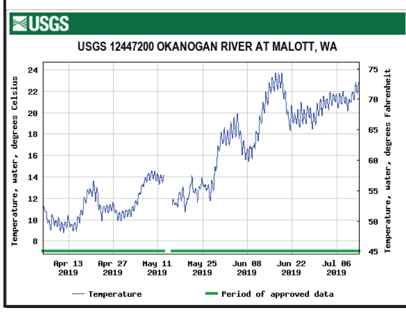


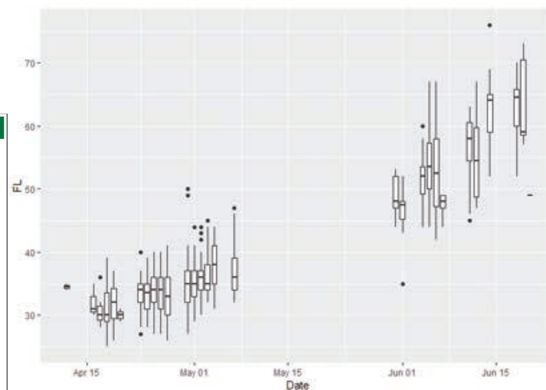
Two efficiency trials were conducted with hatchery-origin yearling Chinook, and efficiency was low and variable. Juvenile abundance in 2019 could not be reliably estimated.



Date	Released	Recaptured	Efficiency
4/2/2019	1916	22	1.15%
4/8/2019	2004	3	0.15%

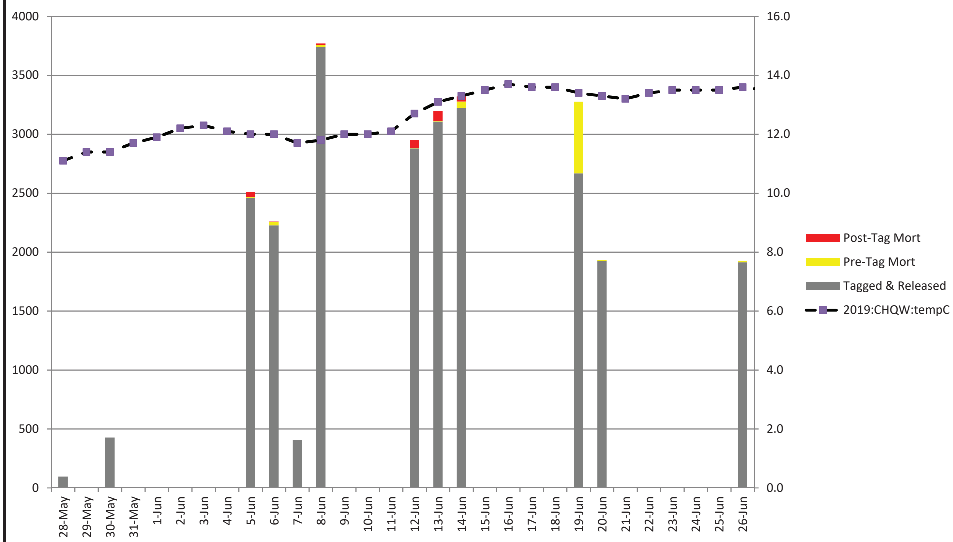
Despite the small total catch, We managed to implant 873 PIT tags in fish captured post-flood.





Year	Growth Rate (mm FL/day)
2014	.26
2015	.35
2016	.37
2017	.23
2018	.43
2019	.66

Of the Chinook handled, 5.2% died, 1.6% were released untagged, and 93.2% swam away with a PIT tag.



Distribution of detections

Rocky Reach

Year	Med. Detect	% Detect
2019	7/20	14.5
2018	7/21	10.5
2017	6/29	16.7

McNary

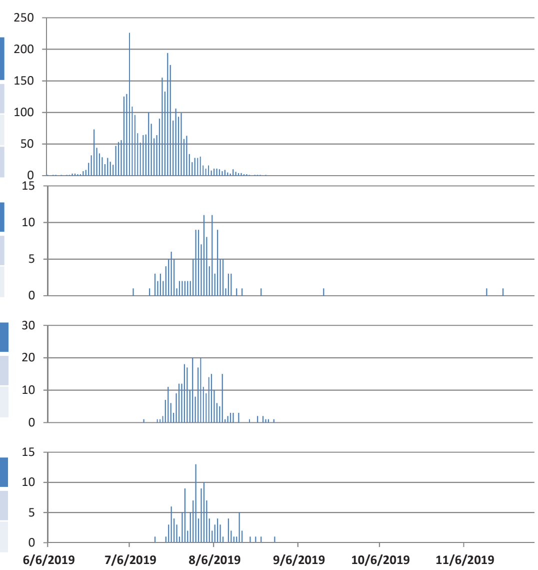
2019	8/2	.6
2018	7/27	.5
2017	7/19	2.5

John Day

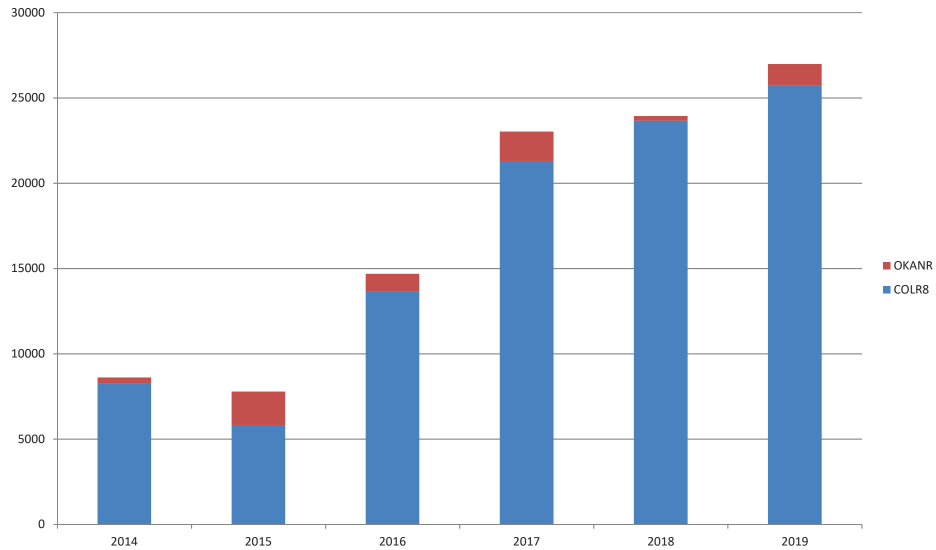
2019	7/31	1.1
2018	7/30	.5
2017	7/22	1.2

Bonneville

2019	8/1	.5
2018	7/27	.2
2017	7/11	1.2



2019 was another record year for number of PIT tags deployed; we released 1267 PIT tags in the Okanogan and 25,717 into the Columbia (26,984 total).



Chief Joseph Hatchery 2020 Annual Program Review

Spawning Grounds Summary

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Andrea Pearl Fisheries Biologist,
Colville Confederated Tribes

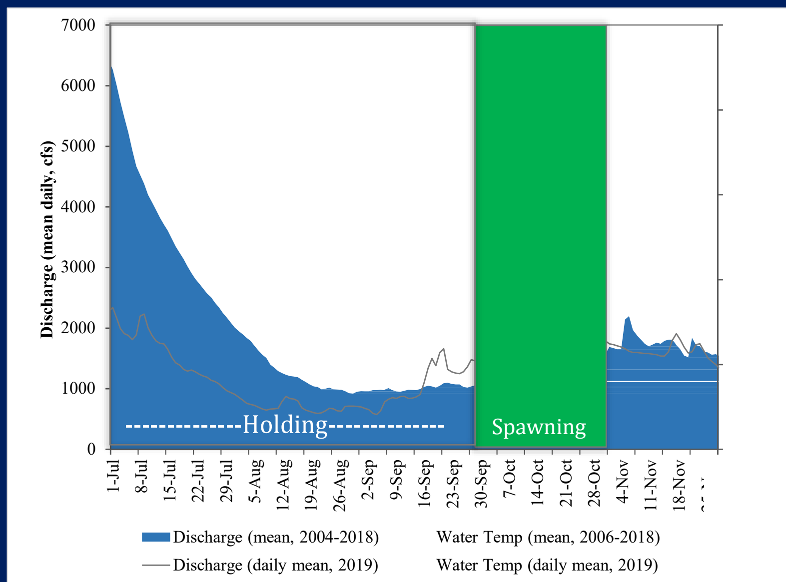
Brian Dietz Fisheries Biologist,
Colville Confederated Tribes

Objectives

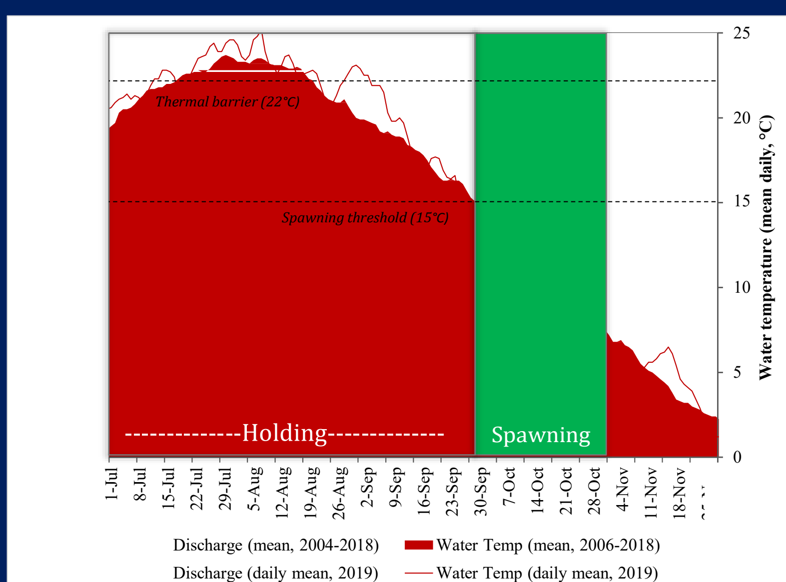
Monitor Status and Trends:
- Environmental Conditions
- Spawn timing
- Spatial distribution
- Pre-spawn mortality
- Age structure (scales, CWT)
- Stray rates
- Sex ratio
- Fish size

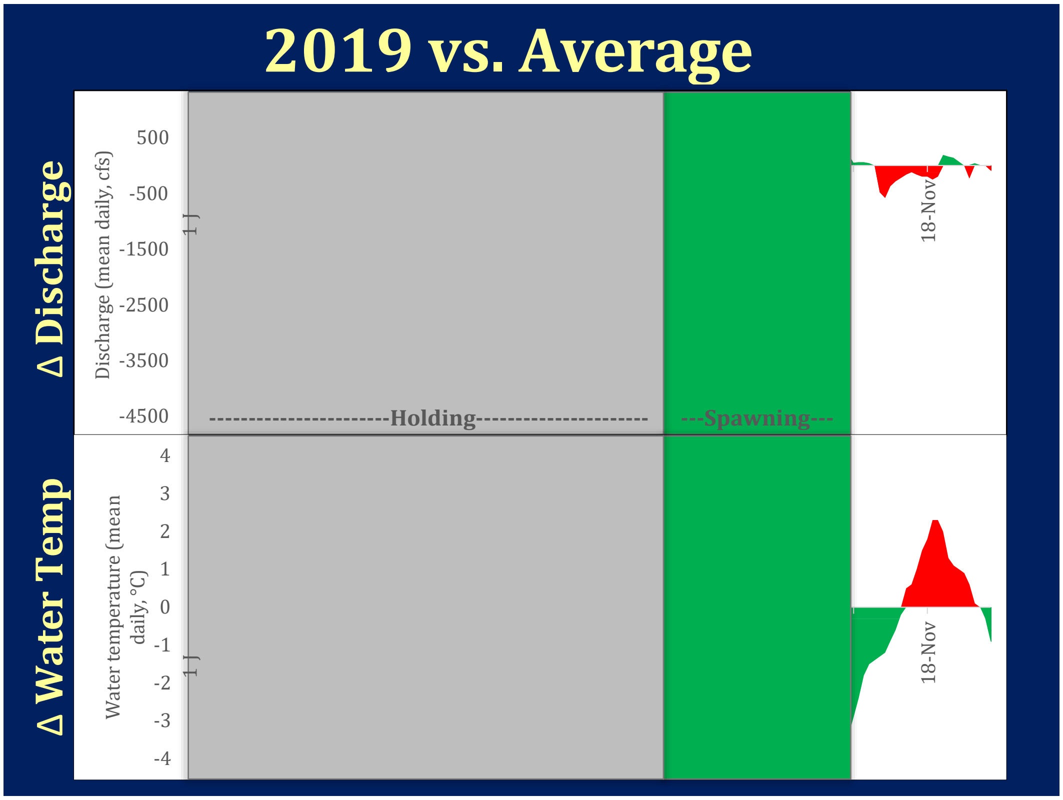
Estimate:
- Escapement
- Composition (pHOS)

Environmental Conditions

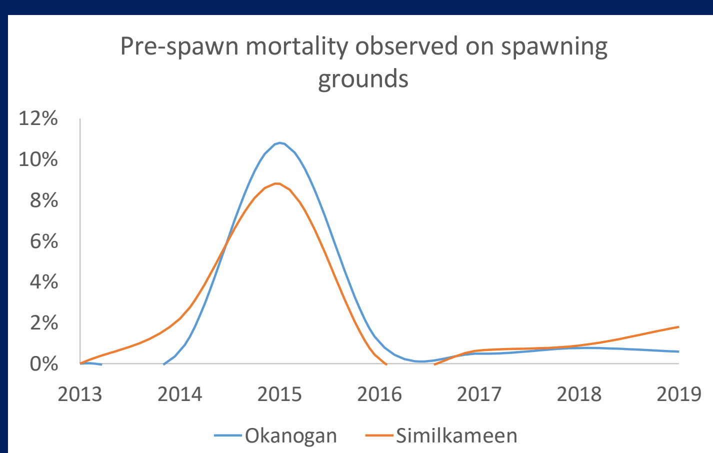


Environmental Conditions



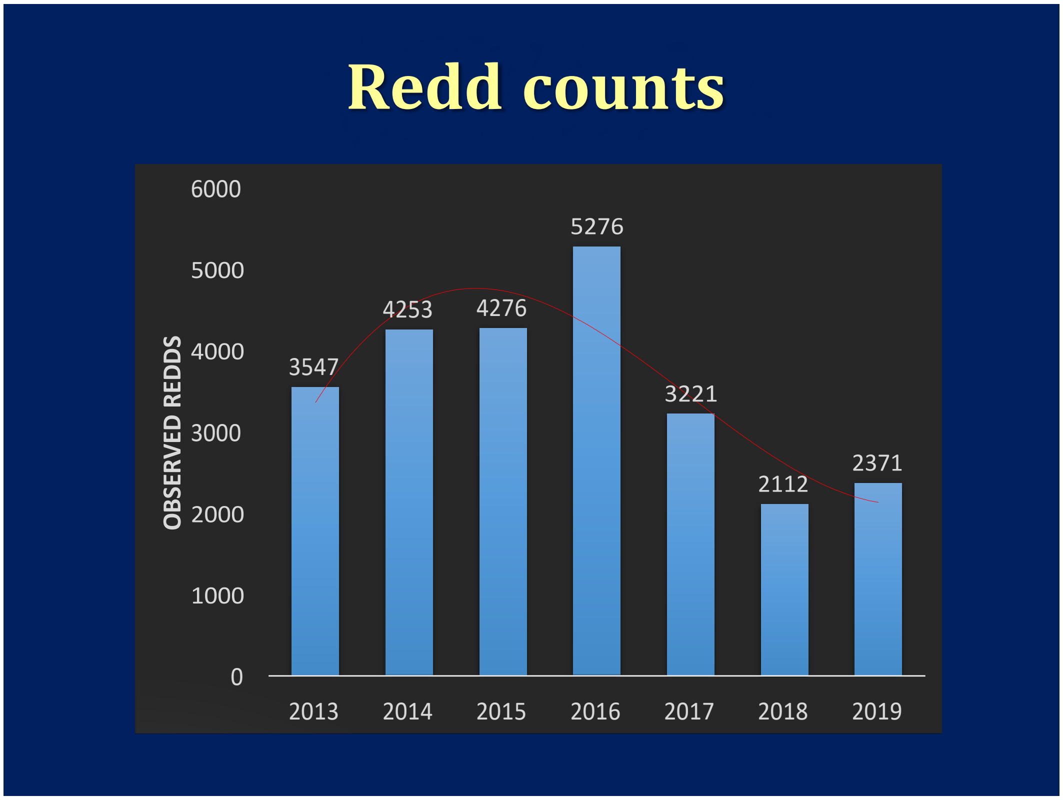


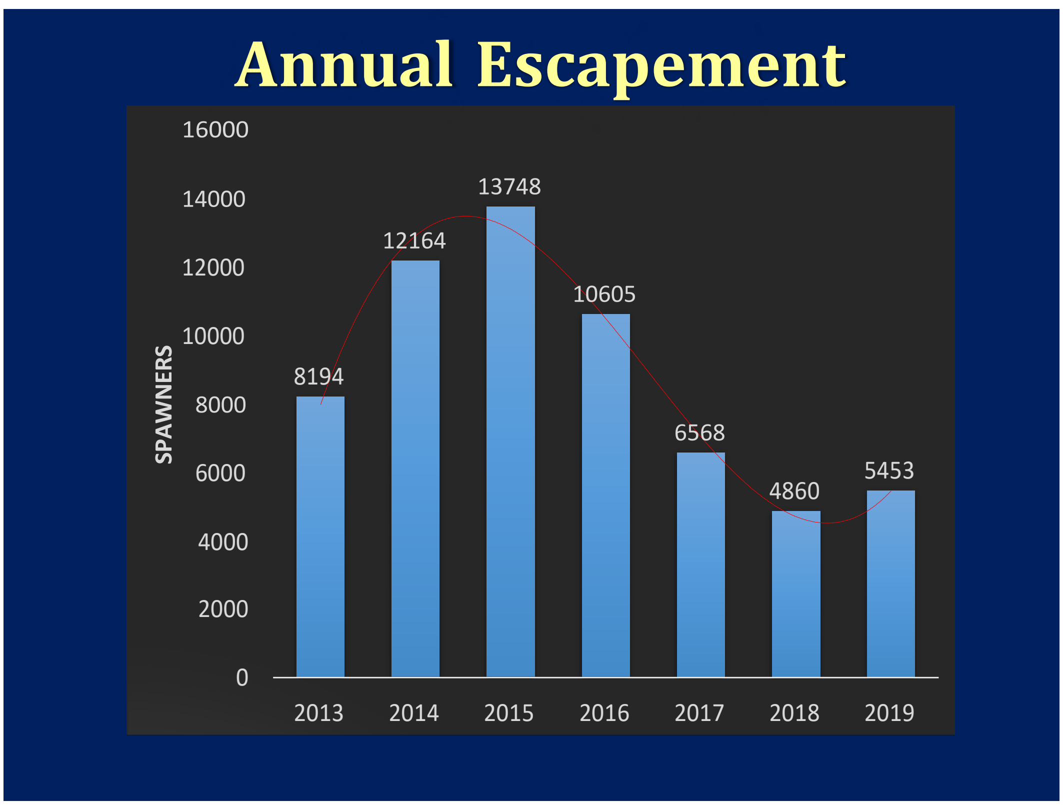
Pre-spawn mortality (PSM)



Count of recovered female carcasses (*sample size*)

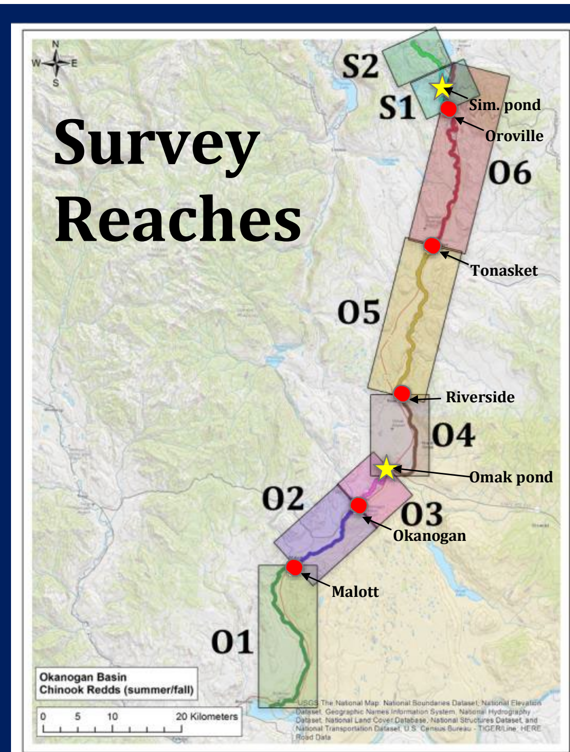
River	2013	2014	2015	2016	2017	2018	2019
Okanogan	314	621	398	786	412	261	170
Similkameen	249	681	923	1018	309	113	111
Total	**563**	**1302**	**1321**	**1804**	**721**	**374**	**281**

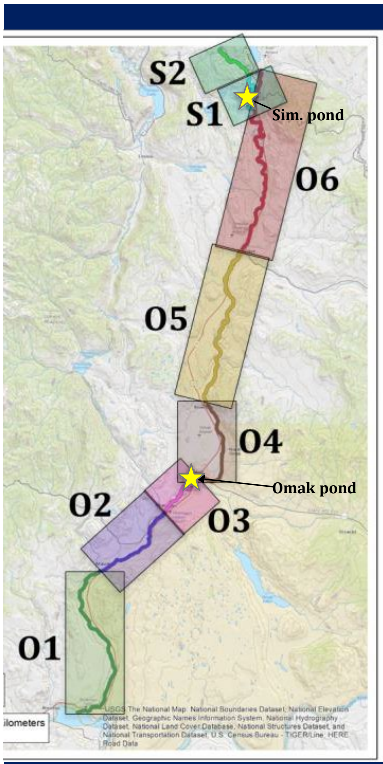

Redd counts
OBSERVED REDDS
6000
5000
4000
3000
2000
1000
0
3547
4253
4276
5276
3221
2112
2371
2013
2014
2015
2016
2017
2018
2019


Annual Escapement
SPAWNERS
16000
14000
12000
10000
8000
6000
4000
2000
0
8194
12164
13748
10605
6568
4860
5453
2013
2014
2015
2016
2017
2018
2019

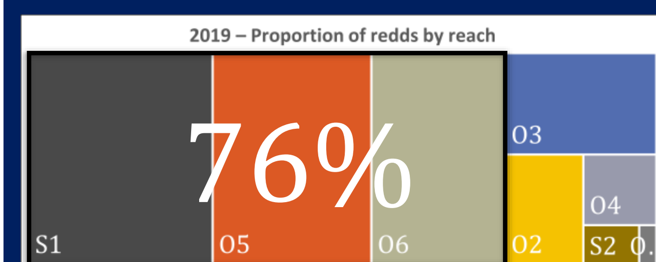
Spatial Distribution

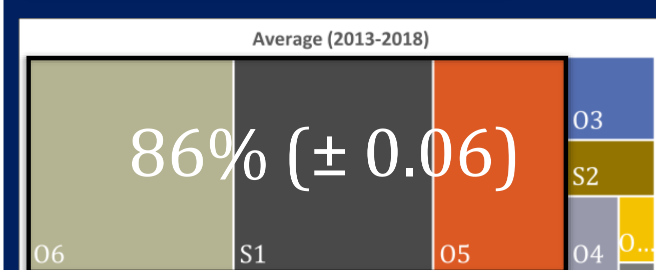
Spawning

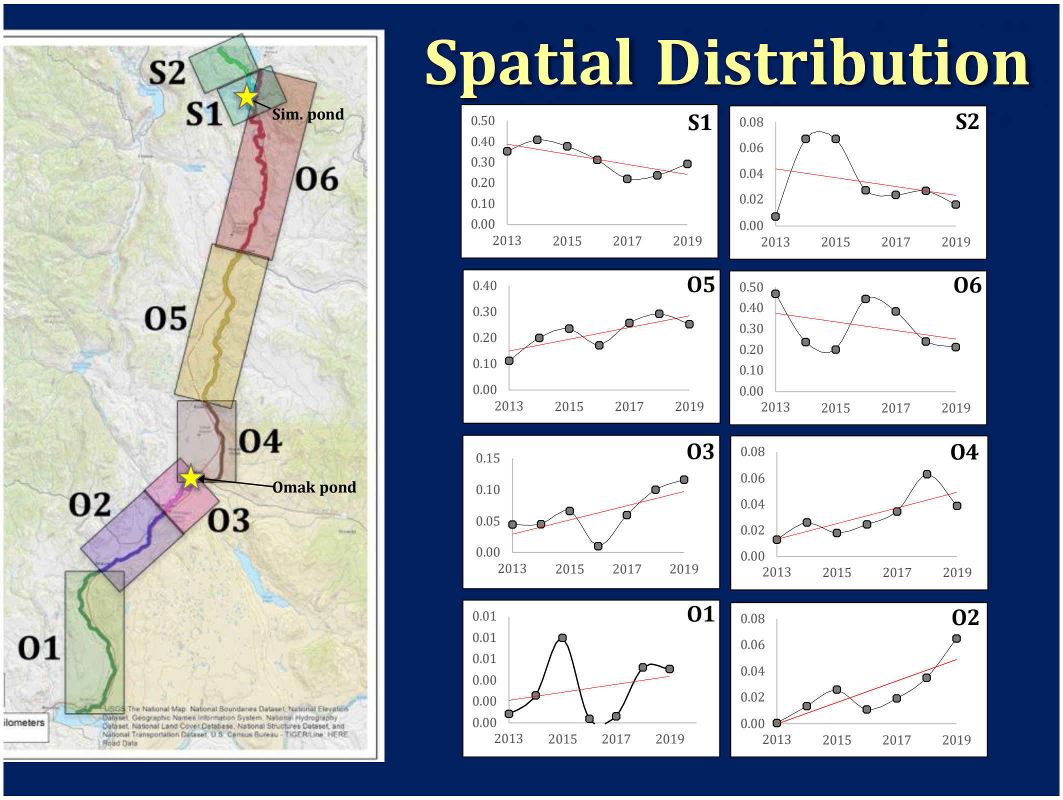




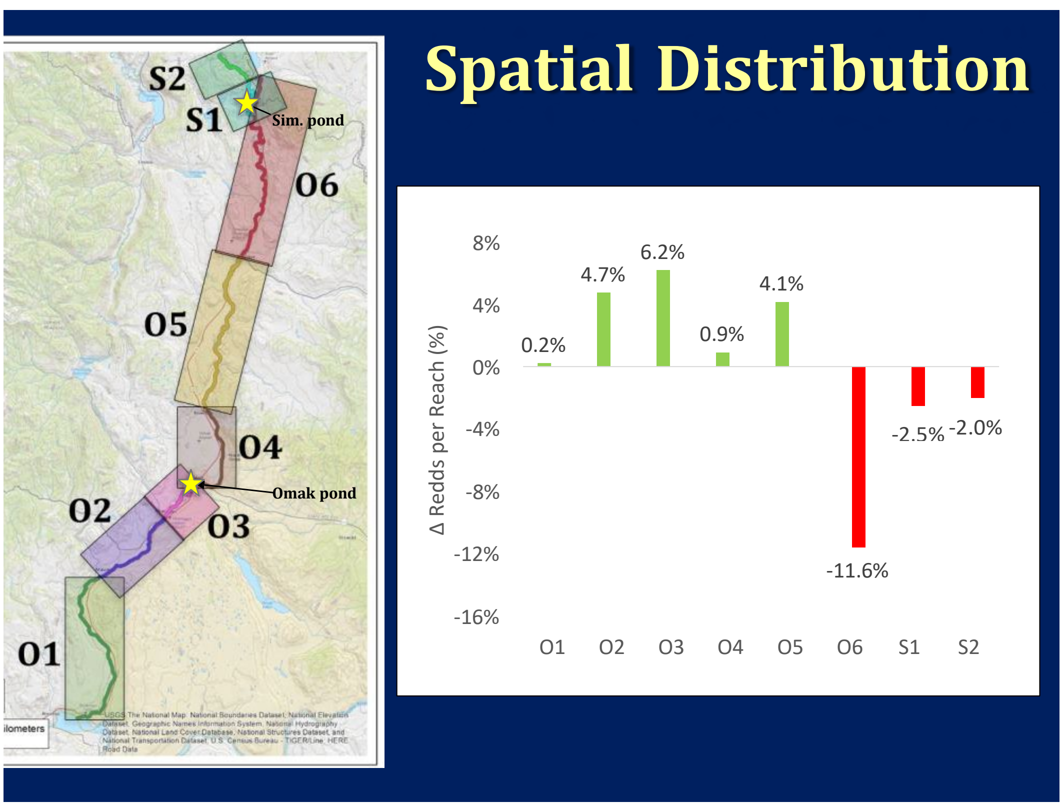
Spatial Distribution



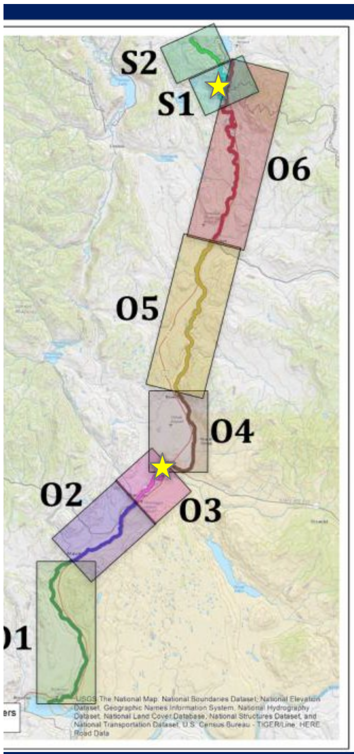




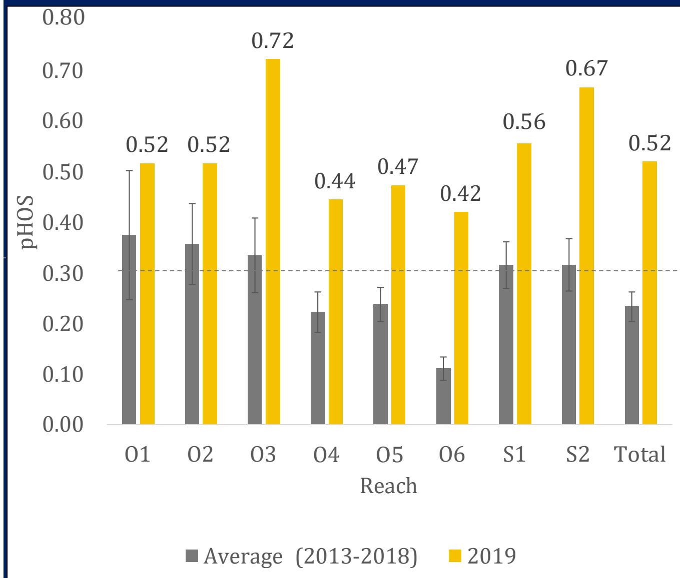
Spatial Distribution
S2
S1
Sim. pond
O6
O5
O4
Omak pond
O2
O3
O1
S1
0.50
0.40
0.30
0.20
0.10
0.00
2013 2015 2017 2019
S2
0.08
0.06
0.04
0.02
0.00
2013 2015 2017 2019
O5
0.40
0.30
0.20
0.10
0.00
2013 2015 2017 2019
O6
0.50
0.40
0.30
0.20
0.10
0.00
2013 2015 2017 2019
O3
0.15
0.10
0.05
0.00
2013 2015 2017 2019
O4
0.08
0.06
0.04
0.02
0.00
2013 2015 2017 2019
O1
0.01
0.01
0.01
0.00
0.00
0.00
2013 2015 2017 2019
O2
0.08
0.06
0.04
0.02
0.00
2013 2015 2017 2019



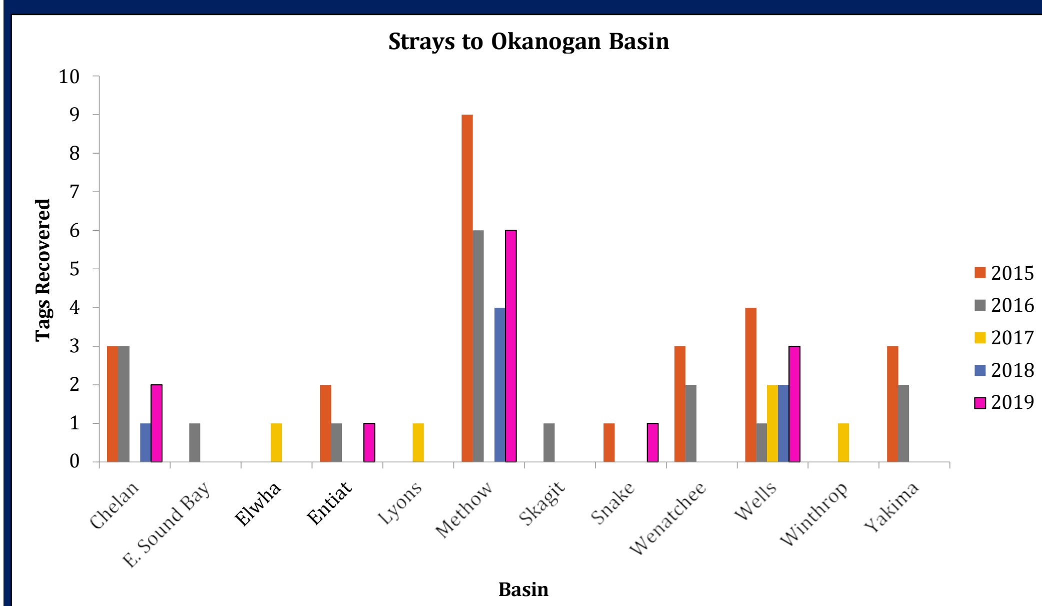
Spatial Distribution
S2
S1
Sim. pond
O6
O5
O4
Omak pond
O2
O3
O1
Δ Redds per Reach (%)
8%
4%
0%
-4%
-8%
-12%
-16%
0.2%
4.7%
6.2%
0.9%
4.1%
-11.6%
-2.5%
-2.0%
O1 O2 O3 O4 O5 O6 S1 S2



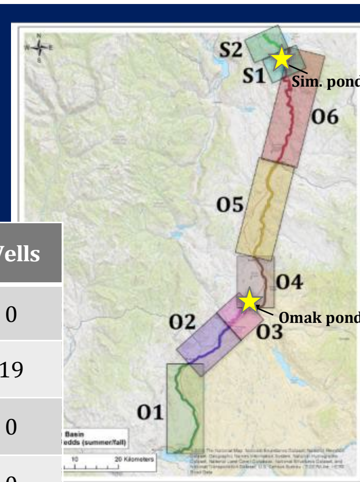
Spawner composition



CWT Recoveries



In-to-basin Stray rates



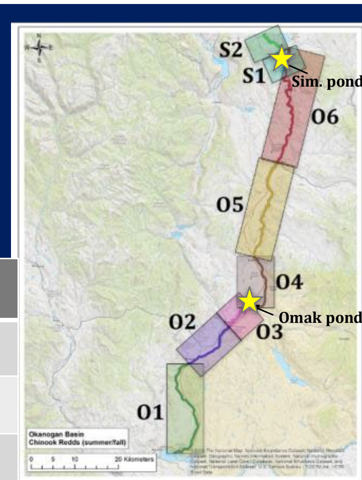
Reach	Chelan	Entiat	Methow	Snake	Wells
O2	12	0	0	0	0
O3	0	9	5	0	19
O4	25	0	0	0	0
O5	0	0	20	0	0
O6	0	0	0	7	7
S1	0	0	27	0	0
S2	0	0	16	0	0
Stray Rate	37 (0.7%)	9 (0.2%)	68 (1.2%)	7 (0.1%)	25 (0.5%)

CJHP strays to out-of-basin

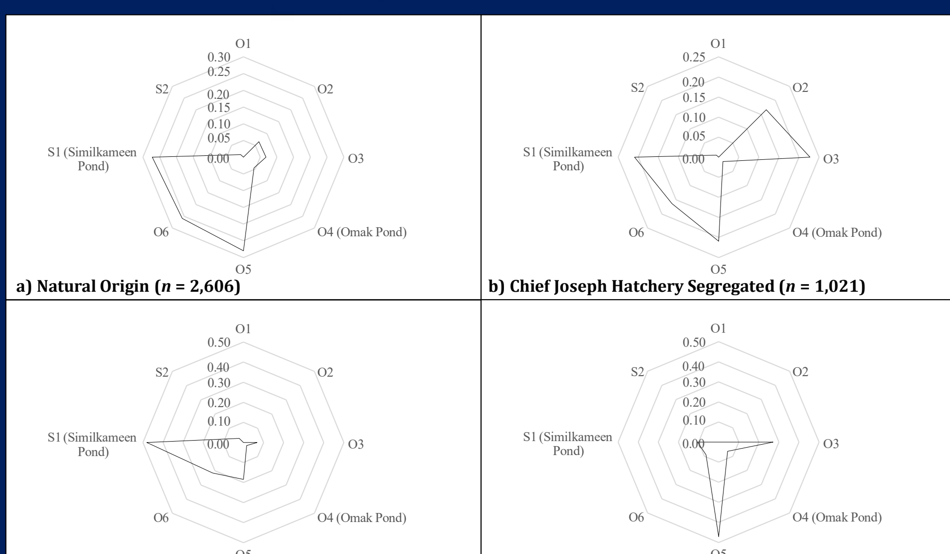
Year	Escapement	Chelan	Cowlitz	Methow	Okanogan	Similkameen	Homing	Straying
2014	241	0	0	0	121	120	100.0%	0.0%
2015	1789	4	0	0	687	1097	99.8%	0.2%
2016	2479	4	0	4	354	2116	99.7%	0.3%
2017	860	11	3	0	510	336	98.3%	1.7%
2018	194	4	0	4	116	69	95.6%	4.4%

CJHP Spawner Distribution

Reach	CJH (Seg)	Omak Pond	Similkameen Pond
O2	171	0	0
O3	232	107	85
O4	16	25	28
O5	214	186	232
O6	167	35	272
S1	214	41	605
S2	8	0	36
Total	1021 (18.7%)	394 (7.2%)	1260 (23.1%)



Spawner Distribution (CJHP homing)



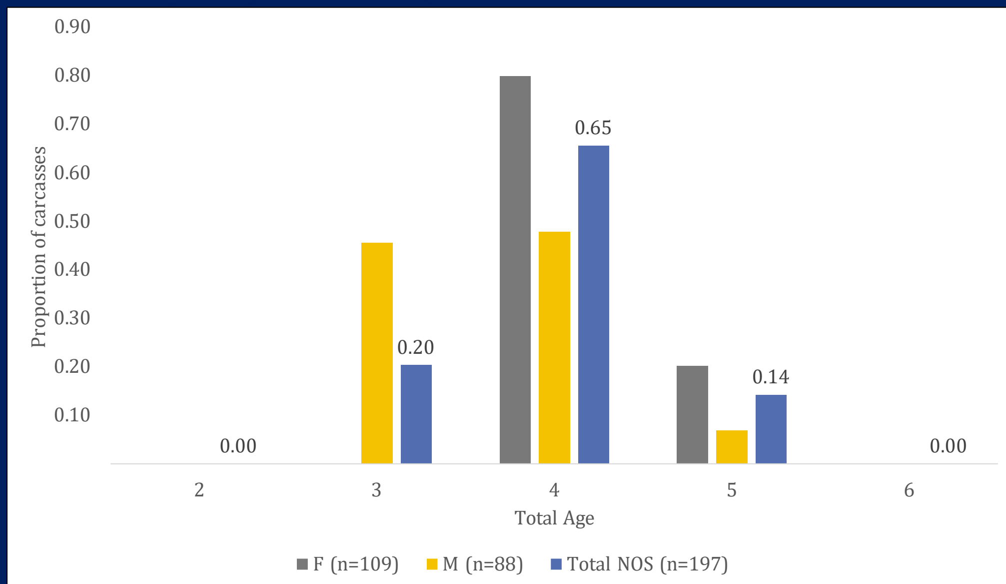
a) Natural Origin (*n* = 2,606)

b) Chief Joseph Hatchery Segregated (*n* = 1,021)

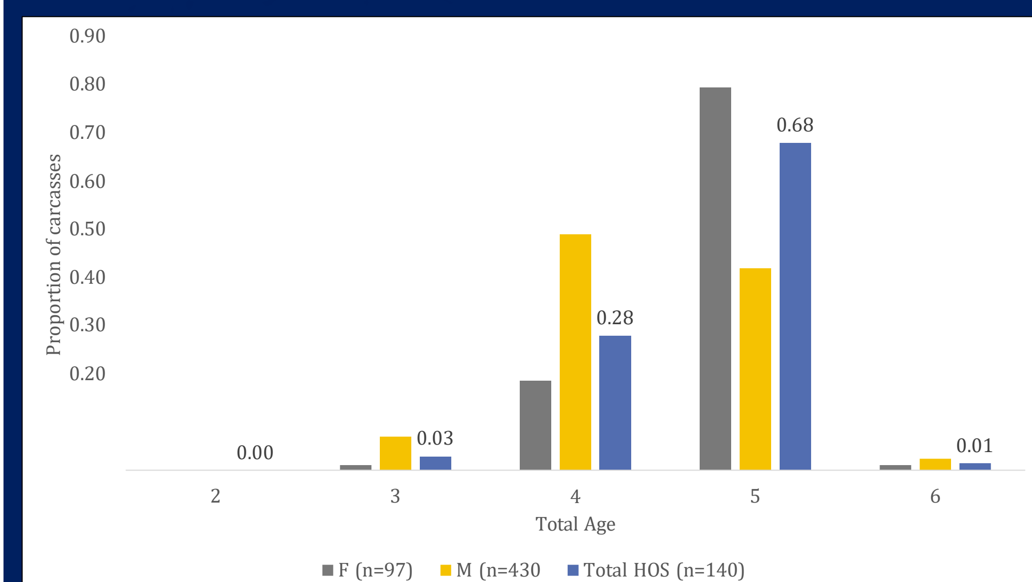
c) Similkameen Pond Origin (*n* = 1,260)

d) Omak Pond Origin (*n* = 394)

Natural-origin spawner Age Structure



Hatchery-origin spawner Age Structure

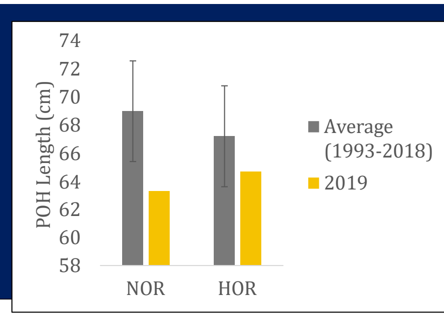


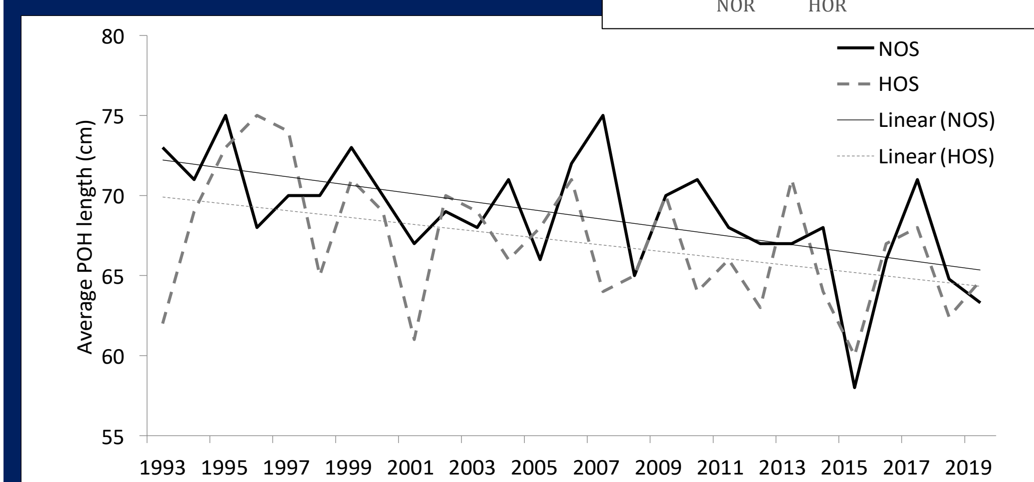
Jacks

Carcasses	Adults	Minijacks (2 yrs)	Jacks (3 yrs)	Total	Jack Rate
HOR	136	0	4	140	3%
NOR	157	0	40	197	20%

Sample Rate = 9%

Length trend

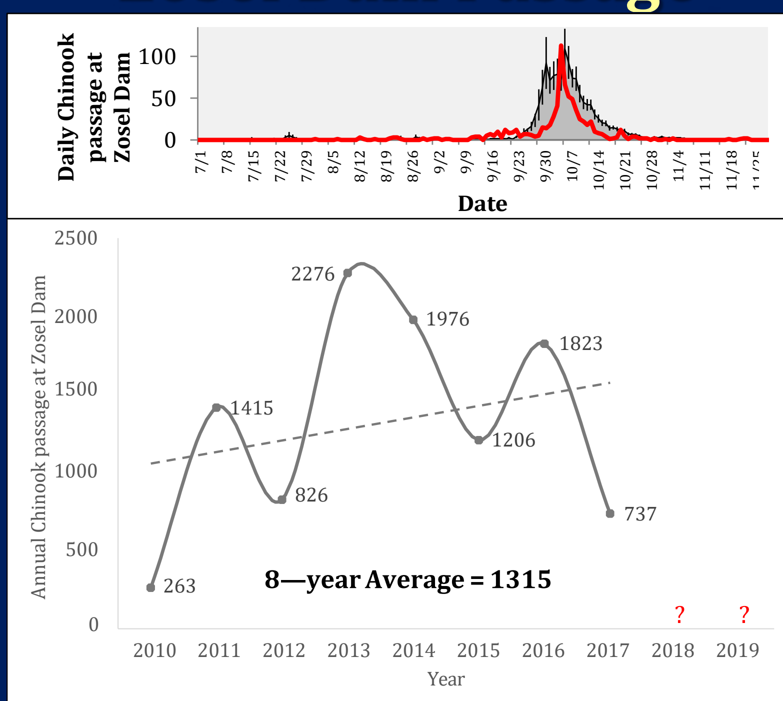


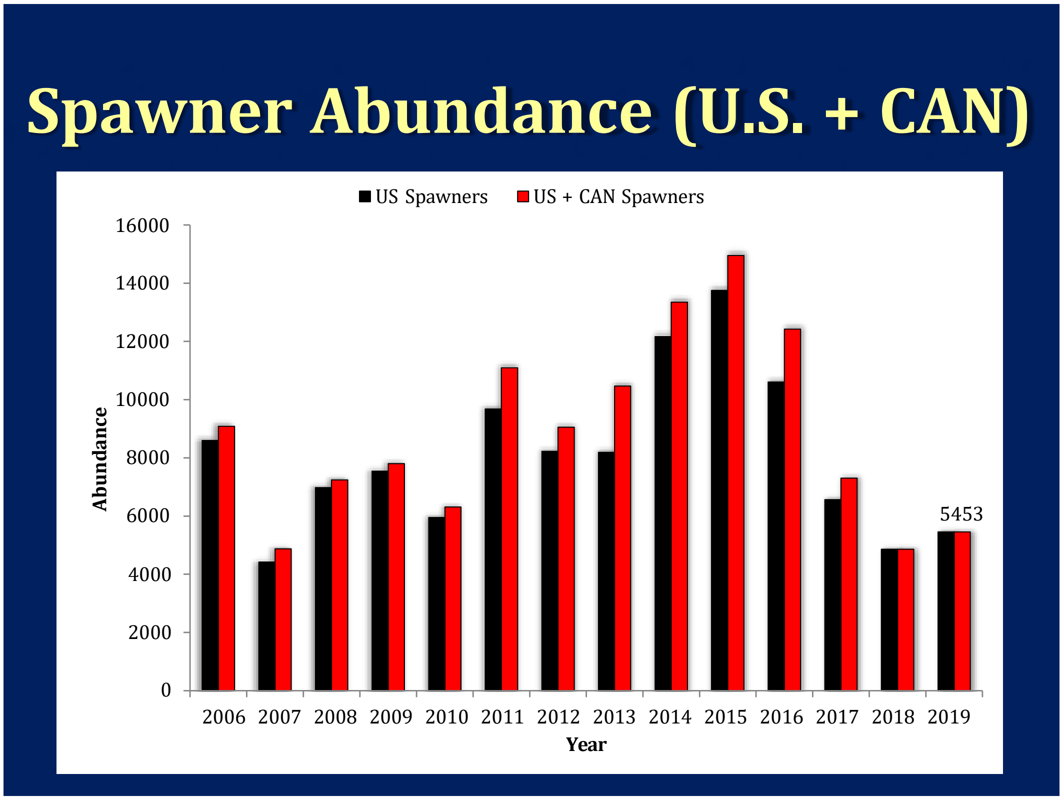


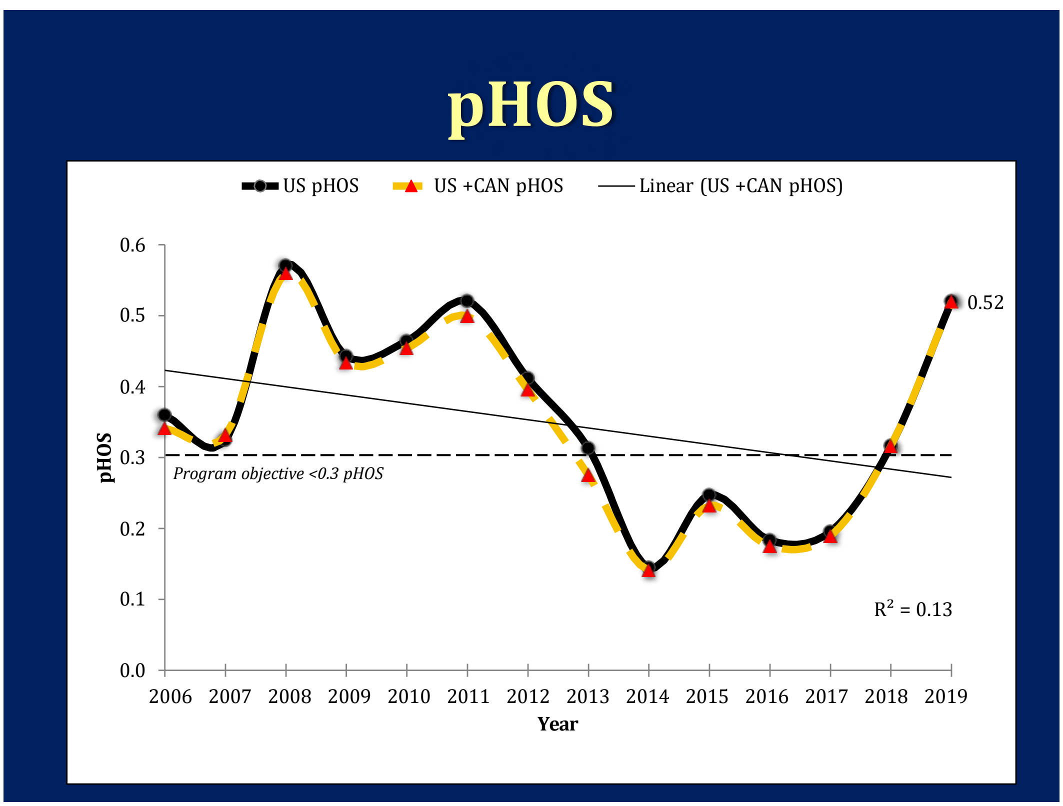
Spawner Abundance (U.S. only)

	Redds	Spawners	HOS	NOS	pHOS
Okanogan	1638	3767	1887	1880	0.50
Similkameen	733	1686	947	739	0.56
U.S. Total	2371	5453	2834	2619	0.52

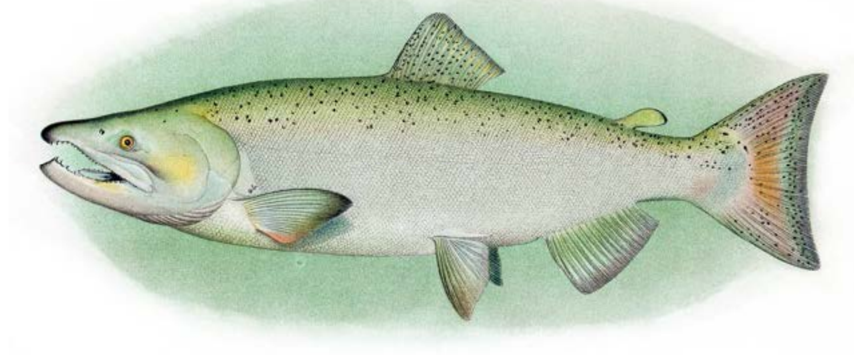
Zosel Dam Passage




Spawner Abundance (U.S. + CAN)
US Spawners
US + CAN Spawners
Abundance
16000
14000
12000
10000
8000
6000
4000
2000
0
5453
2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Year


pHOS
US pHOS
US +CAN pHOS
Linear (US +CAN pHOS)
pHOS
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Program objective <0.3 pHOS
0.52
R² = 0.13
2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Year


Special thanks to the
CCT field staff
Grant County
PUBLIC UTILITY DISTRICT
P.U.D.
CHELAN COUNTY
DOUGLAS COUNTY PUD
FISH & WILDLIFE
DEPARTMENT
COLVILLE TRIBES

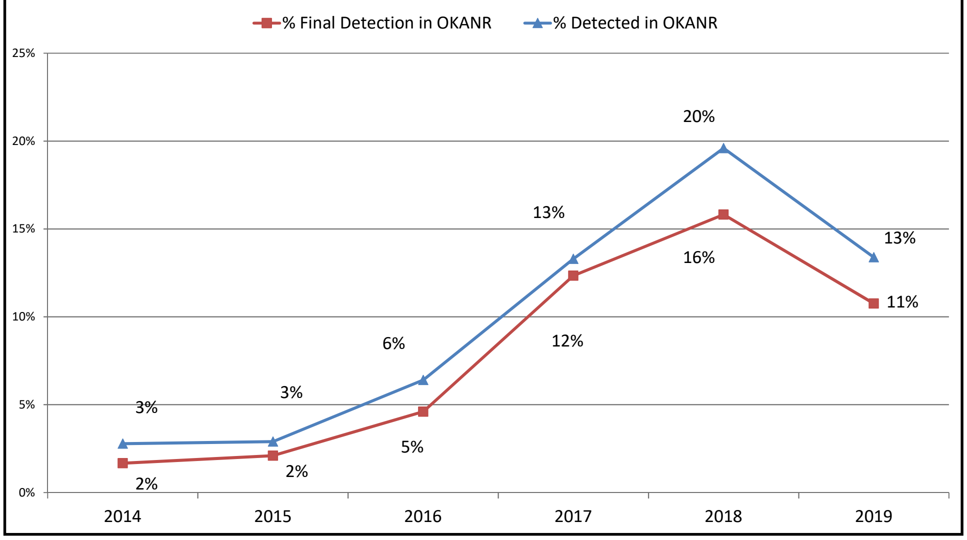


Chief Joseph Spring Chinook M&E:
§10(j) and the segregated program

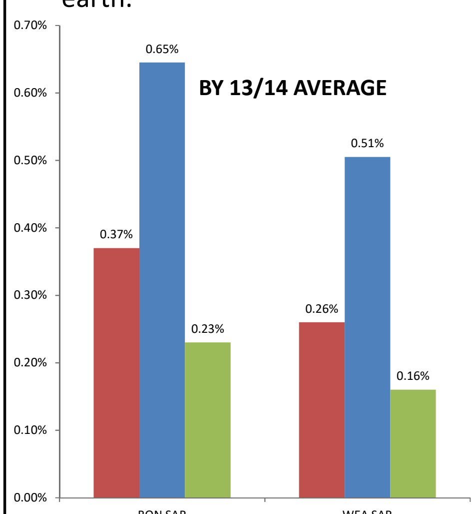
What’s the springer story for 2019?

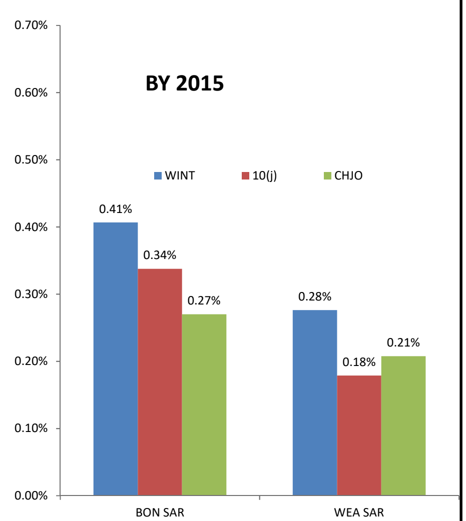
- Spring Chinook are back in the Okanogan, but 2019 was a rough year. We had low returns in general, and particularly for the BY15 10(j).
- There is still very limited spawning in the Okanogan, but we have got juvenile spring Chinook in tributaries!

After spring Chinook were released from Riverside and Chief Joseph Hatchery, the proportion of spring Chinook tagged at Wells that utilize the Okanogan River Basin began to rise, and continued to do so through 2018.

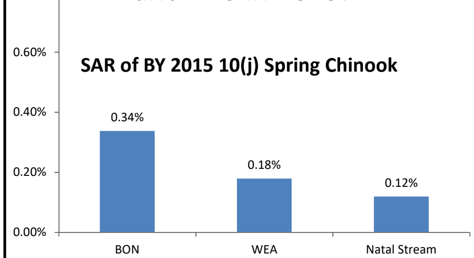


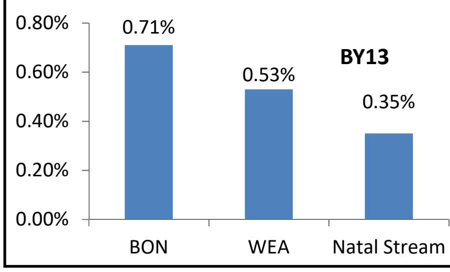
For BY13-15, SAR for Winthrop and Chief Joseph spring Chinook has been pretty consistent. The fish coming out of past three years, fish released from Winthrop and Chief Joseph Hatcheries have had pretty consistent returns. The 10(j) started off hot, but have come back to earth.

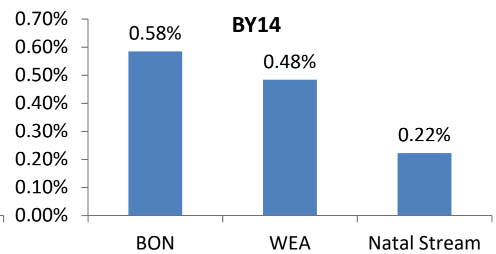




PIT data shows a smolt to adult return of .34% to Bonneville and .18% to Wells for the BY 2015 10(j) fish.
This indicates that approximately 240 BY15 10(j) fish have returned thus far to the Okanogan river basin – 120 in 2018 and 120 in 2019.





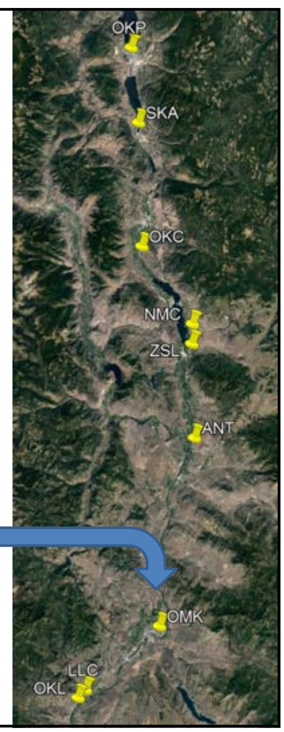


We had fewer fish return to the Okanogan in 2019 than in 2018, and detection in subbasin tributaries was not as widespread.

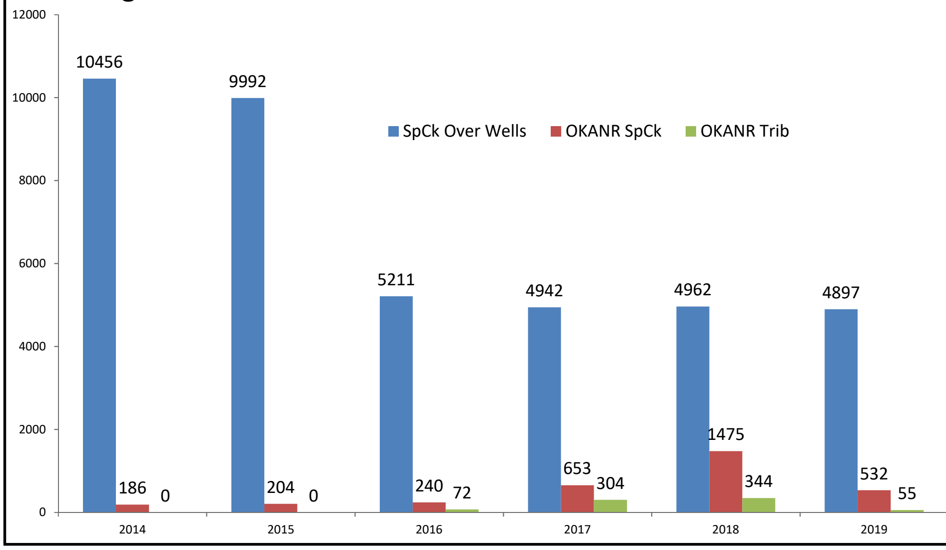
2019 →

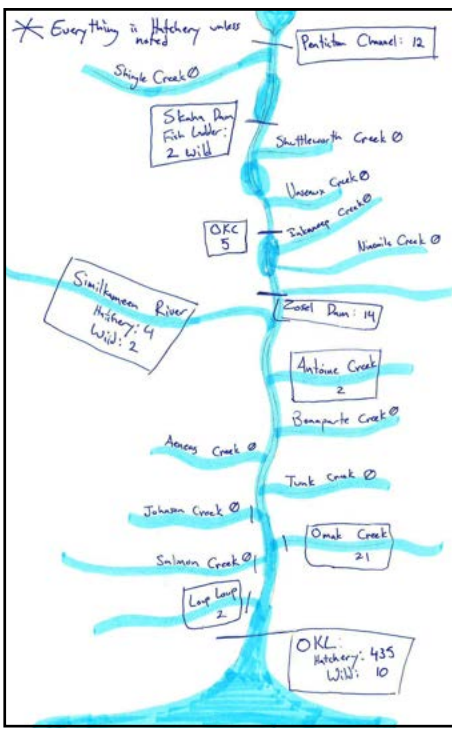
← 2018

§10(j) release site



PIT data doesn’t provide a usable spawn escapement estimate, but last detection information from PIT tags provides the foundation of our current best guess as to spring Chinook run escapement in the Okanogan river basin.





Using last PIT detections to assign tributary escapement estimates, we get the idea that not many Okanogan River spring Chinook ended up in tributary streams.

Brian Miller and OBMEP have calculated juvenile Chinook estimates for Okanogan River tributaries through their mark-recapture electrofishing activities. 2018 was a big year for Chinook!

	Juvenile Chinook					
Tributary	2014	2015	2016	2017	2018	2019
Salmon Cr	0	0	0	18 ± 0	1,893 ± 519	219 ± 57
Lower Omak Cr	0	0	64 ± 0	187 ± 57	48 ± 0	570 ± 185
Upper Omak Cr	0	0	0	0	0	0
Loup Loup Cr	0	0	0	0	295 ± 43	1,474 ± 100
Ninemile Cr	0	0	0	0	0	0
Bonaparte Cr	0	0	24 ± 0	0	0	0
Tonasket Cr	0	0	0	0	0	0
Tunk Cr	0	0	0	0	0	11 ± 0
Aeneas Cr	0	0	0	3 ± 0	7 ± 0	45 ± 3
Wanacut Cr	0	0	0	0	28 ± 26	33 ± 16
Johnson Cr	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled
Antoine Cr	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled
Wildhorse Sp Cr	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled
Shingle Cr	Not sampled	Not sampled	0	0	0	0
Inkaneep Cr	Not sampled	Not sampled	0	0	0	0
Shuttleworth Cr	Not sampled	Not sampled	0	0	0	0
Vaseux Creek	Not Sampled	Not Sampled	Not Sampled	Not Sampled	0	1
Total	0	0	88 ± 0	208 ± 57	2,271 ± 589	2,352 ± 361

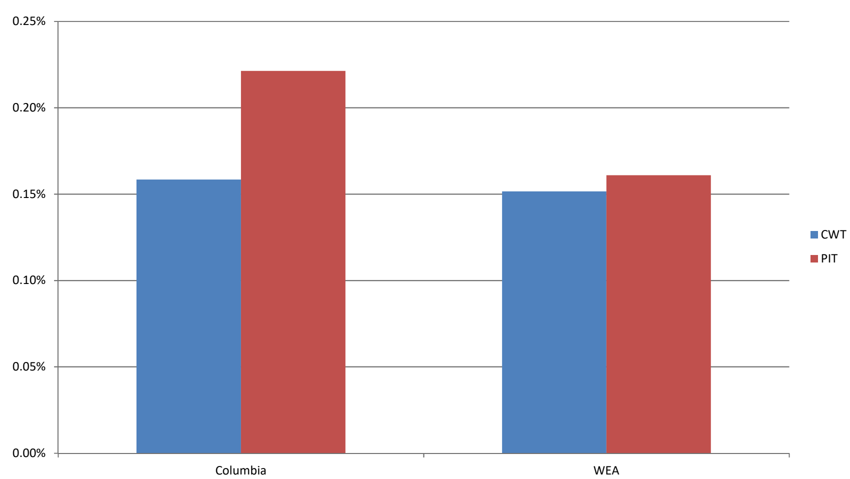
eDNA surveys show good distribution as well – but not in March, when we would expect eDNA from juveniles to show up.

Site	Jun 2012	Aug 2012	Oct 2013	Sep 2014	2015	Sep 2016	Sep 2017	Mar 2018	Sep 2018	Mar 2019	Sep 2019
US Tributaries											
Aeneas Creek			-	-		-	+	-	-	-	-
Antoine Creek			-	+		+	-	-	+	-	+
Bonaparte Creek	-	+		-		-	+	-	+	-	-
Johnson Creek								-	+	-	-
Loup Loup Creek			-	+		+	+	-	+	+	+
Ninemile Creek	-	-		-		+		-		-	-
Omak Creek (above falls)	-	-				+	+	-	+	-	-
Omak Creek (near mouth)	+	+		+		+	+	-	+	-	+
Salmon Creek (RKM 7.1)	+	+		+		+	+	-	+	+	+
Siwash Creek			+					-		-	
Tonasket Creek			+			-		-		-	
Tunk Creek			-			+	+	-	+	-	+
Wanacut Creek			-			-	+	-		-	
Canada Tributaries											
Inkaneep Creek	-	+		-		-	-	-			-
Vaseux Creek	-	+		+		+	+	-			-
Shuttleworth Creek	-	-		-		-		-			-
Shingle Creek (Lower)	-	+		+		-	+	-			-
Shingle Creek (Upper)								-			+
Shatford Creek								-			+

Although many stream miles were surveyed for spring Chinook, no redds were documented. 14 carcasses were recovered; extracted wire indicated 10(j) and Winthrop NFH release groups.

****TO BE UPDATED***

From the segregated fish, we can calculate SAR using coded wire tags as well as PIT tags. The two results are similar, and they pencil out to ~1140 fish back to the Columbia and ~820 back to Wells from BY 13.



WHAT'S THE TAKE HOME?

1. It's safe to say that adult springers return to the Okanogan basin
2. Natural reproduction is happening, if only on a small scale. Better redd and carcass data requires more intense sampling.
3. Collaborating with CRITFC and OBMEP has really helped our understanding of the spring Chinook recolonization of the Okanogan.

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:	2020		**Planting Goal:**	1,100,000
Species:	Summer Chinook		**Pounds:**	86,000
Stock:	Okanogan			
Origin:	Wild			
Program:	Integrated			
Egg Take Goal:	1,485,000		**Adult Goal:**	656

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
05/15/21	06/01/21	300,000	50.0	9.1	6,000	2,722	Sub-Yearlings	Omak	Ad Clipped	100% CWT
05/22/20	04/30/22	400,000	10.0	45.4	40,000	18,144	Yearlings	Similkameen	Ad Clipped	100% CWT
04/15/22	04/30/22	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:	2020	**Planting Goal:**	900,000
Species:	Summer Chinook	**Pounds:**	58,000
Stock:	Okanogan		
Origin:	Hatchery		
Program:	Segregated		
Egg Take Goal:	1,240,000	**Adult Goal:**	552

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
05/15/21	06/01/21	400,000	50.0	9.1	8,000	3,629	Sub-Yearlings	CJ Hatchery	Ad Clipped	100k CWT
04/15/22	04/30/22	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:	2020	**Planting Goal:**	700,000
Species:	Spring Chinook	**Pounds:**	46,667
Stock:	CJ Hatchery		
Origin:	Hatchery		

Egg Take Goal: 1,094,400 **Adult Goal:** 640

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
04/15/22	04/30/22	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: 2020
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
04/15/22	04/30/22	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

Contact List: Colville Tribes / Chief Joseph Hatchery Program

Updated: 04/17/2020

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2019 CJHP APR Meeting Summaries

Day 1, Wednesday, March 27, 2019

Day 2, Thursday March 28, 2019

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2019 APR Meeting Summary

DAY 1 – Wednesday, March 27, 2019

Attendees: See attached attendance list

Part 1 – Program Overview

8:15 – 8:30 Welcome Message & Participant Appreciation. *CCT F&W Director*

8:30 – 8:45 Introductions, APR Objectives, Agenda Review, Focus of Session.
***Casey** Baldwin, CCT, DJWA*

Questions/ comments:

- **No questions or comments.**

Part 2 – Data Analysis and Presentation: 2018 Year-in-Review

8:45 – 9:05 Population Status presentation. *Andrea Pearl CCT*

Questions/ comments – Population Status presentation

- Andrea Pearl– Recruits per spawner includes data through BY 2012 (includes 6-year old returns from that BY). Next year, we will present results from BY 2013, which is the first year hatchery fish were released from CJH.
- Tom Kahler (DCPUD)– Where do pHOS and PNI calculations before CJH program started (pre-2013) come from?
- Andrea P. – These results are based on data from the Similkameen Hatchery program.
- Todd Pearsons (GCPUD) – In the Okanogan River, the summer and fall Chinook populations are lumped together. In the Hanford reach, they are treated as separate populations. As we review program data over the next two days, what proportion of the run is actually fall Chinook?
- Casey Baldwin – This program hasn't intentionally propagated fall Chinook. Currently, summer/fall Chinook are considered one ESU. It's not clear how mainstem spawners fit into the ESU. One of the original objectives of the program was to bring back the fall component of the Okanogan population, but to date the program hasn't intentionally propagated the late-run/fall component, although some late-run brood are being collected.
- Steve Smith – In the Okanogan Master Planning process, the summer/fall Chinook population was considered a continuum. One of the Master Plan goals is to collect the late run component – this hadn't been done in previous programs that released fish into the Okanogan. By doing this, the goal was to also increase the spatial distribution of the population by increasing the number of spawners in the lower river.

- Todd Pearsons. – I've always assumed summers are tributary spawners and falls are mainstem spawners. Should these run components be managed separately?
- Steve S. – Charmaine Ashbrook did a tagging study showing that later arriving fish at Wells Dam spawn lower in the Okanogan River. This confirmed the Master Plan assumptions. The program goals were to intentionally increase this portion of the run component.
- Randy Friedlander– The program doesn't currently propagate fall Chinook, since the intention is to produce a high quality run that is available for harvest before the hunting season begins.

Part 3 – Review Operating Hypothesis (Pages 28-39)

9:05 – 9:35 **Review Management Framework** ***(Casey B. CCT, DJWA)***

- *<u>Logic Path</u>: Program Goals → Management Policy → Projected Outcomes*
- *Review 2018 ISIT updates: Override tool, adjustments to broodstock management and terminal harvest after July 15th Wells Dam counts were available*
- *2018 Outcomes versus Management Targets/ Plans for 2019*

Questions/ comments – Logic Path presentation

- Casey B. – In 2018, we made our first mid-season (July 15) PIT tag forecast for HORs. The forecast was based on expanded PIT tag returns to Wells Dam. The final PIT tag forecast was very close to the mid-season forecast. We can estimate integrated and segregated HOR program returns.
- Steve S. – The mid-season program adjustments by CCT and WDFW were impressive and it's good to see how well they worked.
- Peter Lofy (BPA) – I have a question about natural production (EDT) assumptions. Do we think that habitat productivity will continue to be low?
- Casey B. – Changes in EDT assumptions don't necessarily reflect changes in the habitat. In part, they reflect changes in the modeling assumptions and available information. The Master Planning assumptions were very preliminary and not based on empirical data. Now, we have empirical estimates of productivity and capacity. Since they are very close to EDT estimates, we decided to stick with EDT numbers for now.
- John Arterburn – New EDT estimates will be available soon. Habitat conditions are improving. Capacity is increasing but productivity is decreasing slightly. The new EDT model runs also include climate change scenarios through 2040 that incorporate changes in flows and temperature regimes. Outcomes indicate the summer/fall Chinook stock is surprisingly resilient and will maintain levels similar to current population.
- Casey B. – At next year's APR, we will present a full update of EDT/habitat assumptions.

Part 4 – Data Analysis and Presentation: 2018 Year-in-Review

9:45 – 10:20 **Harvest Program and Hatchery Surplus – Year-in-Review, 2018 Data Review & Analysis.** *Mike Rayton CCT, Brian Dietz CCT*

- *Harvest program and hatchery ladder results, (Mike R.)*

- *CWT presentation and results for harvest program (creel, purse seine) and hatchery ladder (Brian D.)*

10:20 – 10:40 Discussion with Partners – Harvest program and hatchery surplus

Questions/ comments – Harvest presentation

- Todd P. – At last year's APR, we discussed how the modified US v. Oregon agreement might change the CCT tribal allocation. Have any changes been made?
- Mike Rayton – At this point, no changes have been made to the U.S. v. Oregon allocations. We're still not sure how ocean harvests are estimated.
- Kirk Truscott – The previous U.S. v. Oregon allocations were rolled over for another 4 years.
- Steve S. – A scientific assessment of the allocation methods is in the works. Columbia River managers will also be reexamining escapement goals.
- Mike R. – They are also modifying how index stocks are selected to better represent UC fish in the allocation calculations.
- Todd P. – Are any other fisheries selective besides the tribal fishery?
- Steve S. – The Zone 1-6 sport fisheries are selective.
- Randy F. – The tribe needs to be more vocal and remind fisheries managers that CJHP fish are contributing to lower river fisheries.
- Pat Phillips – I attended a meeting earlier this year where a presentation showed that 40% of the Chinook entering the Columbia River are CJHP fish.
- Todd P. – In the CWT analysis, it looks like no Priest Rapids hatchery wire was found this year?
- Brian Dietz – That's correct, none were found at the purse seine or ladder this year.
- John R. – One Priest Rapids fish showed up on the spawning grounds this year.
- Casey B. – A few years ago, the program operated the ladder later in the year. We were concerned that late arriving fish that weren't tagged or ad-clipped would be mistaken for NORs. Our analysis using otolith marking data showed that a substantial number of PR fish showed up in October and November.
- Maureen Kavanagh (BPA) – Did the program use the Whooshh system this year (2018) to move brood?
- Mike R. – We used it last year (2017), but decided not to this year because fish numbers were so low. It was easier and faster to move fish manually. It also meant we didn't have to spend time maintaining the Whooshh equipment and protecting it from being vandalized.

10:40– 11:40 **Hatchery Production Program, Release Numbers and Broodstock Collection – Year-in-Review, 2018 Data and Analysis.** ***Matt McDaniel CCT, Casey Baldwin CCT, Andrea Pearl CCT, Brian Dietz CCT***

- *2018 hatchery release numbers and smolt survival*
- *2019 planned release numbers*
- *Source of broodstock (weir, purse seine, ladder)*
- *CWT and scale lab (age structure) results for broodstock based on collection location*
- *Management actions to meet program goals (pre-spawn mortality, fecundity)*
- *What we did in 2018 to deal with low catch rates and egg loss- what did we do in 2018*

- *to try and meet program goals (pre-spawn mortality, fecundity), did it work?*
- *Spring Chinook – returns to ladder, broodstock source*
- *Forecast and likely broodstock management scenarios for 2019*

11:40 – 12:00 Discussion with Partners – Hatchery program

Questions/ comments – Hatchery presentation

- Peter L. – Does the program have problems with precocial development? Have you considered changes in rearing practices to address this? Would this help with the fecundity problem?
- Kirk T. – The program is doing everything we can within the limitations of the existing water sources to slow fish development down. We can't move fish to acclimation sites earlier due to pathogen issues. We switch to surface water as soon as it cools down. We don't have a precocity issue. The jack rate is very low.
- Steve S. – The relief water tunnel water temperature is consistently around 50 degrees. Would using this water source making a difference to the program?
- Kirk T. – This is currently being discussed with BPA.
- Steve S. – Is the age structure of subyearling returns different from yearlings? I thought that subs were more likely to return as 5-year olds?
- Matt McDaniels – We haven't looked at this yet.
- Matt L. – We can look at this using CWT data from spawning ground surveys (age structure of subyearling vs. yearling returns).
- Casey B. – We need to weigh the trade-offs of releasing yearlings vs. subyearlings. Yearling releases have a high SAR but returns may have a younger age structure.
- Greg Fraser (FWS) – What is the relationship between brood size/length and fecundity? Would this save sorting /handling in the hatchery? Other programs uses this approach.
- Matt M. – We can try this. We do have size and fecundity data for NORs and HORs.
- Maureen K. – Will the program's assumption about pre-spawning mortality and fecundity be adjusted this year?
- Matt M. – We will discuss this on Day 2. This year, the program will still shoot for a PSM or 90%.
- Greg F. – What is the purpose of night releases from the acclimation ponds?
- Matt M. – This reduces avian predation. The following morning, they are forced out if they don't leave volitionally at night.
- Greg F. – For the survival rates of smolts to RRJ – does the night release method influence this survival rate? Has this release method been consistently used?
- Matt M. – This method has been consistent for the past few years. Casey's survival data to RRJ reflects consistent release practices.
- Matt L. – Just taking a quick look at the 2018 CWT data, the subyearling and yearling age structure based on returns to the spawning grounds is very similar.
- Todd P. – Have there been any fertility problems in the hatchery? Do you use Heath trays?
- Matt M. – No, we haven't had fertility problems. We use 1:1 spawning with a backup male. Yes, we use Heath trays.

- Todd P. – At the most recent PNW fish culture conference, a presentation showed there was a 10-15% increase in incubation success by increasing the amount of substrate. We're considering trying this next year in the Hanford Reach.
- Matt M. – We actually decreased the substrate amount this year, but we're evaluating this.
- Casey B. – Back to the question about adjusting key assumptions: this year, it makes sense to adjust the fecundity assumption. However, adjusting both the fecundity assumption and PSM assumption means we'll need to collect more brood, which potentially increases the PSM problem due to higher densities in raceways. Also, collecting more brood is problematic given the low run forecast this year. We assume there is no policy support for reducing the program size, particularly since the facility and program was designed with the third water source in mind to allow production of 2.9 million juveniles.

12:50 – 2:15 **Research, Monitoring & Evaluation Program – Year-in-Review, 2018 Data Review & Analysis Summer/Fall Chinook.** ***John Rohrback CCT, Andrea Pearl CCT, Matt Laramie USGS, Brian Dietz CCT***

- *Okanogan Juvenile Chinook Monitoring- Beach Seine, RST, SIA Tease out mainstem Columbia vs Okanogan SAR (John R.) John (Andrea, PNNL staff to develop short summary presentation on 2 year study)*
- *Okanogan Adult Temporary Weir (focus on broodstock collection) (Andrea)*
- *Chinook Spawning Ground Summary – includes CWT and scale lab results, pre-spawn mortality (Matt L.)*

2:15 – 3:00 Discussion with Partners – RM&E Program – Summer/Fall Chinook

Questions/ comments – Juvenile Monitoring Presentation

- John R. – It's not clear why zero (or almost zero) PIT tagged NOR juveniles are returning as adults. We noticed that this starts with BY 2013, which is the first year the tribe took over screw trapping and PIT tagging juveniles. Our sample sizes for the first couple of years, before we started beach seining, were very small. We know that some PIT tagged fish are surviving through RRJ and McNary Dams, so they aren't dying due to tagging practices. We also know that we are tagging fish that are leaving the system later in the season (in order to catch fish that are of taggable size). These fish may experience poor conditions in the river and/or ocean (more so than fish leaving the system earlier in the season).
- Greg F. – Please explain the color coding scheme used in the isotope analysis results.
- John R. – There appear to be some fish that move between the Similkameen and Okanogan. We wanted to make sure the analysis correctly identified these fish as Okanogan fish. In the figure, the red circles are Chinook. The other colors (blue, green) are resident species (found in the Okanogan, Similkameen, and mainstem Columbia) that were also sampled and were used to validate the Chinook results.
- Steve S. – Is there any evidence of overwinter rearing in the upper Columbia (i.e., do some juveniles rear in reservoirs in the upper Columbia rather than migrating to the ocean)?
- John R. – There are a few PIT detections of outmigrating juveniles at RR and McNary in the following year. The reservoir reared component is very small.
- Tom K. – Beach seining for juvenile NORs is probably not representative of the run at large because there are alternative rearing strategies that aren't in the sample, and the sample

doesn't represent the early migrating component (smaller fish leaving the system earlier in the year).

- Casey B. – The question we need to address is, is the juvenile tagging data useful and representative enough to draw conclusions from?
- Tom K. – In our program, old fyke net data showed very small fish migrating out early in the year. These aren't represented in the beach seining sample. We elected to use a 12 mm PIT tag to increase detection probability. We put 12 mm tags in fish as small as 58 mm FL. If you are more interested in SARs than in juvenile detections at RR and McNary, you could probably tag down to 45 mm using a 9 mm tag.
- John R. – We've tried this for the past two years (tagging down to 48-50 mm with a 9 mm tag).
- Todd P. – What is the value of the juvenile trapping information, because the traps aren't capturing a representative sample of juveniles (and efficiency estimates are so low that we can't draw any conclusions about sampling efficacy). It's not clear that juvenile sampling efforts are producing any data that can be used for management purposes (e.g., estimating natural production or SARs or even growth rates due to low sampling efficiency/potential for biased sample).
- Maureen K. – BPA has recently finished conducting a review of screw trap methods and results from a number of Columbia Basin programs. The results have not yet been disseminated.
- Kirk T. – These results/low trap efficiencies are not unusual for large river systems. We've been continuing to trap juveniles because we were hoping to sample spring Chinook as well. We agree that data are low quality and we need to reconsider our monitoring methods.
- Todd P. – If data are not representative of timing or size of fish leaving the system, and can't be used to estimate natural production of juveniles, then you have to question why you are continuing to collect these data. Other large river systems are able to estimate trap efficiency and use this information to estimate the number of smolts leaving the system.
- Peter L. – What management decisions are you making based on these data that you can't get any other way?
- Kirk T. – Estimation of number of natural juveniles produced, average size, estimation of SAR of natural origin fish.
- Casey B. – We attended a workshop a couple of years ago with the PUDs that discussed how to effectively evaluate subyearling Chinook mitigation programs. Have any conclusions come out of these discussions?
- Tom K. – No, we are working on a report, but we've agreed that it is difficult to obtain a representative sample of these populations to monitor them effectively.
- Kirk T. – Our plan at this point is to continue to monitor juveniles. It is somewhat difficult to justify what we are doing since there is a 4-5 year delay between trapping and marking juveniles and getting adults back to calculate SARs (in order to have data that can be used for management decisions).
- John A. – Non-traditional approaches are available. We've been PIT tagging steelhead in small tributaries for a number of years, and have been able to estimate SARs with a very small sample size (although SH yearlings are much bigger than Chinook subyearlings). One question I've had about the summer/fall Chinook data is, why is mortality so high between

release (after PIT tagging) and the first detection site (using CJS model)?

- Steve S. – Why is the 8 foot screw trap trap placed in the current site and not moved elsewhere?
- John R. – Historically, this has been the site with the highest number of captures. It also can be operated during lower flows.

Questions/ comments – Weir presentation

- John A. – Is this the first year steelhead have been collected at the trap?
- Andrea P. – Steelhead were not collected – they were trapped, marked, and released upstream.
- John A. – It would be interesting to discuss the possibility of collecting wild steelhead for brood using weir.
- Greg F. – Based on the data, it appears that 2014 is only year when the weir worked well (~15% capture rate). What was different about that year?
- Andrea P. – It's difficult to say what worked well in that year. In 2014, adult returns were high and it was easy to collect enough brood for the program. In 2015, the majority of the season was lost due to fires, so we couldn't test what worked in 2014. In 2016 and 2017, adult returns were also high but trap numbers were low again. We're trying different approaches to direct fish into the trap.
- Mike Vaughn (WDFW) – Were carcasses captured at the weir PSMs or spawners?
- Andrea P. – The majority were PSMs. We don't know how far they washed down. We do know that captures of PSMs at the weir are not a good way to evaluate the PSM rate in the basin, since not all carcasses wash downstream.

Questions/ comments – Spawning Ground Surveys

- Matt L. – Zosel Dam video monitoring has been discontinued, which means we won't have data on escapement in Canada. One possible strategy to replace this information is PIT tagging returning adults at Wells. Abundance in Canada has averaged 1,000 adults.
- Pat Hale (WDFW) – Does anyone surveys redds in the mainstem Columbia River above Wells Dam?
- Mike Vaughn (WDFW) – Redds tend to be 30-35 feet depth and are not detected adequately by spawning surveys. We assume there is a lot of undocumented spawning activity in the mainstem above Wells.
- Todd P. – Your graphs showed a growth difference between hatchery and wild fish. You'd expect adults returning from outmigrating hatchery yearling smolts to be larger than wild fish, not the other way around as your data showed.
- Matt L. – The graph compares wild subs to hatchery yearlings, which have a difference in age of one year. Wild subyearlings make this initial size difference up in the first year in the ocean.
- Casey B. – It was shocking to see how many small adults (<66 cm FL) are actually 4-year olds. I wonder if this is a function of bad ocean conditions – slow growth resulting in small adult returns?
- Steve S. – Does the size trend (smaller fish on the spawning grounds, HORs smaller than NORs) also reflect fishing pressure/ harvest (size) selectivity in the lower Columbia River gill net fisheries?

- Todd P. – It's probably a combination of harvest effects and competition/food web issues in the ocean. This size trend has also been observed in Alaska.
- Greg F. – Are fish < 66 cm FL sexed or assumed all male? This past year, we started sexing fish during creel surveys instead of assuming jacks were males.
- Tony C. – Fish are ultra-sounded on the broodstock collection barge to determine sex. But smaller fish need to make it to the barge in order for us to check this – right now, they are being harvested (HOR jacks) or released (NOR jacks).
- Casey B. – Would incorporating small NOR females into the brood impact the size of progeny? It depends on the heritability of size and other factors. Is small size due to ocean conditions or size selectivity in Lower River fisheries?
- Mike R. – Even if small NORs were collected for brood, the program would still need to collect HORs for integrated program brood (there are not enough NORs to make up the shortfall).

3:15 – 4:15 **Research, Monitoring & Evaluation Program – Year-in-Review, 2018 Data Review & Analysis Spring Chinook**. *Casey Baldwin CCT, Matt Laramie USGS, John Rohrback CCT*

- *CCT presentation:*
    - *Brief review of Adaptive Management process (Casey, provides update to Adaptive Management Plan and Monitoring)*
    - *PIT Tag Returns and Escapement - PIT tag escapement based on fish tagged at Wells Dam by WDFW which doesn't use the Wells spring vs summer run timing to mark fish. It marks across the run and what the fish looks like (spring vs summer)*
    - *Spring Chinook distribution- summary of eDNA results and juvenile sampling (electrofishing)*

4:15 – 4:45 Discussion with Partners – RM&E Program – Spring Chinook

Questions/ comments

- Steve S. – How are US and Canada goals for spring Chinook integrated? How is habitat in Canada taken into account when setting population goals for spring Chinook?
- Casey B. – 10(j) status only accounts for the US portion of the population. PIT tag arrays exist in both US and Canadian spawning areas. The EDT assessment will include Canada – it's all considered one population. ONA is very interested in spring Chinook recovery but they have a limited budget. OBMEP is doing most of the monitoring work.
- John A. – There are PIT tag arrays in Canada on the bottom of Osyoos Lake, at Skaha Lake, and elsewhere, but detection efficiencies aren't very high. The tributary arrays in the US are very efficient.
- Steve S. – The spring Chinook monitoring results are extremely encouraging given poor ocean conditions.
- Casey B. – We observed differences in SARs (10(j) fish vs. segregated fish. One question is whether there a difference in run timing? We know that early returning fish are hit harder by pinniped predation below Bonneville Dam. Between the mark-selective fishery in the

lower river and pinniped predation, can we explain the difference in SARs?

- Matt C. – The Leavenworth population has been declining due to pinniped predation – it is one of the hardest hit stocks. From the mouth of the Columbia River to Bonneville, survival of returning adult spring Chinook is only 52%.
- Todd P. – Is there any directionality in the PIT tag arrays in the Okanogan River?
- John R. – No. The detection rate at OKL is about 64%. The last detection is assigned to the last location or tributary based on the date of detection.
- Todd P. – Is it possible to determine if fish were detected in the tributaries and then left?
- John R. – Only if they were detected in the tributaries and later detected in the mainstem. A lot of the detections in the tributaries were late in the year, so this is possible.
- Casey B. – It is also important to note that some fish PIT tagged by WDFW at Wells Dam and identified as spring Chinook (based on date of capture) turned out to have CWT and were later determined to be CJH HOR summer/fall Chinook. Also, some springers have final detections at Zosel in late September.
- Mike Vaughn (WDFW) – At the end of the season, we try to go back once scale results are available to correct the stock ID of tagged fish in PTAGIS.
- Casey B. – We need to remember to re-query PTAGIS to get these updates.
- John R. – We don't see any difference between the timing of returns of Winthrop and the segregated CJHP fish to Bonneville Dam.
- Greg F. – Do eDNA surveys distinguish between runs?
- Matt L. – No. Spatial attributes (detection location) are used to distinguish runs.
- Greg F. – What time of year are juvenile electrofishing surveys conducted?
- John R. – September/October.
- Casey B. – We need to take a closer look at homing (back to CJ hatchery – segregated fish) vs. to the Okanogan River.
- Steve S. – Juvenile spring Chinook in the tributaries could be forced out by winter conditions. As the Okanogan warms up, they could reenter the tributaries. We've observed this in Idaho and elsewhere.
- Casey B. – The best adult distribution data is from fish tagged at Wells. It is our understanding that WDFW is going to expand PIT tagging effort at Priest Rapids, and Wells tagging will go away. CJH fish are a very small proportion of fish at captured at Priest and we may not have a very large sample size.
- Mike Vaughn (WDFW) – At this point, Wells tagging will continue.
- Todd P. – Given what you know now, does EDT modeling suggest that adult spring Chinook could survive in tributaries where adults have been detected?
- John A. – Several creeks – Salmon, Shingle, etc. – could likely support adults. They have adequate flows, pools and cool water for adults to hold over and spawn. Other creeks are marginal and have limited pools and flows. All of these streams produce steelhead smolts. The limiting factor for spring Chinook is adult holding habitat.
- Todd P. – Would it be worth collecting adults that are using unsuitable habitat and placing them in suitable habitat?
- Casey B. – I believe is possible. All spring Chinook in the Okanogan are considered nonessential experimental fish. There is limited protection for fish or restrictions on take.

4:45 – 5:00 Wrap-up, Actions, Discuss Key Issues for Day 2. *Andrea Pearl CCT, DJWA*

Questions/ comments

- Casey, Andrea P. – Thanks for everyone's participation today. Day 2 will start with a review of Key Assumptions (hatchery, harvest, etc.). We can also continue any Day 1 discussions if there are additional questions. Then we will work through the Work Plans for spring and summer/fall Chinook. This year, we will start with the spring Chinook work plan.

END DAY 1

2019 APR Meeting Summary

DAY 2 – Wednesday, March 28, 2019

Attendees: See attached attendance list

DAY 2 – Thursday, March 28

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

Follow-up Comments from Day 1

New PIT array/estimating prespawning mortality

John A., Kirk T. – There was a follow-up discussion on potentially installing a new PIT tag array in the Okanogan or Similkameen. This would be included in a future funding request. We need to determine the location – possibly above Johnson Creek. The PIT array in Salmon Creek cost approximately $80,000 to install. A good first step might be to install a video camera for site assessment. We may look into purchasing or leasing video equipment for FY 2019 and also purchase a new PIT detector for staff to try in 2019.

John A. – Pre-spawn mortality is very difficult to measure. Many fish likely end up in deep holes in the Similkameen and we can't get a true determination of pre-spawn mortality.

Casey B. – Do we know how deep PIT tags can be detected? In the Wenatchee, WDFW uses drift boats and PIT tag detectors on long poles. A priority location for a new PIT array may be the Similkameen. We need to determine where to site a new PIT array, estimate the cost of installation and maintenance, and decide who is responsible for following through on this action.

John R. – A scuba certified person would be needed to survey deep holes on the Similkameen for carcasses. We know that the spawning ground surveys underestimate prespawning mortality, and the radio-tagging study (adults tagged at Wells) may also be an underestimate due to cooler water conditions during the two years of the study.

Invasive Species

Mike R. – Are areas being monitored for zebra mussels? The Okanogan has a higher risk than the Similkameen. Are eDNA sampled analyzed for invasive species?

Matt L. – The samples we collect annually for spring Chinook monitoring are not currently being screened for zebra or quagga mussels, but we have the ability to do this, if there is interest and funding to support it.

Randy F. – Currently the Resident Fish division is the lead on collecting mussel data. We don't have a separate division to monitor invasive species. Chris Fisher is also involved with a multi-agency program to monitor 150 river miles for northern pike minnows.

Casey B. – Is there a plan for how to respond when northern pike are detected in the Okanogan? CCT should plan for this.

Kirk T. – DCPUD is responsible for this.

Andrea / Randy F. – Within CCT, the resident fish division is responsible for monitoring invasive fish species.

Future Program Management (2019 and Beyond)

Key Assumptions/ ISIT Review – Harvest Rates

- Casey led a discussion to review harvest rate assumptions.
- We reviewed the most recent empirical estimates of pre-terminal and terminal harvest rates in the Key Assumptions. Pre-terminal harvest rates (ocean, Zones 1-5, and Zone 6) are estimated based on TAC data. Terminal harvest rates for HORs are estimated using RMIS data (expanded estimates of CWT recoveries).
- The five-year average of the terminal harvest rate on HORs has been about 30%, but in 2018 it was just 20% due to management decisions to reduce terminal harvest levels.
- In 2019, the plan is to minimize terminal harvest of integrated HORs to maximize natural escapement in the Okanogan River given the low run forecast. Therefore, to calculate the 2019 Management Targets, we assumed the terminal harvest rate of HORs (int and seg) will be 20% (similar to 2018).

Key Assumptions/ ISIT Review – Hatchery

- Casey and Matt McDaniels led a discussion to review in-hatchery assumptions.

Prespawning Mortality and Fecundity Assumptions

- Matt M. noted that the program has not been achieving its pre-spawning mortality and fecundity objectives. While managers don't have any control over fecundity, this year the plan is to implement additional protocols to attempt to reduce pre-spawn mortality.
- We discussed adjusting the pre-spawning mortality assumptions for both the integrated and segregated programs. The problem with doing this is that it means more broodstock would need to be collected, which means taking more fish (NORs and integrated HORs) off the spawning grounds. Given the low run forecast this year, this isn't a good option.
- This year, the focus will be on reducing prespawning mortality by minimizing sorting and handling of brood and utilizing prophylactics to treat adults in the raceways. The goal is to keep mortality < 10%. Next year, we will evaluate whether these methods worked and whether an adjustment to the prespawning mortality assumption is needed.
- Randy F., Steve S., Matt M., Kirk T. – There was a discussion about the reservoir, well and relief tunnel water supplies. There needs to be a long-term plan for implementing the relief tunnel water supply. In the meantime, an interim plan needs to be developed. Is it feasible to tap the relief tunnel using a temporary water supply line? We need to assign a working group and develop an issue paper discussing short term and long term program needs.

Segregated Program Straying Assumptions

- For the segregated program, we assume that 90% of fish that reach the terminal area are harvested; of the remaining unharvested fish, we assume 80% go to the hatchery ladder and 20% stray to the Okanogan spawning grounds. This means that only 2% of total segregated returns are assumed to stray to the spawning grounds ((1-90%)* 20% = 2%).
- We need to revise our calculations of straying segregated fish in 2018 to make a direct comparison to this benchmark (calculate strays as a percent of total returning segregated fish, rather than as a percent of spawners).

Weir Assumption

- We discussed adjusting the weir assumption for 2019. The plan in 2019 will be to release all integrated HORs trapped at the weir but to retain all segregated HORs. Therefore, the weir assumption used to calculate the management targets will be adjusted to 0% for integrated HORs. We will continue to use the five-year average weir assumption for segregated HORs.

Broodstock Collection

Casey B., Mike R. – There was a brief discussion about using a new location to beach seine for brood in 2019. This would supplement brood collected by the purse seine.

Randy F. – The program's management priorities are to 1) put fish on the spawning grounds, 2) collect fish for brood, and 3) harvest fish.

John R. – Could we consider moving more production to the segregated program (this would mean fewer NORs and int HORs would be collected for brood and more would be on the spawning grounds).

Kirk T. – Not much would be gained by doing this. The segregated program produces fish for harvest, not to supplement natural spawning.

Issue of small fish in broodstock

Matt L. – The small size of returning adults in 2018 may be partly caused by selective (size biased) fishing, but may also be related to poor ocean conditions. In 2018, we found 4-year old fish on the spawning grounds that are < 62 cm FL (jack size).

Casey B., Tony C. – There was a brief discussion about how small fish are sorted during broodstock collection at the purse seine. NOR jacks are released. HOR jacks are not used for broodstock, but are harvested.

John R. – If we don't collect NOR jacks for broodstock, they are released and go to the spawning grounds. HOR jacks are harvested at the purse seine.

Harvest Issues

Application of pound net traps for harvest or broodstock

- Casey B. – This is a potential future application to Spring Chinook in the Wells inundated zone.

Summary of work on harvest issues that are affecting program (Steve Smith)

- The CJHP stock is one of the most heavily harvested stocks in Alaska harvests of 11 indicator stocks

- A new consideration this year is pinniped mortality on adult Chinook salmon. Studies are now indicating that seals and sea lions are taking about a third of the adult spring Chinook run between the river mouth and Bonneville Dam. Information on pinniped predation of summer/fall Chinook has not been reported, but it could be impacting at least the early portion of the summer run.

- One reason for the continued health of the summer/fall Chinook population may be a result of how managers allocate fish to the spring, summer and fall runs in the Columbia River. Some summer run Chinook are likely passing Bonneville prior to the June 15 designated end of the spring Chinook run and are consequently exposed to lower harvest rates in Zones 1-6 to protect weaker spring Chinook runs. Additionally, the significant Zone 6 harvest could be taking later arriving spring Chinook which are counted against the summer Chinook harvest.

- UCR summer/fall Chinook have been identified as an important prey species for Southern resident killer whales. Efforts to boost whale survival in the future may include reductions in ocean harvest of Chinook salmon in Washington coastal waters. Conversely, reductions in some northern ocean and Puget Sound fisheries might be offset with greater harvest in Washington coastal waters supporting UCR Summer/fall Chinook. Litigation is currently underway on ocean harvest management as it relates to the health of the whales.

- Steve Smith suggested putting together a summary for the CCT chair of key management issues related to harvest that need to be addressed to help meet escapement goals.

Issues (Steve S. /Randy F. Discussion)

- The Pacific Salmon Commission (PSC) reports count any fish passing McNary Dam as escapement. Fish exceeding the U.S. v. Oregon allocation above McNary are considered overescapement. This policy doesn't consider the impacts of harvest past McNary Dam on CJHP fish.
- Need to determine appropriate escapement levels based on increased lower Columbia River harvests.
- New harvest regulations for 2019 may take out ~2200 fish in lower Columbia River fisheries.

Randy F. – Harvest goals are all focused on lower river fisheries. The CCT Chair will be testifying at the PSC meeting.

10:00 – 12:00 **Annual Work Plan for Anadromous Division to Support CJHP – Program Planning Exercise. Activities, Responsible Parties, Timeline, and Deliverables.**
Andrea Pearl CCT, Casey Baldwin CCT, Mike Rayton CCT, Matt McDaniel CCT, John Arterburn CCT, DJWA

Questions/ comments:

- Notes on this discussion are in the Work Plans for Spring and Summer/Fall Chinook.

1:00 – 3:00 **Annual Work Plan for Anadromous Division to Support CJHP – Program Planning Exercise. Activities, Responsible Parties, Timeline, and Deliverables.**
Andrea Pearl CCT, Casey Baldwin CCT, Mike Rayton CCT, Matt McDaniel CCT, John Arterburn CCT, DJWA

Questions/ comments:

- Notes on this discussion are in the Work Plans for Spring and Summer/Fall Chinook.

END 2019 APR

The Chief Joseph Hatchery
2020 Annual Program Review