

# Colville Confederated Tribes Chief Joseph Hatchery 2021 APR Production Update

## Colville Tribes Fish & Wildlife Presenters



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# Summer Chinook 2020 Release Summary

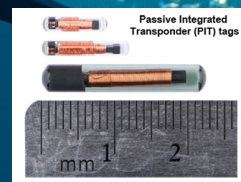
## Summer Chinook – Okanogan Stock

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

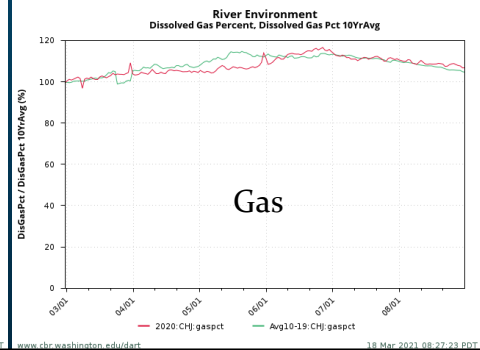
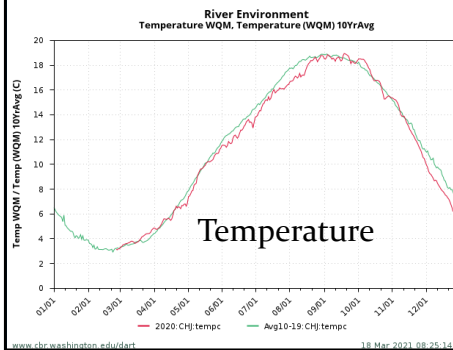
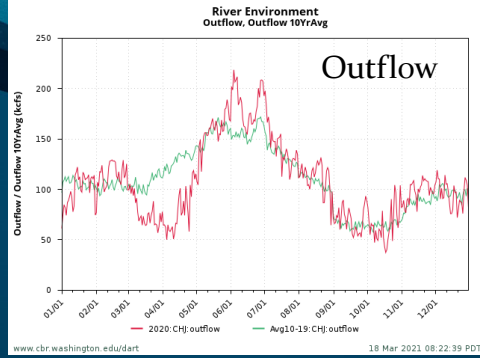
## KQM 4: Are the hatchery post-release targets met for survival?



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

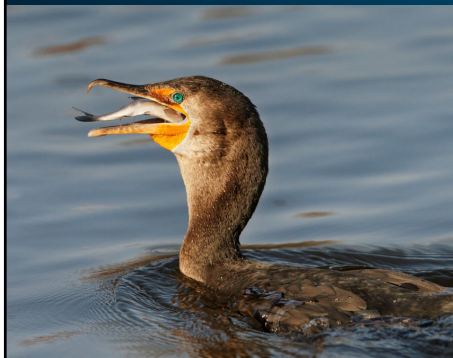


## In-river conditions

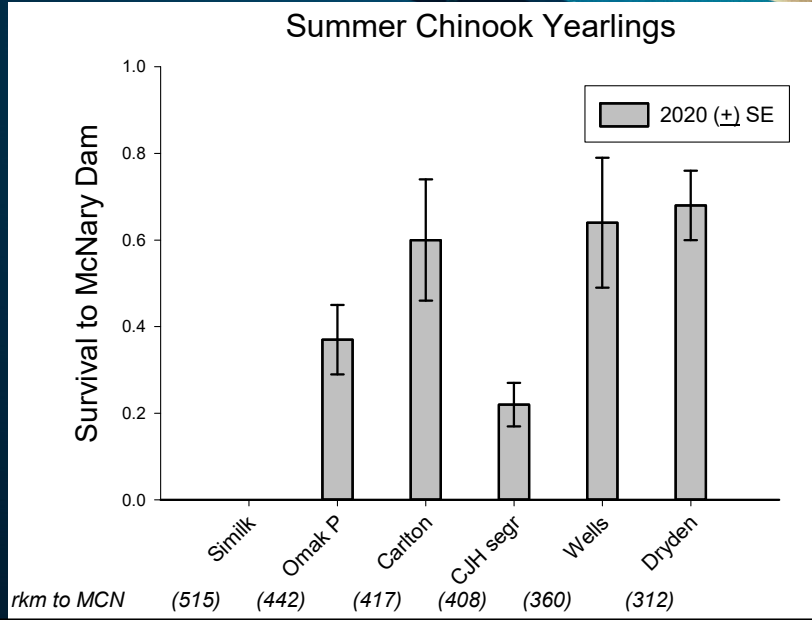


## Management Practices

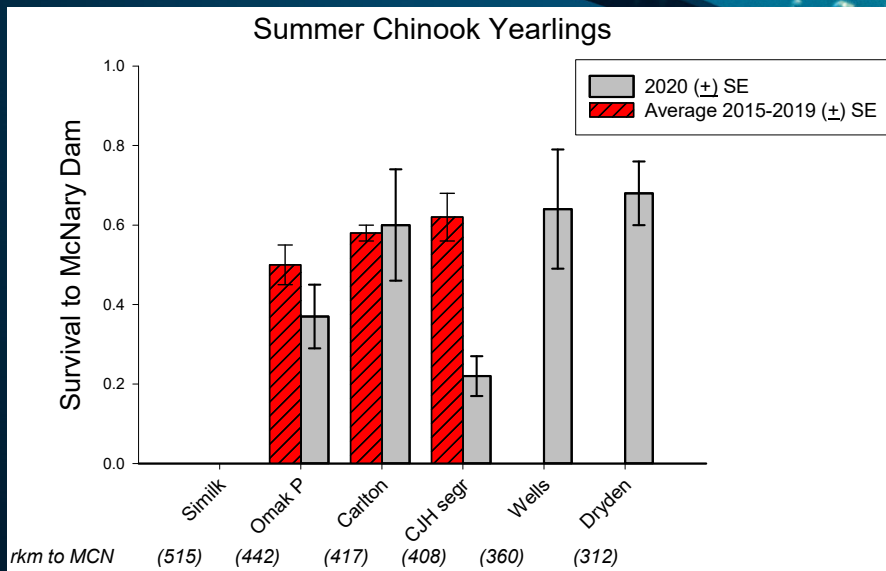
- 2020 night volitional release then 'force out' at CJH to reduce predation (SOP since 2016)
- Fish size and release timing:
  - SumChk Yearlings FPP = 10.3 (target = 10)
  - Spr Chk Yearlings FPP = 13.5 (target = 15)
  - SumChk Subs FPP = 67.3 (target = 50)
- Yearlings released April 15-16
- Subs released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



# Survival to McNary Dam

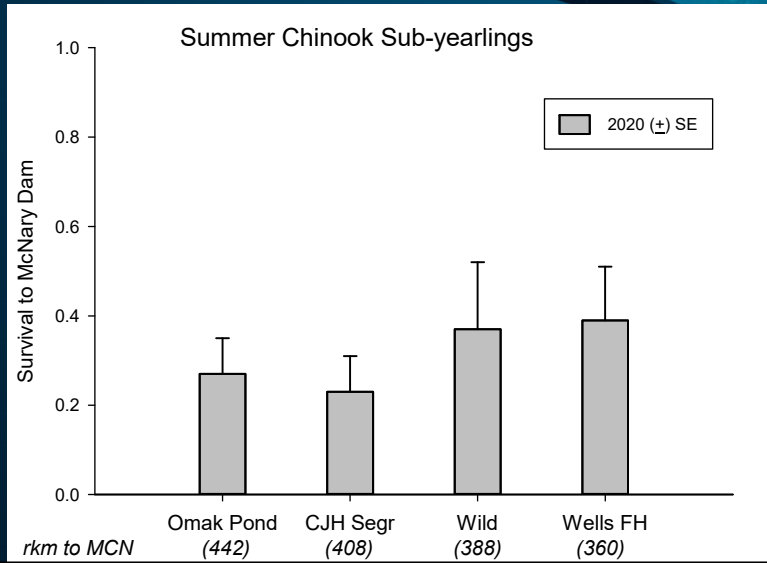


# Survival to McNary Dam



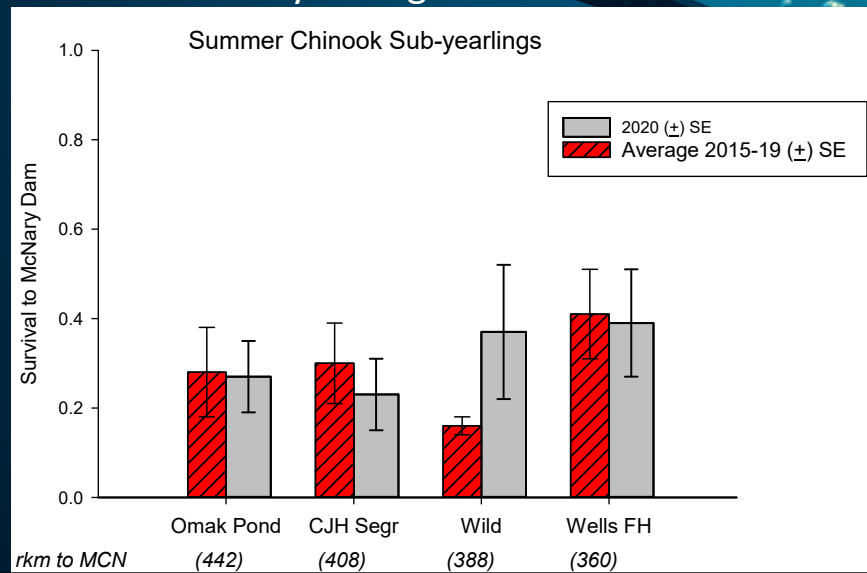
# Survival to McNary Dam

## Subyearling Summer Chk



# Survival to McNary Dam

## Subyearling Summer Chk



# Summer Chinook In-river Survival Summary

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

# BY20 Summer Chinook Broodstock Survival to Spawn

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

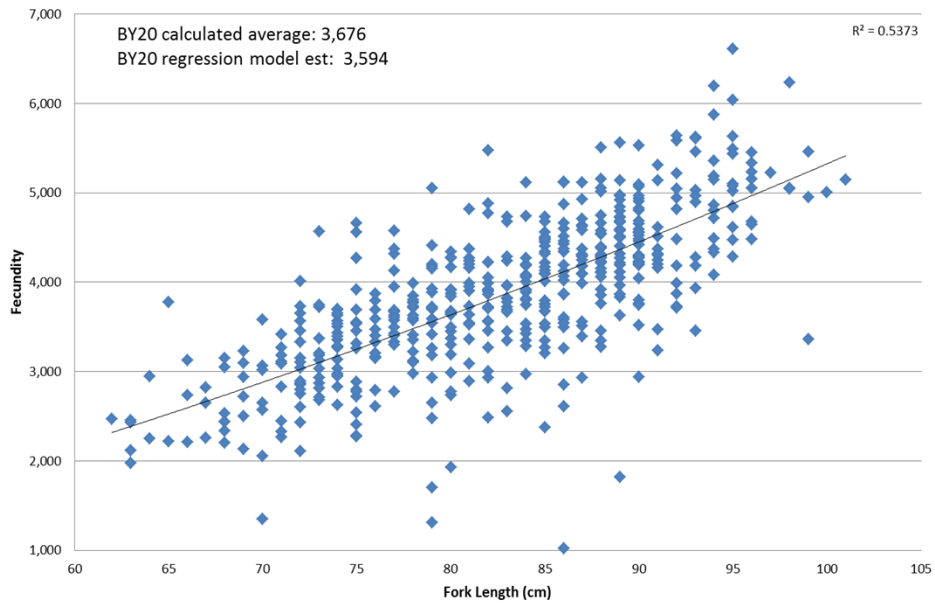
Bio-criteria standard for survival to spawn: 90%

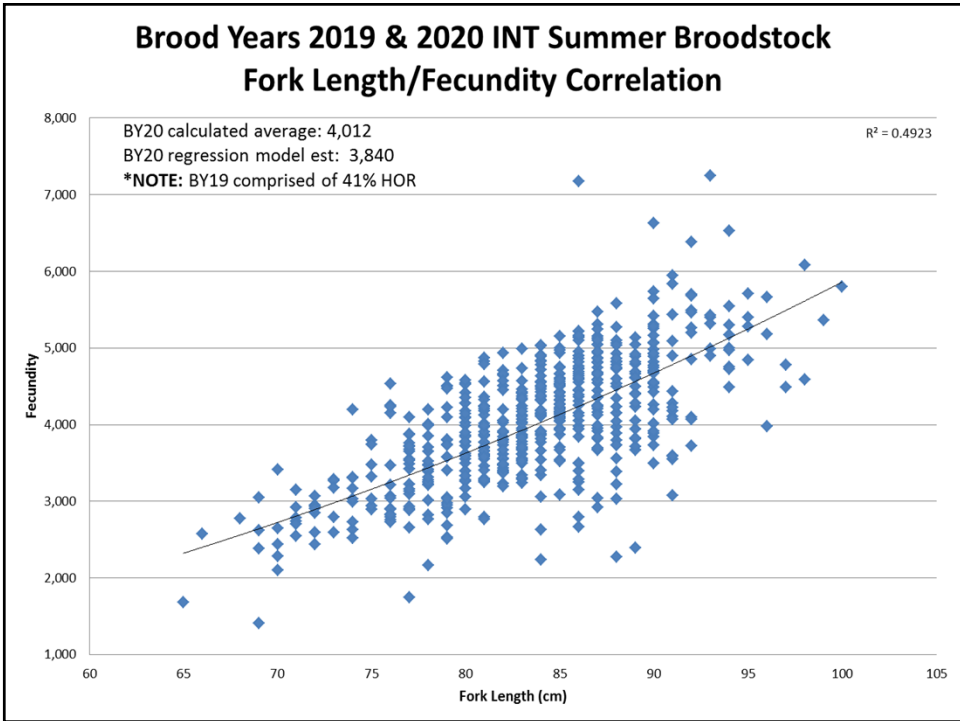
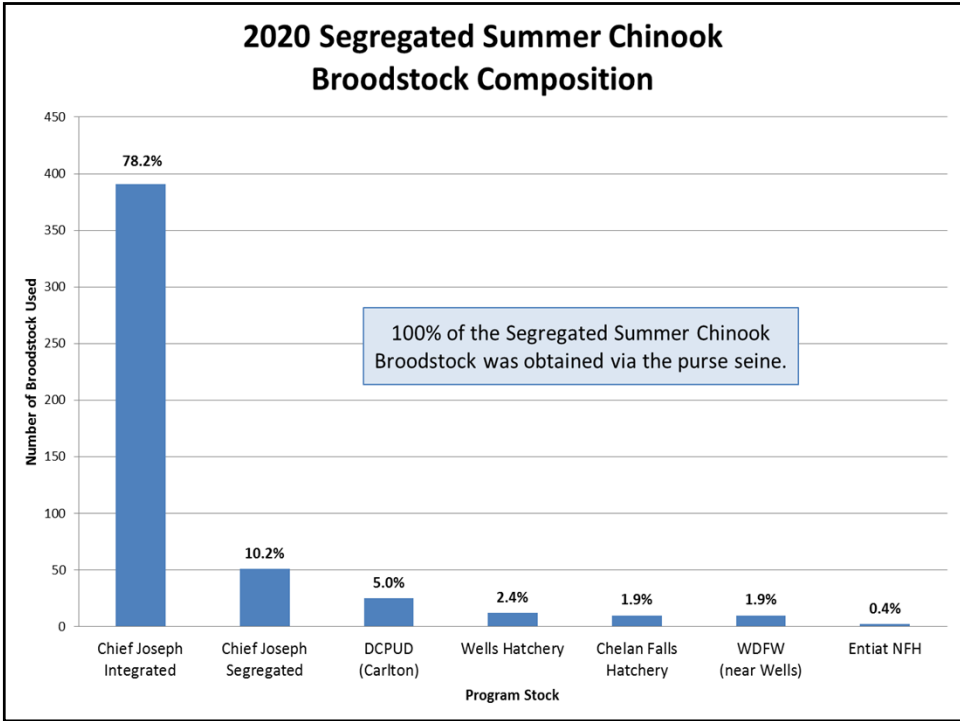
# BY20 Summer Chinook Egg Take



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

## Brood Years 2019 & 2020 SEG Summer Broodstock Fork Length/Fecundity Correlation







## Integrated (NOR) Summer Chinook In-Hatchery Performance

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

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

## Segregated (HOR) Summer Chinook In-Hatchery Performance

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

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

# SEG vs INT Summer Chinook Mean In-Hatchery Performance

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

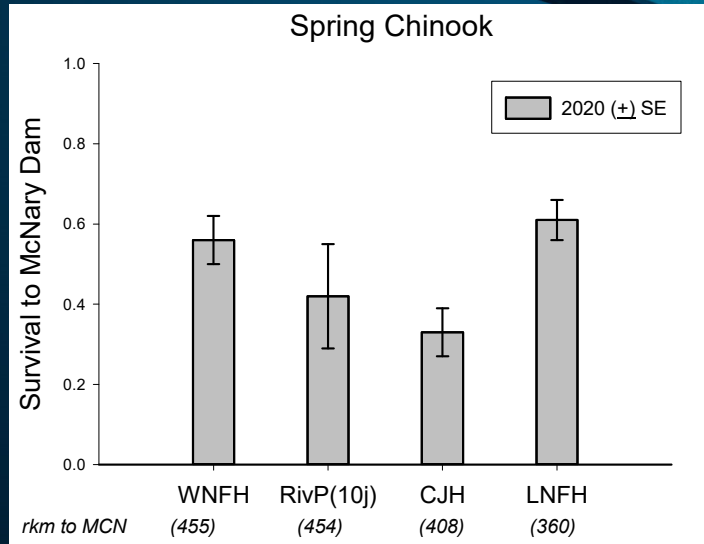
\*Does not include BY19.

\*\*No INT sub-yearlings in BY17 and no sub-yearlings for either program in BY18.

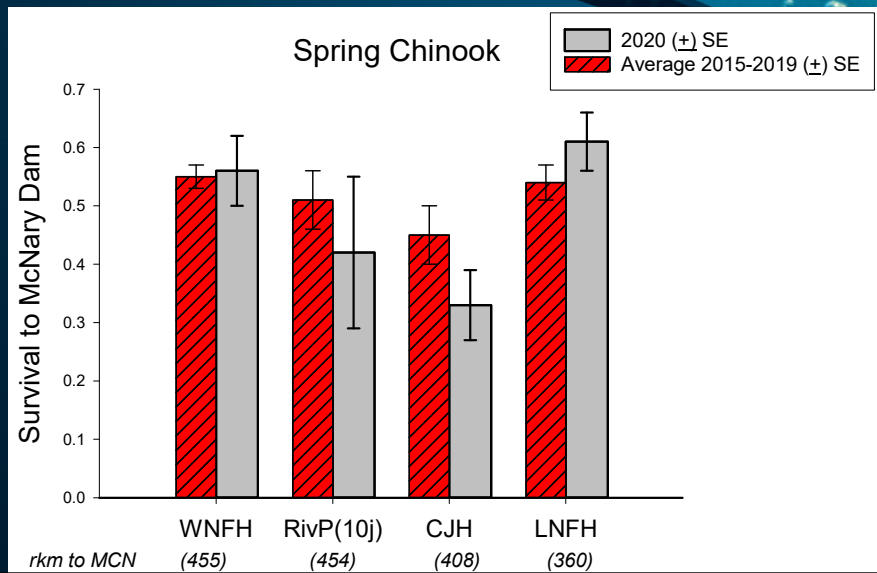
# Spring Chinook 2020 Release Summary

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

# Survival to McNary Dam Spring Chinook



# Survival to McNary Dam Spring Chinook



# Spring Chinook Yearling In-river Survival Summary

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



# BY20 Spring Chinook Broodstock

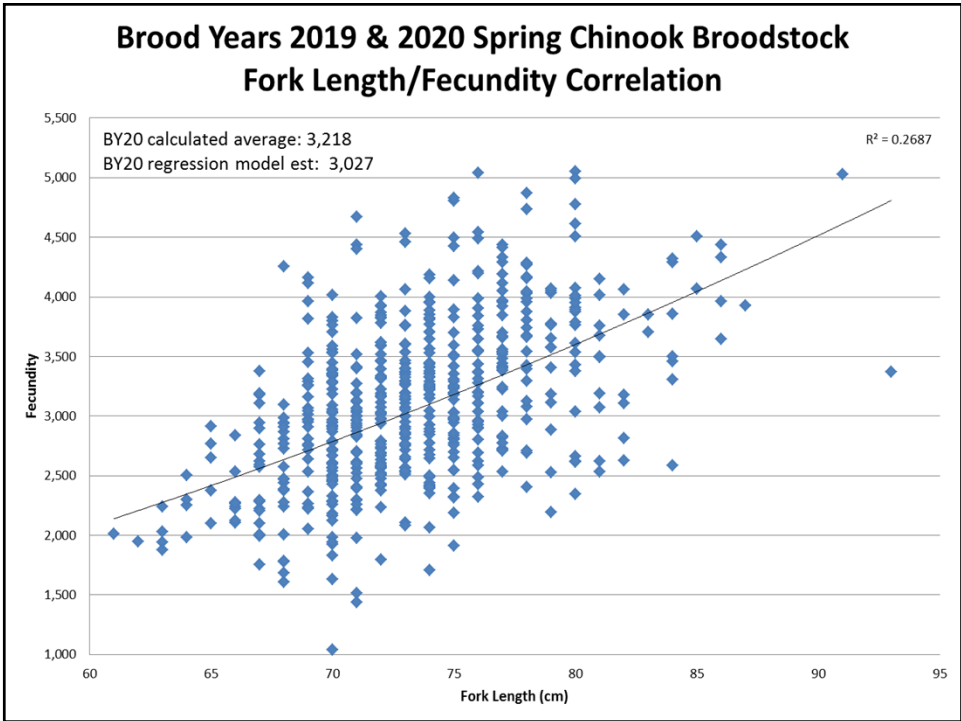
Spring Chinook – CJH Stock			
	# Fish Spawned	# Brood Collected*	% Survival to Spawn
Females	329	333	98.8%
Males / Jacks	217 / 1	228 / 2	94.8%
<b>Total</b>	<b>547</b>	<b>563</b>	<b>97.2%</b>

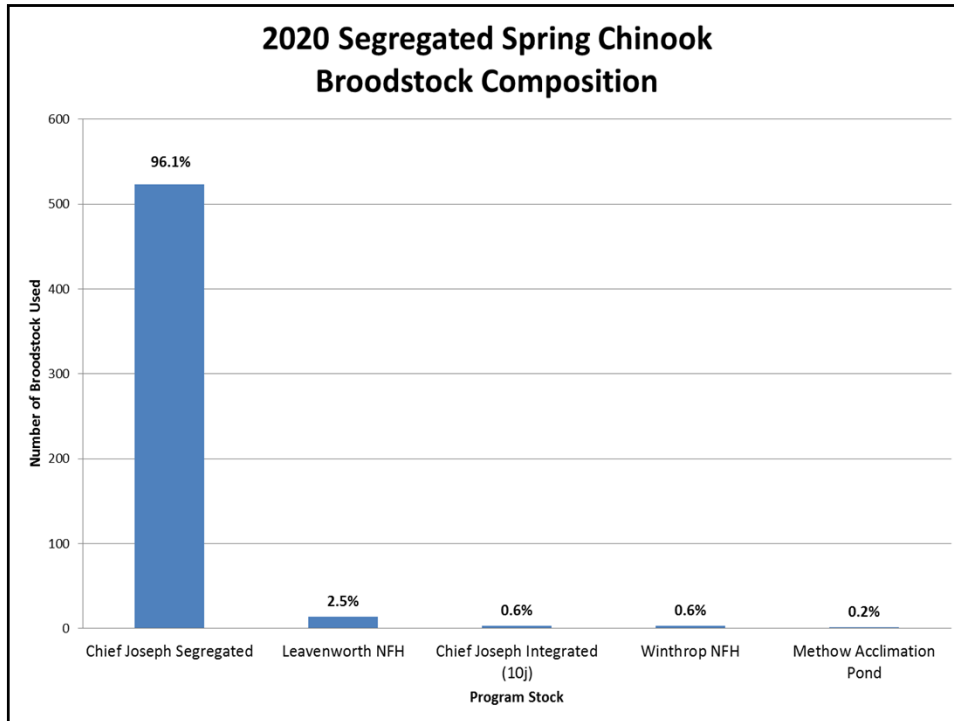
Bio-criteria standard for survival to spawn: 90%

\*Brood collected includes 65 females and 15 males collected at LNFH.

# BY19 HOR Spring Chinook Egg Take

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





## HOR Spring Chinook In-Hatchery Performance

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

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

# MetComp 10j Spring Chinook In-Hatchery Performance

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

\*Current as of Mar. 15, 2021.

\*\*Does not include BY19.

## Key Challenges to Date

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



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

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



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

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

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



# Summer Chinook 2021 Projected Releases

## Summer Chinook – Okanogan Stock

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

# Spring Chinook 2021 Projected Releases

## Spring Chinook

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



## Changes Made in 2019

- **Broodstock:**
  - Prophylactic treatment of H<sub>2</sub>O<sub>2</sub> for copepods in spring chinook broodstock
  - Prophylactic treatment of Chloramine-T for Columnaris in summer chinook broodstock, plus Diquat when Columnaris detected.
- **Spawning:**
  - First sort was day before first spawn, then all sorting occurred the morning of spawning.
  - Add salt to raceways during sort to reduce stress



## Changes Made in 2019

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



## Changes Made in 2020

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



## Changes to Make in 2021

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

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

Are the program goals and Key Assumptions realistic?

Do they need adjustment or are other management actions needed?

- **Possible solutions:**

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



Questions?