2019 Forecast Meeting Schedule

9:00 – 9:30  Introduction
• Welcome and Introduction  Ron Warren
• North of Falcon – Setting Salmon Fisheries in 2019  Kyle Adicks

9:30 – 10:00  Southern Resident Killer Whales  Kirt Hughes

10:00 – 11:00  Salmon Forecasts 2019
• 2018/19 Environmental Outlook  Marisa Litz
• Puget Sound and Coast Chinook, Coho, Pink, Chum, Sockeye Stocks  Aaron Dufault
• Columbia River Salmon Stocks  Ryan Lothrop
• PFMC Salmon Technical Team Review  Cindy LeFleur
  Wendy Beeghley

11:00 - Noon  Regional Discussion Sessions
• Puget Sound Recreational  Big Room  Mark, Aaron, Derek
• Columbia River & Ocean  Small Room 1  Ryan, Kyle(s), Wendy
• Coastal  Annette
• Puget Sound Commercial  Small Room 2  Kirt, Kwasi, Marisa

Noon – 1:00 pm  Lunch Break
1:00 – 3:00  Regional Discussion Sessions Continued

Slides Available Online: http://wdfw.wa.gov/fishing/northfalcon/
## 2019 NOF Meeting Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Purpose</th>
<th>Location</th>
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<tr>
<td>Feb. 26</td>
<td>Willapa Bay – Grays Harbor Forecast meeting</td>
<td>Montesano City Hall</td>
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<td>Feb. 27</td>
<td>Statewide Forecast Meeting</td>
<td>Lacey Community Center</td>
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<td>Mar. 7-12</td>
<td>Pacific Fishery Management Council meeting</td>
<td>Vancouver, WA Hilton</td>
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<td>Mar. 18</td>
<td>Columbia River Fisheries Meeting</td>
<td>WDFW Region 5 Headquarters, Ridgefield</td>
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<td>Mar. 19</td>
<td>North of Falcon 1</td>
<td>DSHS Office Building 2 Auditorium, Olympia</td>
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<td>Mar. 21</td>
<td>Puget Sound Recreational Fisheries Discussion</td>
<td>Trinity Methodist Church, Sequim</td>
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<td>Mar. 25</td>
<td>Ocean Management Option Public Hearing</td>
<td>Chateau Westport</td>
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<td>Montesano City Hall</td>
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<td>Upper Columbia River Fisheries Discussion</td>
<td>Douglas County PUD, Wenatchee</td>
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<td>Mar. 27</td>
<td>Puget Sound Recreational Fisheries Discussion</td>
<td>WDFW Mill Creek Office</td>
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<td>Mar. 27</td>
<td>Willapa Bay Fisheries Discussion</td>
<td>Raymond Elks Club</td>
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<td>Mar. 27</td>
<td>Mid-Columbia River Public Meeting</td>
<td>Kennewick Irrigation District Board Auditorium</td>
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<td>Mar. 28</td>
<td>Snake River Fisheries Discussion</td>
<td>Walla Walla Comm. College, Clarkston</td>
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<td>Apr. 2</td>
<td>Columbia River and Ocean Fisheries Discussion</td>
<td>WDFW Region 5 Headquarters, Ridgefield</td>
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<td>Apr. 3</td>
<td>North of Falcon 2</td>
<td>Lynnwood Embassy Suites</td>
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<td>Apr. 11-15</td>
<td>Pacific Fishery Management Council</td>
<td>Double Tree Hilton Sonoma, Rohnert Park, CA</td>
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Handouts

• Agenda/Schedule
• FWC Policies (NOF Policy)
• PFMC Tables
• Regional Forecast Details:
  • Puget Sound and Columbia Chinook
  • Puget Sound Coho
  • Puget Sound Chum & Sockeye
• Presentation slides
  (http://wdfw.wa.gov/fishing/northfalcon/)
Update on Southern Resident Orca Recovery Efforts

Dave Ellifrit, Center for Whale Research
Governor Inslee takes action.
Governor’s Executive Order

March 2018

• Supplemental Funding
• Immediate actions for state agencies
• Established Task Force
Task Force and Working Groups

• Stephanie Solien & Les Purce, co-chairs
• Diverse membership
• Three Working Groups
  ✓ Vessels (Todd Hass, Puget Sound Partnership)
  ✓ Contaminants (Derek Day, Ecology)
  ✓ Prey [Penny Becker (WA Dept. Fish & Wildlife) & Steve Martin (Gov. Salmon Recovery Office)]
Reports

2018
Draft due Oct. 1, 2018 | Final due Nov. 15, 2018
Content included:
• Task Force recommendations for addressing all major threats and recovering Southern Residents (policies, programs, priority actions, legislation, budget needs)
• Summary of minority views and actions considered but not ultimately recommended

2019
Due Oct. 1, 2019
Content will include:
• Progress made
• Lessons learned
• Outstanding needs and additional recommendations
Task Force Recommendations

36 recommendations

- **Prey** - 16 recommendations
- Vessels - 10 recommendations
- Contaminants - 10 recommendations
  - 10 recommendations require or likely require legislative changes
Prey Recommendations
RESTORE & ACQUIRE HABITAT

Recommendations 1 and 2

• Significantly increase investment in restoration and acquisition of habitat for Chinook and forage fish
Recommendation 3

- Increase Enforcement and Technical Assistance for Hydraulic Permitting, Shoreline, Water Quality and Water Quantity Laws
AMEND LAWS TO STRENGTHEN HABITAT PROTECTION

Recommendation 4

• Through legislation, amend existing State authorities to better align with local Shoreline Management laws

• Give state agencies the authority to deny, amend unnecessary bulkhead requests to protect habitat
Recommendation 5
• Develop incentives to encourage voluntary actions to protect habitat
Recommendation 6

• Increase Hatchery Production of Salmon in Concert with increased Habitat protection and restoration
INCREASE ABUNDANCE AND IMPROVE SURVIVAL OF CHINOOK AROUND HYDRO DAMS

Recommendation 7
• Prepare an implementation strategy to reestablish salmon runs above existing dams

Recommendation 8
• Modify State Water Quality Standards for Greater Spill over Columbia River and Snake River Dams

Recommendation 9
• Facilitate a Stakeholder process around potential Lower Snake River Dam Removal
INCREASE CHINOOK ABUNDANCE THROUGH REDUCED CATCH AND BYCATCH

Recommendation 10
• Support full implementation and funding of the 2019-28 Pacific Salmon Treaty – Federal Request

Recommendation 11
• Reduce Chinook bycatch in West Coast Commercial Fisheries
DECREASE THE NUMBER OF CHINOOK LOST TO PREDATION BY SPECIES OTHER THAN ORCAS

Recommendation 12
• Develop Science and Options for Pinniped Management in Puget Sound

Recommendation 13
• Increase Management of Pinnipeds on the Columbia River

Recommendation 14
• Reduce populations of nonnative predatory fish that prey upon or compete with Chinook
SUPPORT A HEALTHY MARINE FOOD WEB AND FORAGE FISH POPULATIONS

**Recommendation 15**
- Monitor and manage forage fish populations to support Chinook

**Recommendation 16**
- Support the Puget Sound zooplankton sampling program for management of Chinook and forage fish
What’s Going On Now, What’s Next
### Budget Recommendation

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<th>Budget</th>
<th>Recommendation</th>
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<td>Operating</td>
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<td>Capital</td>
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<td>Transportation</td>
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<td><strong>Total</strong></td>
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- 3 Governor request plus multiple other state legislative bills (vessels, oil traffic, habitat)
- State agencies implement recommendations as possible with funds now and when new funds hopefully become available in July 2019
- Year 2 work of the Task Force
The Department will continue to consider effects of salmon fisheries on Southern Resident Killer Whales (SRKW) when setting fishing seasons. The Department will work with the National Marine Fisheries Service to refine tools to assess the effects of fisheries on available prey for SRKW, and will plan fisheries to ensure that they provide proper protection to SRKW from reduction to prey availability or from fishery vessel traffic, consistent with the Endangered Species Act.
Orca Risk Assessment and Adaptive Management Framework

- Identifies conditions when increased prey is essential for orcas
- Categorizes orca status and expected Chinook abundance for a given year, weights fisheries based on their spatial overlap with orcas during key foraging times, and establishes threshold proportions for maximum allowable reduction of Chinook by fisheries for a given time and area
- If planned fisheries are projected to exceed the allowable prey reduction threshold, then adjustments made until the threshold is met
QUESTIONS?

Update on Ocean Conditions

Marisa Litz
Marisa.litz@dfw.wa.gov

Acknowledgements:
Laurie Weitkamp, NOAA Fisheries
Outline

• Update on the “Warm Blobs”, El Niños, and La Niñas
• Physical and biological observations
• NWFSC environmental indicators (stoplight chart)

Take-Home Messages:

• Sea surface temperatures (SSTs) cooled following “The Blob”, ushering in weak La Niñas
• Return of warm SST anomalies to the North and South in Fall 2018
• Projections are for a weak El Niño through spring 2019
• Cooling in 2018 and return to “normal”ish conditions (upwelling/copepods) may lead to better survival
The ecosystem is connected
What is the “Warm Blob”? 

Ridiculously Resilient Ridge 

Atmospheric Pressure Anomalies 

Michael Jacox, Bond et al. 2015
Sea Surface Temperature Anomalies

July 2014
Blob forms

October 2014
Blob comes ashore

July 2015
+3°C

October 2015
El Niño forms

July 2016

October 2016

July 2017

October 2017
La Niña forms

polar.ncep.noaa.gov/sst/ophi/
Sea Surface Temperature Anomalies

Weak La Niña dissipated in Spring 2018 and summer/fall were ENSO neutral

Mild September and October led to concerns of a return of “The Blob”
North Pacific cools through 2017-2018

Feb 15, 2017
Feb 15, 2018
Feb 15, 2019

Blob is gone

polar.ncep.noaa.gov/sst/ophi/
2014-16 **Strong** and 2019 **weak** El Niños and 2016 + 2017/2018 **weak** La Niñas

www.climate.gov/enso
Typical El Niño Pattern

Bad for PNW Salmon
Typical La Niña Pattern

Good for PNW Salmon
El Niño Advisory

Equatorial sea surface temperatures (SSTs) are above average across most of the Pacific Ocean.

Weak El Niño conditions are present and are expected to continue through the Northern Hemisphere spring 2019 (~55% chance).

Widespread or significant global impacts are not anticipated.

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html
Terrestrial impacts on salmon production
Terrestrial Climate Outlook

1 Month
Feb 2019

3 months:
Feb – Apr 2019

www.cpc.ncep.noaa.gov/products/forecasts
Biological Responses to the Warm Ocean

**2015**
- Harmful algal blooms shut down crab and clam fisheries CA – AK
- Reductions in zooplankton and changes to jellyfish community
- Tropical fish caught in the PNW
- Whales feeding in estuaries

**2016**
- Pelagic red crabs wash ashore
- Food web changes continue
- Anchovy increase in Salish Sea
- Whales nearshore; entangled in fishing lines

**2017**
- Pyrosomes explode in N Pacific
- Sea bird die offs in Bering Sea
- Pacific cod collapse in Gulf of AK
- Sea lion abundance increasing in PNW
Huge Responses at all Trophic Levels

- More whale entanglements in estuaries and near shore
- Northern, lipid-rich copepods and high abundances of crab megalopae in coastal waters
- Pyrosomes dissipated off OR/WA for first time since 2017
- Culling of up to 93 sea lions approved by federal government below Willamette Falls to protect winter run of steelhead
- Better than expected Chinook returns to South Puget Sound
- Record breaking opah caught off WA
- 2018
  - Hypoxic conditions on shelf and estuary from Jun-Sep
  - Mourning Orca mother carries dead calf for a record 17 days
Unusual salmon observations in 2015

- Bristol Bay sockeye ocean age 3 adults extremely small body size
- Interior Fraser & Puget Sound coho extremely low abundance, small body size, and low fecundity
- Columbia & Oregon coast coho lowest returns since 1990s
- Oregon coast Chinook returns high
- Extremely low downstream survival Central Valley Chinook & steelhead (drought)

Modified from L. Weitkamp
Unusual salmon observations in 2016

Alaska pinks: **lowest** returns in memory

Fraser sockeye **lowest** on record

High chum returns WA & OR coasts, Columbia

Fraser chum **highest** in 20 years

Modified from L. Weitkamp
Unusual salmon observations in 2017

Bristol Bay sockeye: **top 5** runs since 1952
59.5 million

Fraser sockeye: **2nd lowest** in last 70 years

Lowest **steelhead** returns on record to OR Coast

Highest **chum** harvest ever in Alaska

Fishery closures for **Chinook** from CA to BC

Fraser and PS **pinks**: lowest run in decades

Modified from L. Weitkamp
Unusual salmon observations in **2018**

- **Bristol Bay sockeye:** Largest run ever: 62.3 million
- **Fraser sockeye:** Below forecast but >10 million
- Poor sockeye, pink, and Coho run in SE Alaska
- Low **steelhead** return to Columbia River
- High shad returns on Columbia River
- Fishery closures for **Coho** in OR and CA
## Salmon Indicators: Bad -> Fair -> Good

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<td>46050 SST (°C; May-Sept)</td>
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<td>Upper 20 m T (°C; Nov-Mar)</td>
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<td>Copepod richness anom. (no. species; May-Sept)</td>
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<td>N. copepod biomass anom. (mg C m⁻³; May-Sept)</td>
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<td>S. copepod biomass anom. (mg C m⁻³; May-Sept)</td>
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<td>Biological transition (day of year)</td>
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<td>Ichthyoplankton biomass (mg C 1,000 m⁻³; Jan-Mar)</td>
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<td>Ichthyoplankton community index (PCO axis 1 scores; Jan-Mar)</td>
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<td>Chinook salmon juvenile catches (no. km⁻²; June)</td>
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<td>Coho salmon juvenile catches (no. km⁻²; June)</td>
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www.nwfsc.noaa.gov

2018 = Ranked 12th
Questions?
WA Coast and Puget Sound 2018 Returns and 2019 Forecasts
Chinook Salmon
Chinook Historical Runsize – Puget Sound

Wild Chinook  \(-28\%\) since 10yr avg. prior to listing under ESA in 1999

Wild 10 yr Avg 28,247
Wild 10 yr Avg 39,353
2018 Wild Fall Chinook Returns

- All returns are preliminary
- Returns range from Poor to Good in Puget Sound and on the Coast

Relative to Recent 10yr Avg. Escapement

- **Good**  > 125%
- **Neutral**  75-125%
- **Poor**  < 75%
2019 Wild Fall Chinook Forecasts

- Forecasts range from **Poor** to **Good** for both Puget Sound and Coast
- Both Puget Sound and Coast wild forecasts ↑ 6%

Relative to Recent 10yr Avg. Runsize
- **Good** > 125%
- **Neutral** 75-125%
- **Poor** < 75%
Puget Sound hatchery Chinook forecast $\uparrow$ 11% from recent 10 year avg
($\downarrow$ 6% from 2018 forecast)
Coastal Hatchery Chinook Forecasts

Coastal Hatchery Chinook forecast ﹋25% from recent 10 yr avg. (﹋36% from 2018 Forecast)

*Excludes Quinault R.
Several Coastal forecasts are preliminary and subject to change
Coho
Coho Historical Runsize – Puget Sound

10 yr Average 580k
2018 Wild Coho Returns

• All returns are preliminary
• Returns ranged from Poor to Neutral for Puget Sound and Coast

Relative to Recent 10yr Avg. Escapement
- Good  > 125%
- Neutral  75-125%
- Poor  < 75%
2019 Wild Coho Forecasts

• Forecasts range from Poor to Neutral across Puget Sound; ↓ 15%

• Poor to Good on coast; ↓ 11%

Relative to Recent 10yr Avg. Runsize

- Good > 125%
- Neutral 75-125%
- Poor < 75%
Puget Sound Hatchery Coho forecast ↑ 49% from recent 10 year avg.  
(↑ 35% from 2018 forecast)
Coastal Hatchery Coho Forecasts

Coastal Hatchery Coho forecast ↑ 5% from recent 10 year avg.
(↑ 20% from 2018 forecast)
Pink
Pink Historical Runsize

10 yr Average
5.7 million
• Returns were **poor** everywhere
• Large body size common
• Poor freshwater production as fry

Relative to Recent 10yr Avg. Runsize

- **Good** > 125%
- **Neutral** 75-125%
- **Poor** < 75%
2019 Pink Forecasts

- Forecasts are mostly poor
- Very poor outmigrating fry numbers from most systems

Relative to Recent 10yr Avg. Runsize
- **Good** > 125%
- **Neutral** 75-125%
- **Poor** < 75%
2017 Pink Forecasts

Puget Sound Pink forecast ▼ 89% from recent 10 year avg.
Chum
Chum Historical Runsize

Number of Chum

10 yr Average 1.51 million
2018 Fall Chum HOR/NOR Returns

- Returns were **Poor** for N. Sound Rivers
- **Neutral** to **Good** in SS and HC
- HC and SS are relative to in-season updated runsizes, not escapement

**Relative to Recent 10yr Avg. Escapement**
- ➕ Good  > 125%
- 🟠 Neutral  75-125%
- ➠ Poor  < 75%
2019 Fall Chum HOR/NOR Forecast

• Forecasts range from **Good** to **Poor**
• Hood Canal - **519k***
• Central/S. Sound – **391k***
• Coast – Willapa – **52k**
  Grays H – **72k**

**Relative to Recent 10yr Avg. Runsize**

- **+** Good > 125%
- **○** Neutral 75-125%
- **−** Poor < 75%

*Forecasts not “agreed-to” with comanagers*
Puget Sound Chum Forecasts

Hatchery ↓ 32% and Wild ↓ 23% over recent 10 year avg.
Coastal Chum Forecasts

Willapa Bay ↑ 37% and Grays Harbor ↑ 89% over recent 10 year avg.
Sockeye
Puget Sound Sockeye Runsize

Number of Sockeye


Lake WA
Baker
2018 Sockeye HOR/NOR Returns

- Returns ranged from **Poor** to **Good** in Puget Sound
- Columbia Return was **Poor**
- Baker and Lake Wa relative to total runsize

Relative to Recent 10yr Avg. Escapement

- Good  > 125%
- Neutral  75-125%
- Poor  < 75%
2019 Sockeye HOR/NOR Forecast

- Baker Lake – 34k
- Lake WA – 15k
- Columbia river - 93k

Relative to Recent 10yr Avg. Runsize

- Good > 125%
- Neutral 75-125%
- Poor < 75%
Puget Sound Sockeye Forecasts

Lake WA ↓ 82% and Baker ↑ 6% over recent 10 year avg.
Columbia Sockeye Forecasts

Lake Wenatchee \(\downarrow 72\%\) and Okanogan \(\downarrow 72\%\) over recent 10 year avg.
WA Columbia River Chinook and Coho 2018 Returns and 2019 Forecasts
Chinook Salmon
Chinook Historical Runsize – Columbia River

Number of Chinook

- Fall
- Summer
- Spring

10 yr Average 1,100,000
2018 Spring/Summer Chinook Returns

All returns are preliminary and returns range from

- Lower Spring – 62k (71%)
- Upriver Spring – 115k (56%)
- Summer – 42k (56%)

Relative to Recent 10yr Avg. Escapement

- Good > 125%
- Neutral 75-125%
- Poor < 75%
Forecasts in Columbia River range from

- Lower Spring – 58k (94%)
- Upriver Spring – 99k (86%)
- Summer – 36k (85%)

Relative to 2018 Runsize

- Good > 125%
- Neutral 75-125%
- Poor < 75%
2018 Fall Chinook Returns

All returns are preliminary and range from

- SAB (Select Area Bright) – 4.1k (33%)
- LRH (Lower River Hatchery) – 50k (55%)
- LRW (Lower River Wild) – 8.3k (53%)
- BPH (Bonneville Pool Hatchery) – 29k (33%)
- PUB (Pool Upriver Bright) – 36k (42%)
- URB (Upriver Bright) – 149k (34%)
2019 Fall Chinook Forecasts

Forecasts in Columbia River range from

- **SAB** (Select Area Bright) – 3.1k (76%)
- **LRH** (Lower River Hatchery) – 54.5k (108%)
- **LRW** (Lower River Wild) – 13.7k (165%)
- **BPH** (Bonneville Pool Hatchery) – 46k (159%)
- **PUB** (Pool Upriver Bright) – 57k (158%)
- **URB** (Upriver Bright) – 158k (106%)

Relative to 2018 Runsize
- **Good** > 125%
- **Neutral** 75-125%
- **Poor** < 75%
### Lower Columbia River Tule Exploitation Rate (ER) Matrix

<table>
<thead>
<tr>
<th>LRH Run Size</th>
<th>LCR Tule ER</th>
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<tbody>
<tr>
<td>&lt;30,000</td>
<td>30%</td>
</tr>
<tr>
<td>30,000 – 40,000</td>
<td>35%</td>
</tr>
<tr>
<td>40,000 – 85,000</td>
<td>38%</td>
</tr>
<tr>
<td>&gt;85,000</td>
<td>41%</td>
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</table>

- LRH is down 40% compared to the previous 10 year return.
- 2018 LRH forecast of 54,500 will manage in ocean and in-river fisheries to not to exceed a 38% ER.
Chinook Historical Runsize – URB

>200,000 = 15% in-river harvest rate

<200,000 = 8.25% in-river harvest rate

10 yr Average 427,000
Upper Summer Steelhead

**A-run**
- 2017 – 106,700 (28,000 wild)
- 2018 – 69,300 (21,700 wild)
- **2019 – 110,200 (33,900 wild)**

**B-run**
- 2017 – 6,600 (375 wild)
- 2018 – 24,600 (2,400 wild)
- **2019 – 8,000 (950 wild)**

10 yr Average 270,000
Coho

Thomas Kline
Coho Ocean Abundance – Columbia River

Number of Coho

- 2,500,000
- 2,250,000
- 2,000,000
- 1,750,000
- 1,500,000
- 1,250,000
- 1,000,000
- 750,000
- 500,000
- 250,000
- 0


Late
Early

10 yr Average 470,000
2018 Coho Returns

All returns are preliminary and returns range from

- Early – 83k (27%)
- Late – 165k (32%)

Relative to Recent 10yr Avg. Escapement

- Good > 125%
- Neutral 75-125%
- Poor < 75%
2019 Coho Forecasts

Forecasts in Columbia River range from

- Early – 545k (660%)
- Late – 360k (560%)

Relative to Recent 2018 Runsize

- Good > 125%
- Neutral 75-125%
- Poor < 75%
Lower Columbia Natural Coho Exploitation Rate (ER) Matrix

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<tr>
<th>Marine Survival Index</th>
<th>ER</th>
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<tr>
<td>Very Low ≤ 0.06%</td>
<td>10%</td>
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<tr>
<td>Low ≤ 0.08%</td>
<td>15%</td>
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<tr>
<td>Medium ≤ 0.17%</td>
<td>18%</td>
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<tr>
<td>High ≤ 0.40%</td>
<td>23%</td>
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<tr>
<td>Very High &gt; 0.40%</td>
<td>30%</td>
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</table>

- Marine survival index is 0.27% (high).
- Normal seeding, exceeds 30% on index sites.
- Exploitation rate for 2019 is 23%.
Questions?
<table>
<thead>
<tr>
<th>Production Source and Stock or Stock Group</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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<td>Fall (Sacramento Index)</td>
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<td>230.7</td>
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<td>Winter (age-3 absent fishing)</td>
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<td>Fall</td>
<td>299.3</td>
<td>423.8</td>
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<td>North and South/Local Migrating</td>
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<td>232.5</td>
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<td>99.3</td>
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<td>Lewis Spring</td>
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<td>1.0</td>
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<td>Upriver Summer b/</td>
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<td>73.0</td>
<td>93.3</td>
<td>63.1</td>
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<td>500.3</td>
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### TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 2 of 3)

<table>
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<th>Production Source and Stock or Stock Group</th>
<th>2014</th>
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<td></td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
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<td>Grays Harbor Fall</td>
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<td>NA</td>
<td>NA</td>
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<td>Hoko&lt;sup&gt;5&lt;/sup&gt;</td>
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<td><strong>North Coast Totals</strong></td>
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<td>1.2</td>
<td>1.4</td>
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<td>Production Source and Stock or Stock Group</td>
<td>Preseason Abundance Forecasts</td>
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<tr>
<td>Puget Sound summer/fall</td>
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<tr>
<td>Nooksack/Samish</td>
<td>Hatchery</td>
<td>43.9</td>
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<td>21.2</td>
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<td>0.6</td>
<td>0.4</td>
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<td>Natural</td>
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<td>0.5</td>
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<td>Tulalip</td>
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<tr>
<td>South Puget Sound</td>
<td>Natural</td>
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<tr>
<td>Strait of Juan de Fuca Including Dungeness spring run</td>
<td>Natural</td>
<td>96.7</td>
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<td>4.9</td>
<td>3.7</td>
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<td>6.0</td>
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</table>

a/ Since 2005, the upriver spring Chinook run includes Snake River summer Chinook.
b/ Since 2005, the upriver summer Chinook run includes only upper Columbia summer Chinook, and not Snake River summer Chinook.
c/ Expected spawning escapement without fishing.
d/ Unless otherwise noted, forecasts are for Puget Sound run size (4B) available to U.S. net fisheries. Does not e/ Terminal run forecast.
f/ Includes a mixture of runsize types including escapement without fishing and terminal run. 2019 values are escapement w/out fishing for Tulalip and Snohomish natural, and terminal runsize for Stillaguamish and Snohomish hatchery.
<table>
<thead>
<tr>
<th>Production Source and Stock or Stock Group</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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