WELCOME – THANKS FOR JOINING US!

ZOOM WEBINAR/ CALL LOGISTICS

You can turn your camera on and mute or unmute yourself through the control panel at the bottom of your screen.

We will keep folks muted during the beginning of our program, then will unmute folks when we open it up for questions and feedback. Callers can unmute yourself by pressing *6 on your phone.

We ask that you "raise their hand" to ask a question which you can access through the control panel at the bottom of the screen. You can also raise your hand by hovering over your face or name on the list of participants. Callers can raise their hand by dialing *9.

If you have any technical issues during the call, use the chat button and we will help you through those. ***Please do not use the chat for questions or comments on the presentation, we will take those live.***

Statewide Salmon Forecast Meeting
March 3, 2023

Washington Department of FISH and WILDLIFE

Meeting Agenda

Note: WDFW staff will take questions and comments following each presentation. Regional discussion sessions will provide opportunities to ask questions and provide comments as well.

9:00 – 9:30	**Introduction** • Welcome and Introduction • NOF 2023 Opening Remarks • North of Falcon – Setting Salmon Fisheries in 2023	 Mark Baltzell Kelly Susewind Kyle Adicks
9:30 – 11:00	**Salmon Forecasts 2023** • 2022/23 Environmental Outlook • Puget Sound and Coastal Chinook and Coho • Puget Sound and Coastal Chum, Pink, and Sockeye • Columbia River Salmon and Steelhead Stocks • PFMC Salmon Technical Team Review	 Mickey Agha Kirsten Simonsen Matthew Bogaard Mark Sorel Kyle Van de Graaf
11:00 – 11:30	**Director's Office** • Marine Mammal Discussion • Legislative Update	 Nate Pamplin and Casey Clark Tom McBride
11:30 – 2:00	**Regional Discussion Sessions** • Puget Sound Recreational • Ocean & Coastal • Puget Sound Commercial	 Mark, Derek, Christina, and Kirsten Kyle(s), Marlene, Reg. 6 and Col R. staff Mickey, Kwasi, Dave, and Maria

Opening Remarks

Director – Kelly Susewind

Washington Department of FISH and WILDLIFE

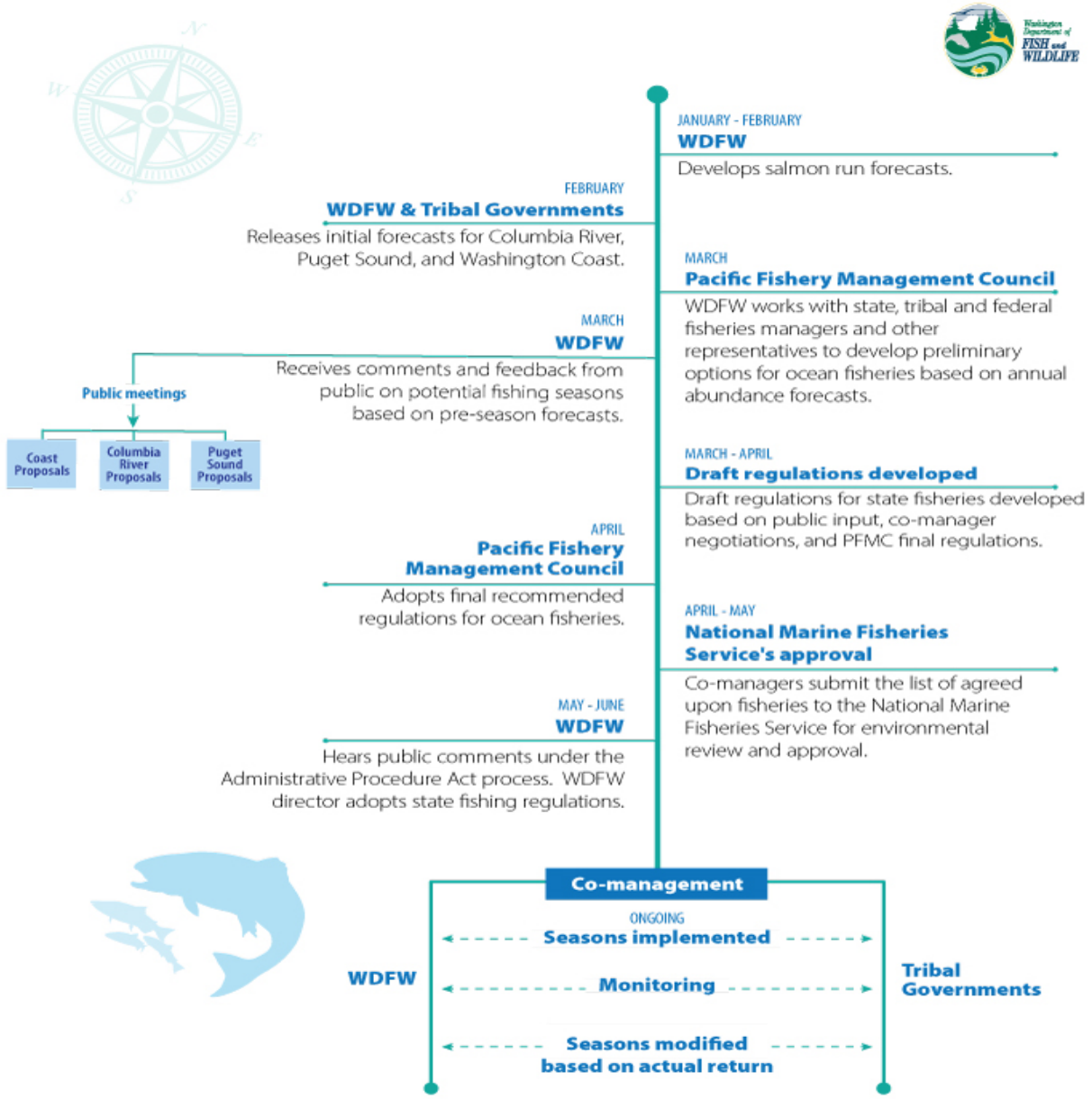
North of Falcon – Setting Salmon Fishery Seasons for 2023

Kyle Adicks

What is North of Falcon?

- North of Falcon is the annual, cooperative process to plan salmon seasons for Washington waters.
- The name refers to waters north of Oregon's Cape Falcon, which marks the southern border of Washington's management of salmon stocks.
- One component of a larger salmon season-setting process that also involves the state, tribal governments, federal regulators, other U.S. states, and Canada.

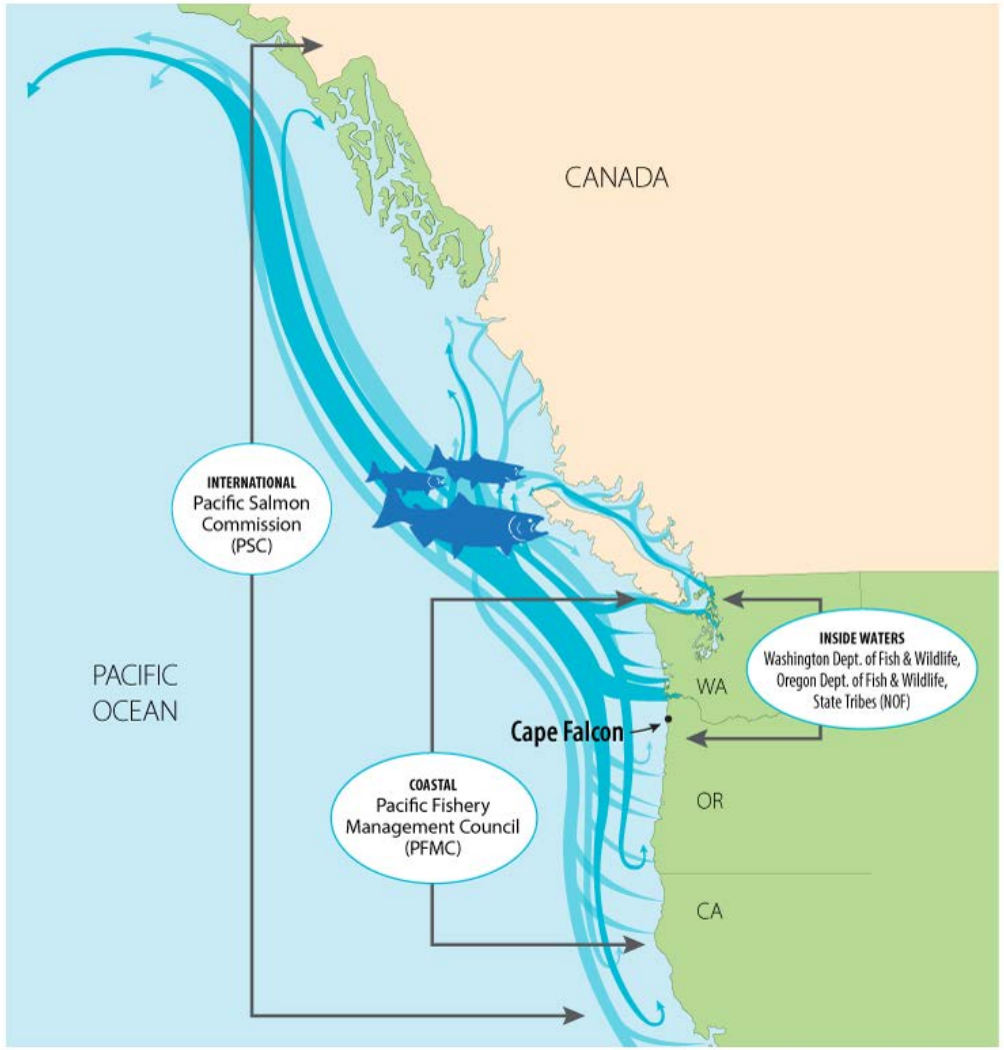
North of Falcon timeline



What guides North of Falcon?

Fishery managers must weigh many factors when developing salmon seasons, including:

- Endangered Species Act (ESA) constraints
- Commission policy
- Pacific Salmon Treaty obligations
- Tribal co-management: Washington's treaty tribes manage their own fisheries, sharing data and splitting harvest with the state
- Extensive monitoring and evaluation of fisheries statewide



2023 NOF Meeting Schedule

Meeting links and materials are available on the WDFW webpage
https://wdfw.wa.gov/fishing/management/north-falcon/public-meetings

Date	Purpose
Mar. 1	Willapa Bay – Grays Harbor Forecast Meeting- Aberdeen
Mar. 3	Statewide Forecast Meeting - Lacey
Mar. 5-10	Pacific Fishery Management Council Meeting - SeaTac
Mar. 14	Columbia River NOF #1 - Ridgefield
Mar. 15	North of Falcon #1 – Public Fishery Discussion - Lacey
Mar. 20	Recreational Fisheries Discussion – Puget Sound, Coast, Straits, and Hood Canal - Virtual
Mar. 20	Public Hearing on Ocean Salmon Management Options - TBD

2023 NOF Meeting Schedule (cont.)

Meeting links and materials are available on the WDFW webpage
https://wdfw.wa.gov/fishing/management/north-falcon/public-meetings

Date	Purpose
Mar. 21	Willapa Bay Fisheries Discussion – Virtual
Mar. 22	Grays Harbor Fisheries Discussion – Virtual
Mar. 23	Recreational Fisheries Discussion – Puget Sound and Tribs - Virtual
Mar. 29	North of Falcon #2 – Public Fishery Discussion - Lynnwood
Mar. 29	Upper Columbia and Snake River Fisheries Discussion - Kennewick
Apr. 1-7	Final Pacific Fishery Management Council Meeting – Foster City, CA

Learn more

To get up-to-date information about upcoming meetings, proposed seasons, updated forecasts, and opportunities for public comment, visit:

https://wdfw.wa.gov/nof

Washington Department of FISH and WILDLIFE

2022/2023 Environmental Outlook

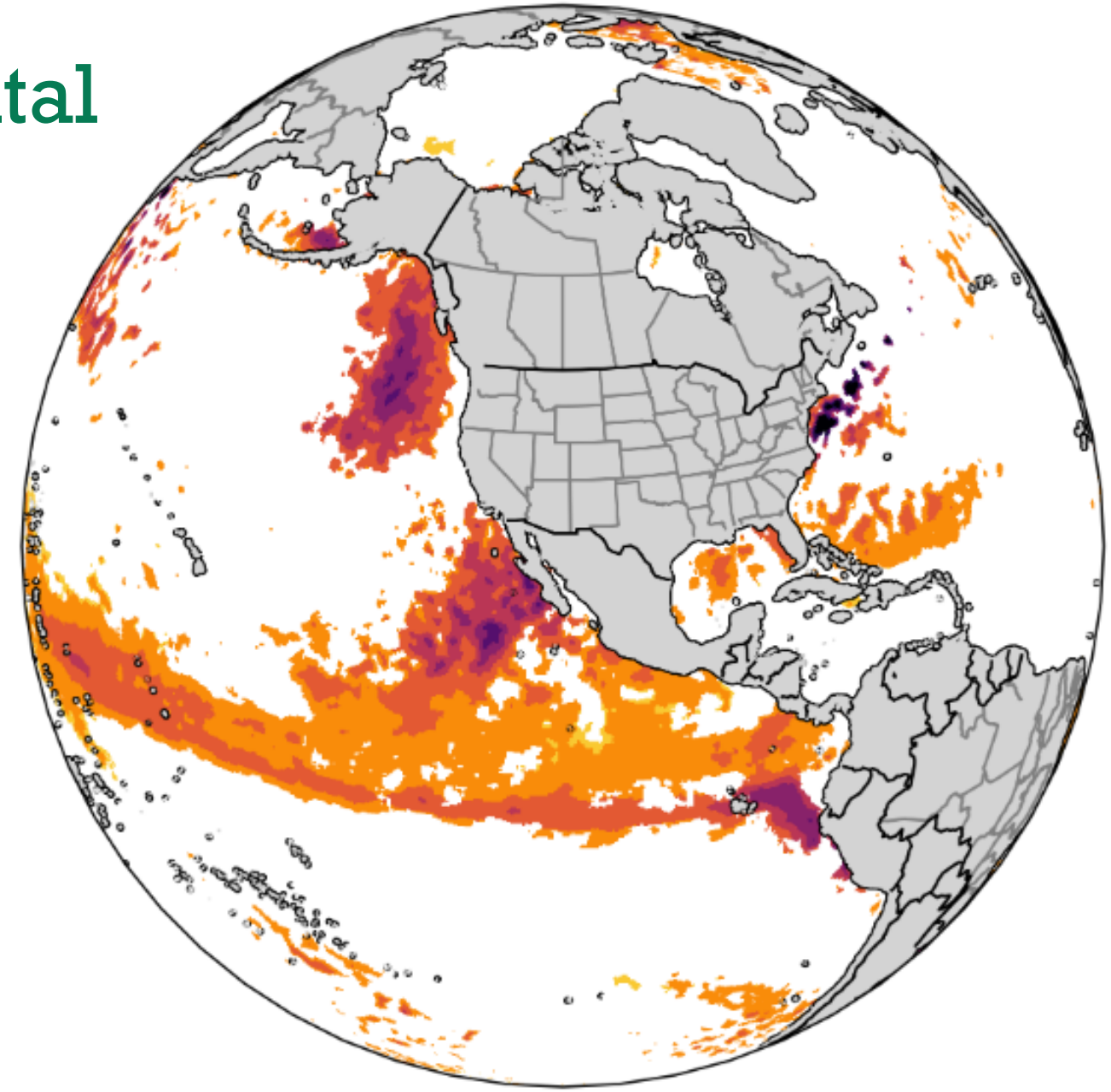
Mickey Agha, PhD

Outline

1. Update on physical environmental conditions 2022 (Rare Triple La Niña)
2. Biological Response (Stoplight Chart and Marine Species Observations and Salmon Responses)
3. 2023 Climate Forecasts (Transition from rare triple La Niña to potential El Niño)
4. Take home Messages

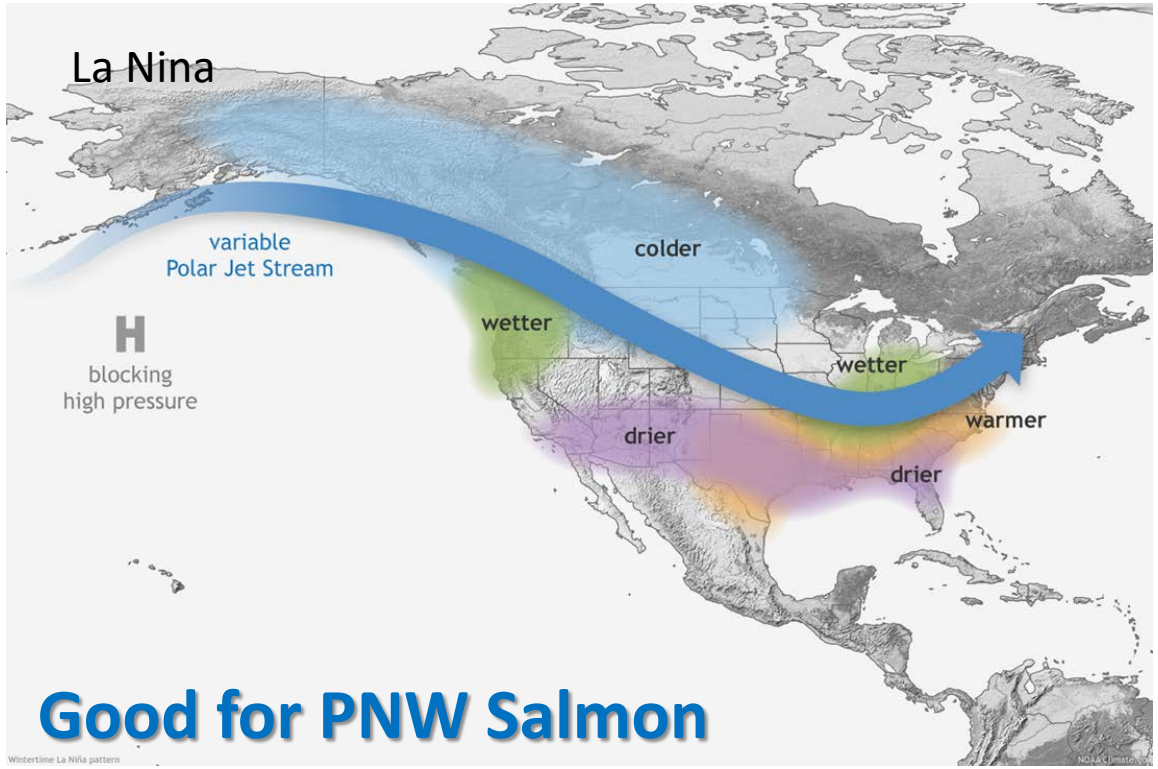
1. Physical Environmental Conditions past and present

- El Niños and La Niñas
- Three-peat La Niña
- Recent Marine Heat Waves

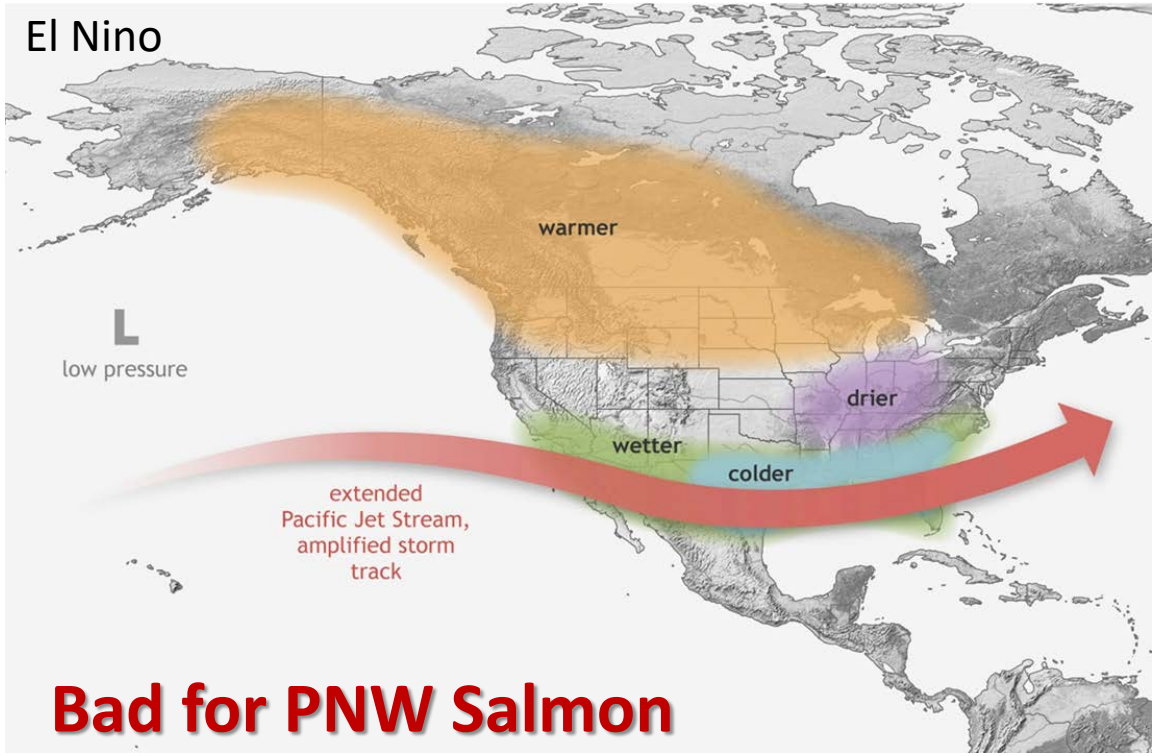


El Niños / La Niñas

- El Niños and La Niñas are warm and cool tropical phenomena that impact global weather
- A primary predictor of global climate disruptions

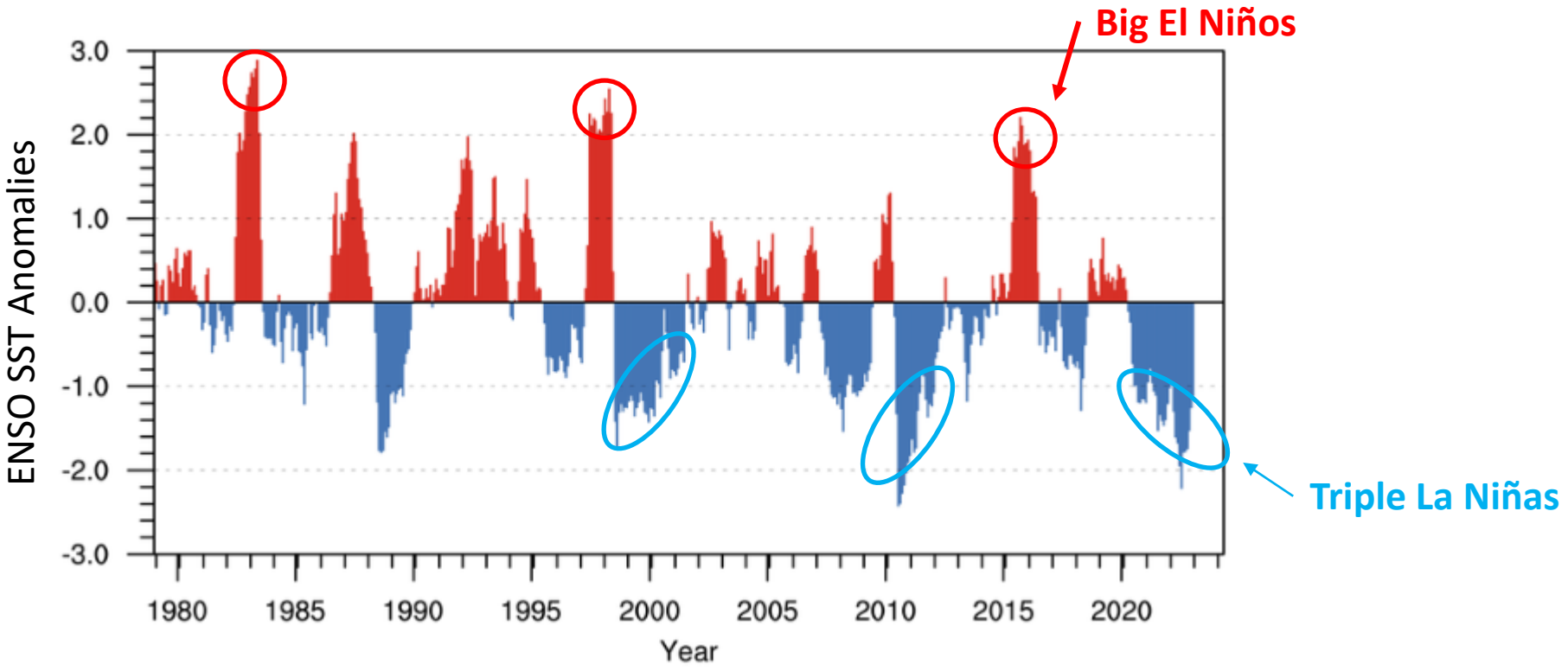


Good for PNW Salmon



Bad for PNW Salmon

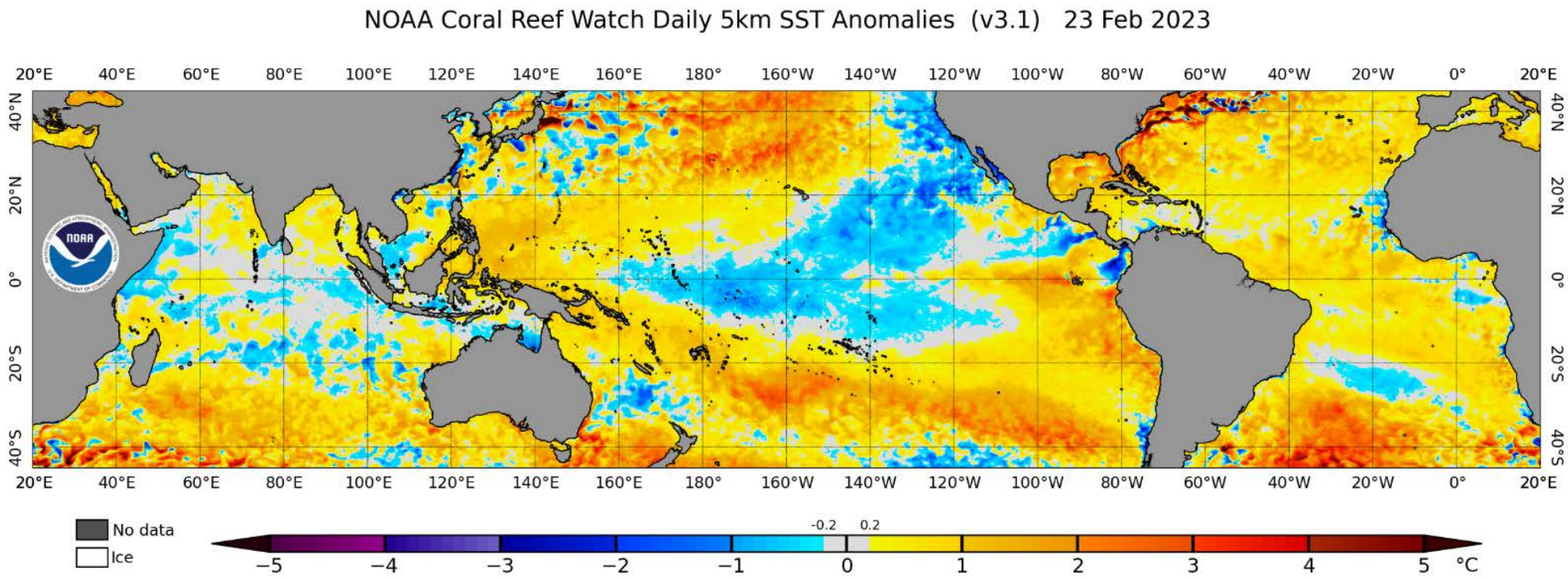
Rare Three-peat La Niñas and Recent Big El Niños



https://www.psl.noaa.gov/enso/mei/

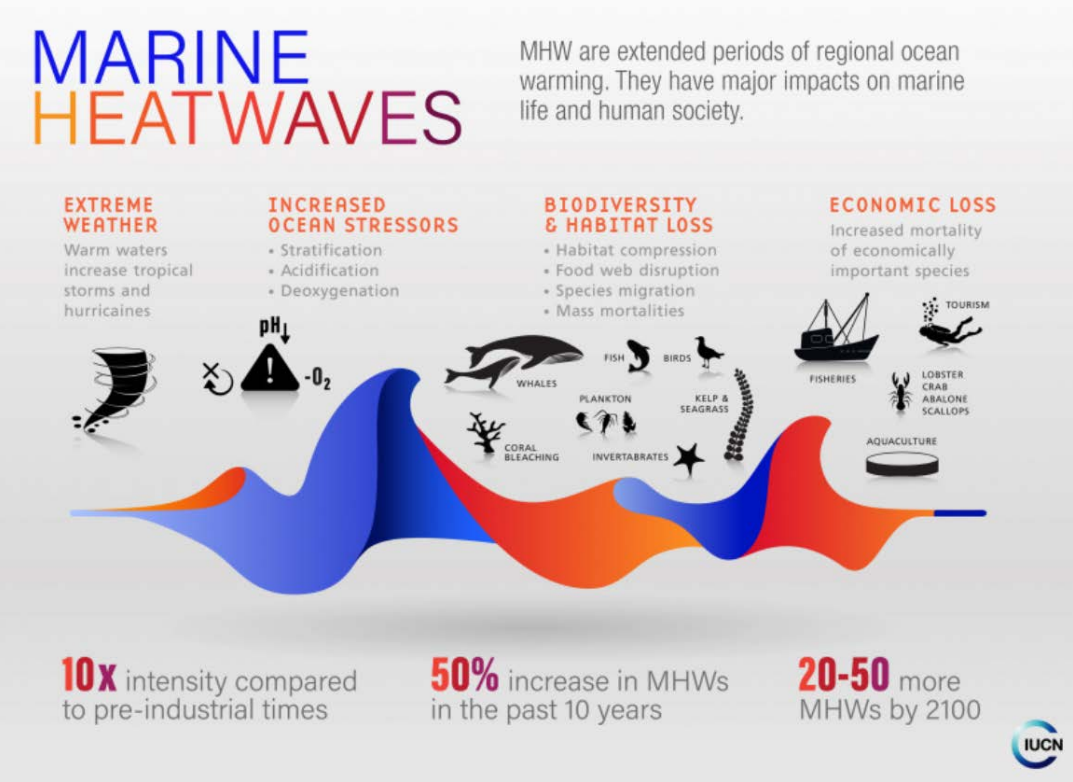
2022-23 La Niña Summary

- Weak La Niña still present during January and February
- Equatorial sea surface temperatures are below average
  - La Niña system continuing to weaken

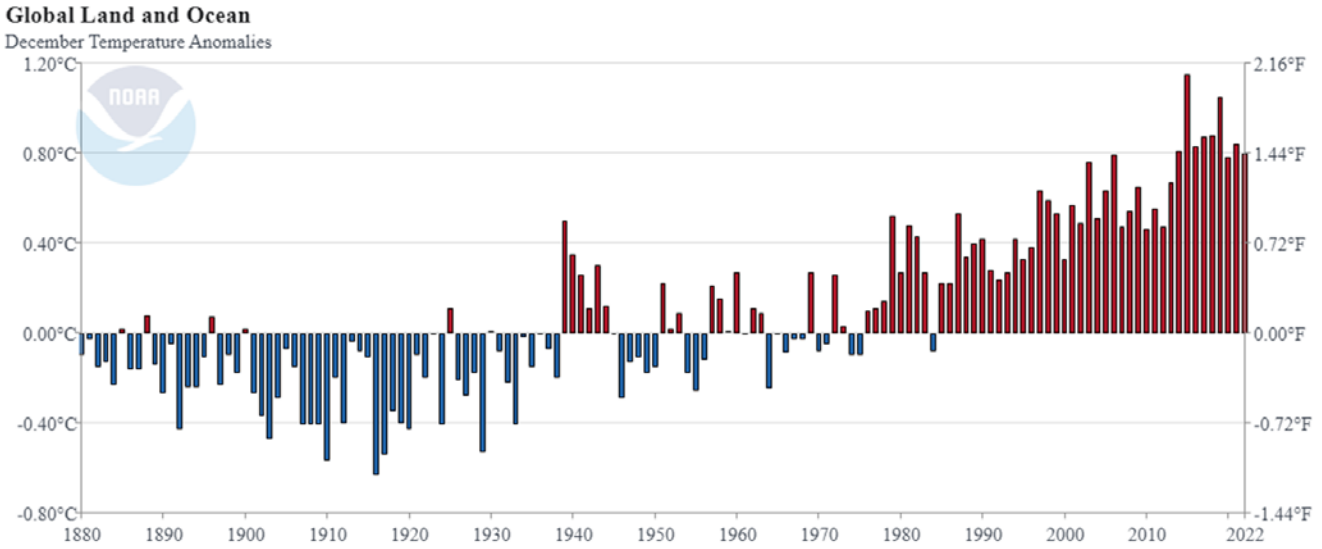


https://coralreefwatch.noaa.gov/

Marine Heat Waves



- Extended periods of extreme warming in seas and oceans have increased in frequency by 50% in the past 10 years



- Last 9 years are warmest over past 150 years

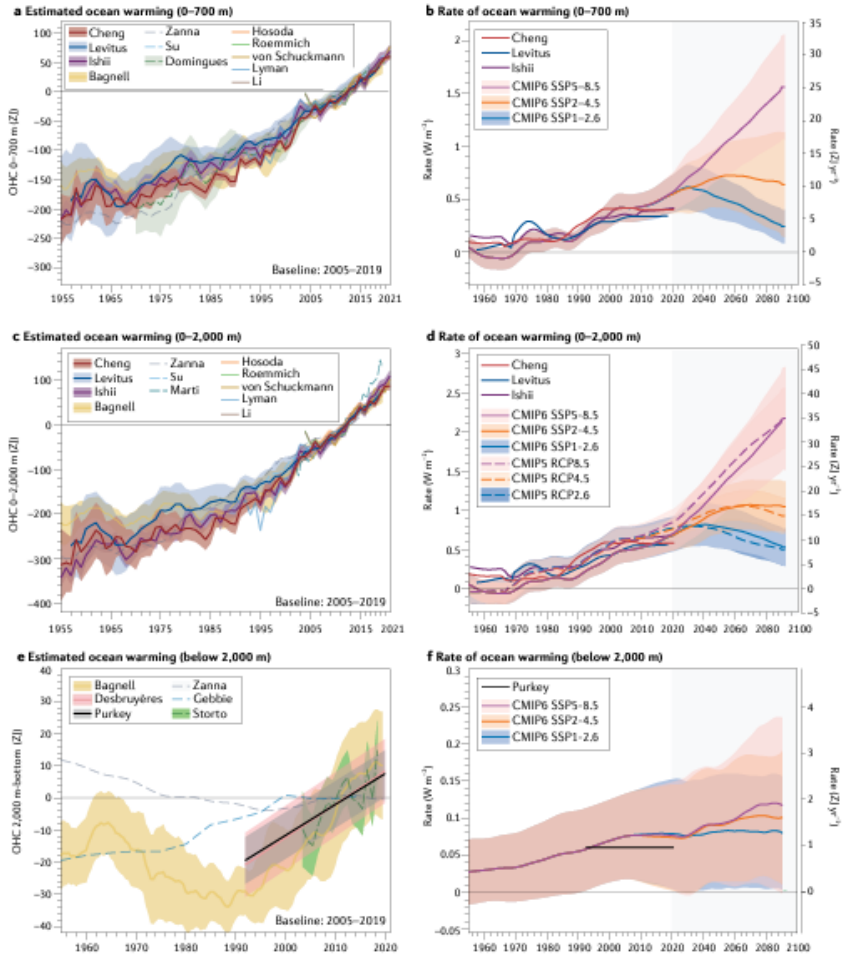
https://www.iucn.org/resources/issues-brief/marine-heatwaves

www.ncdc.noaa.gov

Marine Heat Waves

- Our oceans have absorbed 90% of the earth's excess heat
- Ocean temperatures increasing in deepest waters and at faster rates in recent decade
- Build up of heat is spatially variable, occurred over long period, and unlikely to go away anytime soon

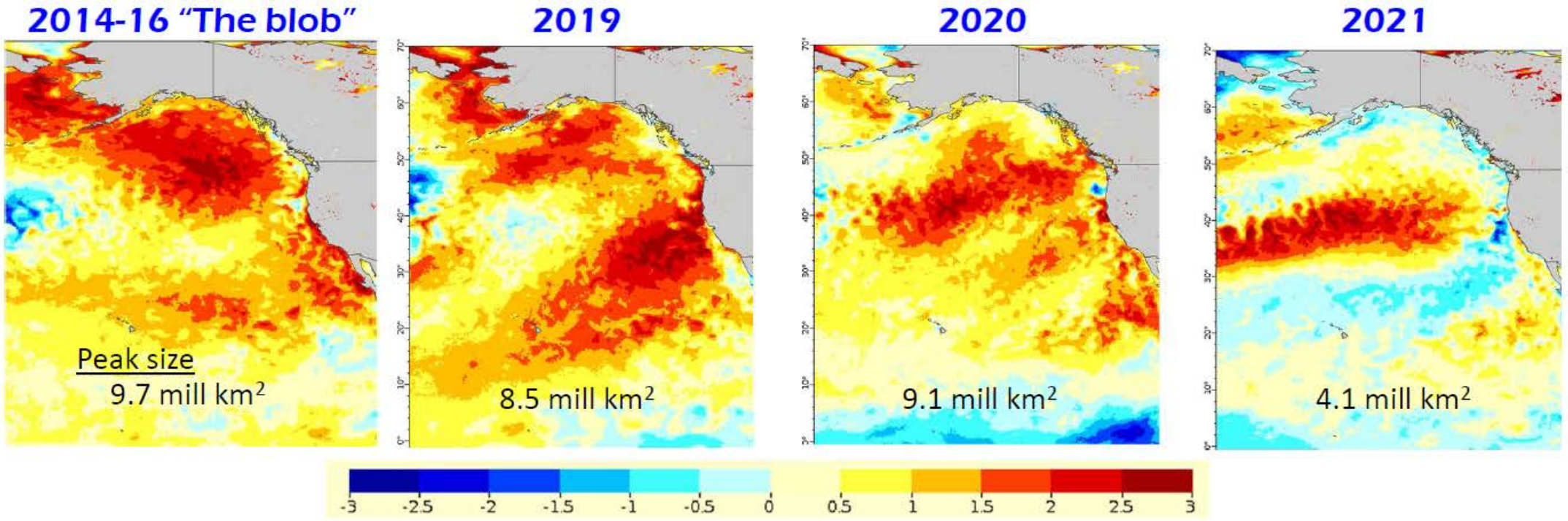
Ocean Heat Content | Rate of Warming



Cheng, L., von Schuckmann, K., Abraham, J.P., Trenberth, K.E., Mann, M.E., Zanna, L., England, M.H., Zika, J.D., Fasullo, J.T., Yu, Y. and Pan, Y., 2022. **Past and future ocean warming.** *Nature Reviews Earth & Environment*, *3*(11).

Recent Northeast Pacific marine heat waves

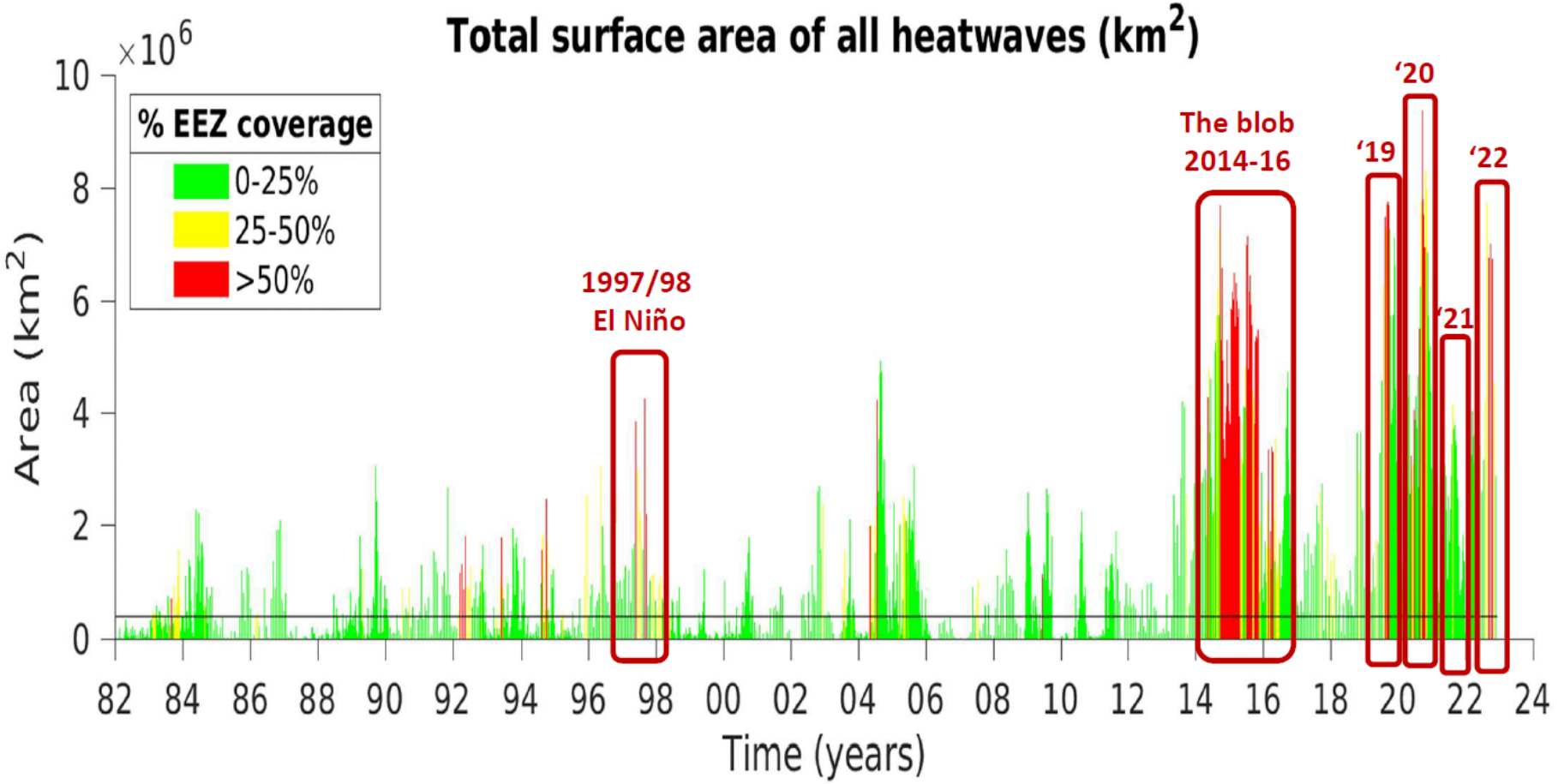
- Sea surface temperature anomalies in September



https://www.integratedecosystemassessment.noaa.gov/regions/california-current/cc-projects-blobtracker
https://coastwatch.pfeg.noaa.gov/erddap/index.html

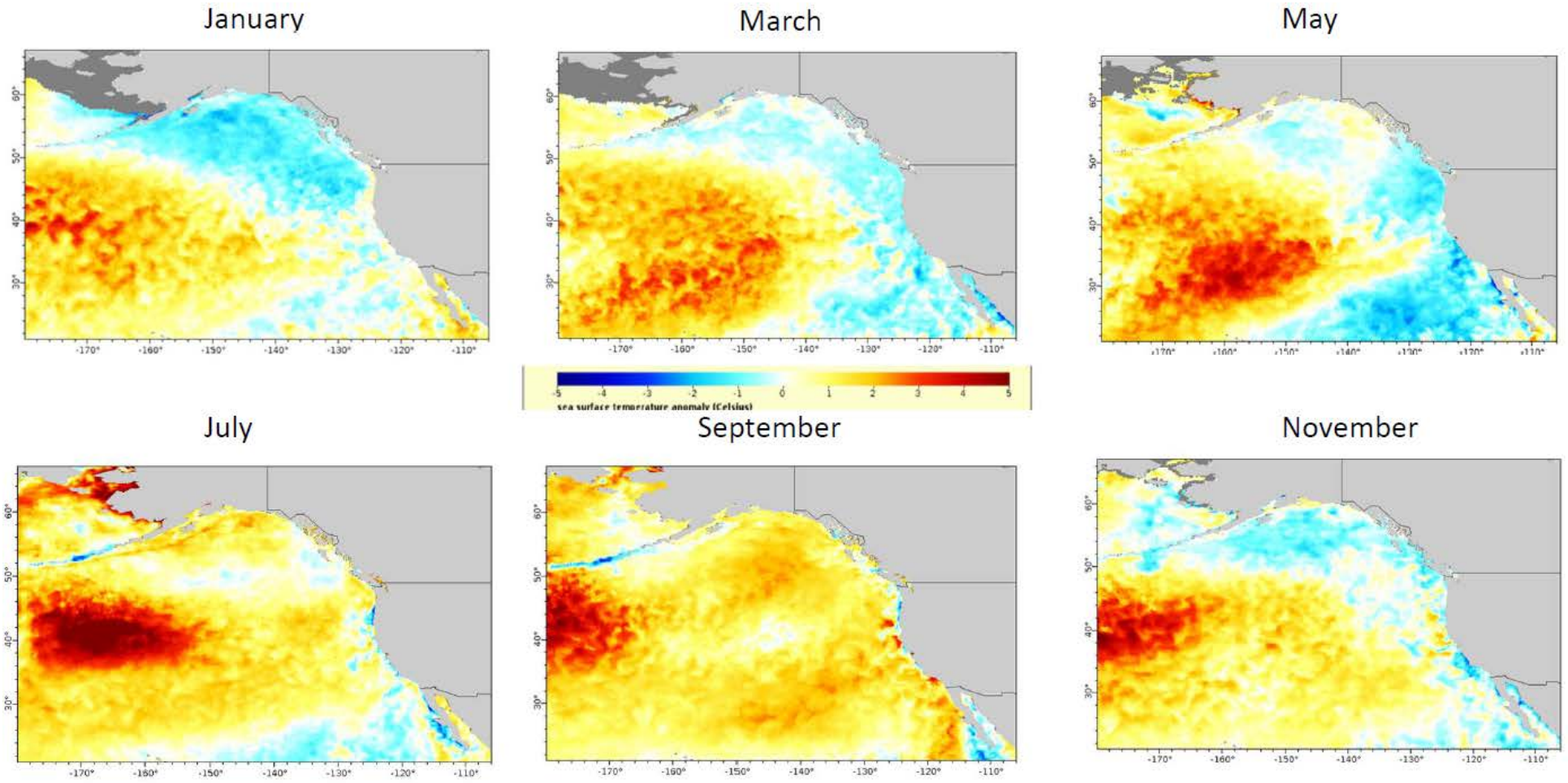
Exclusive Economic Zone (EEZ) Heat Waves

- Area within 200 nautical miles from coast



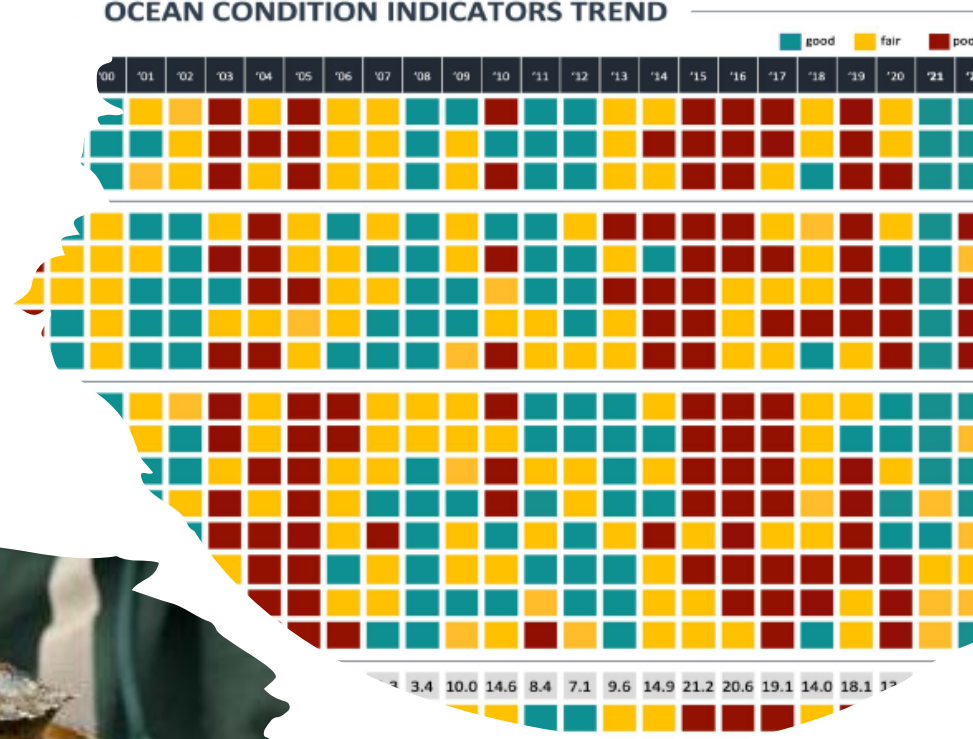
https://www.integratedecosystemassessment.noaa.gov/regions/california-current/cc-projects-blobtracker

2022 Heat Wave Summary



2. Biological Responses

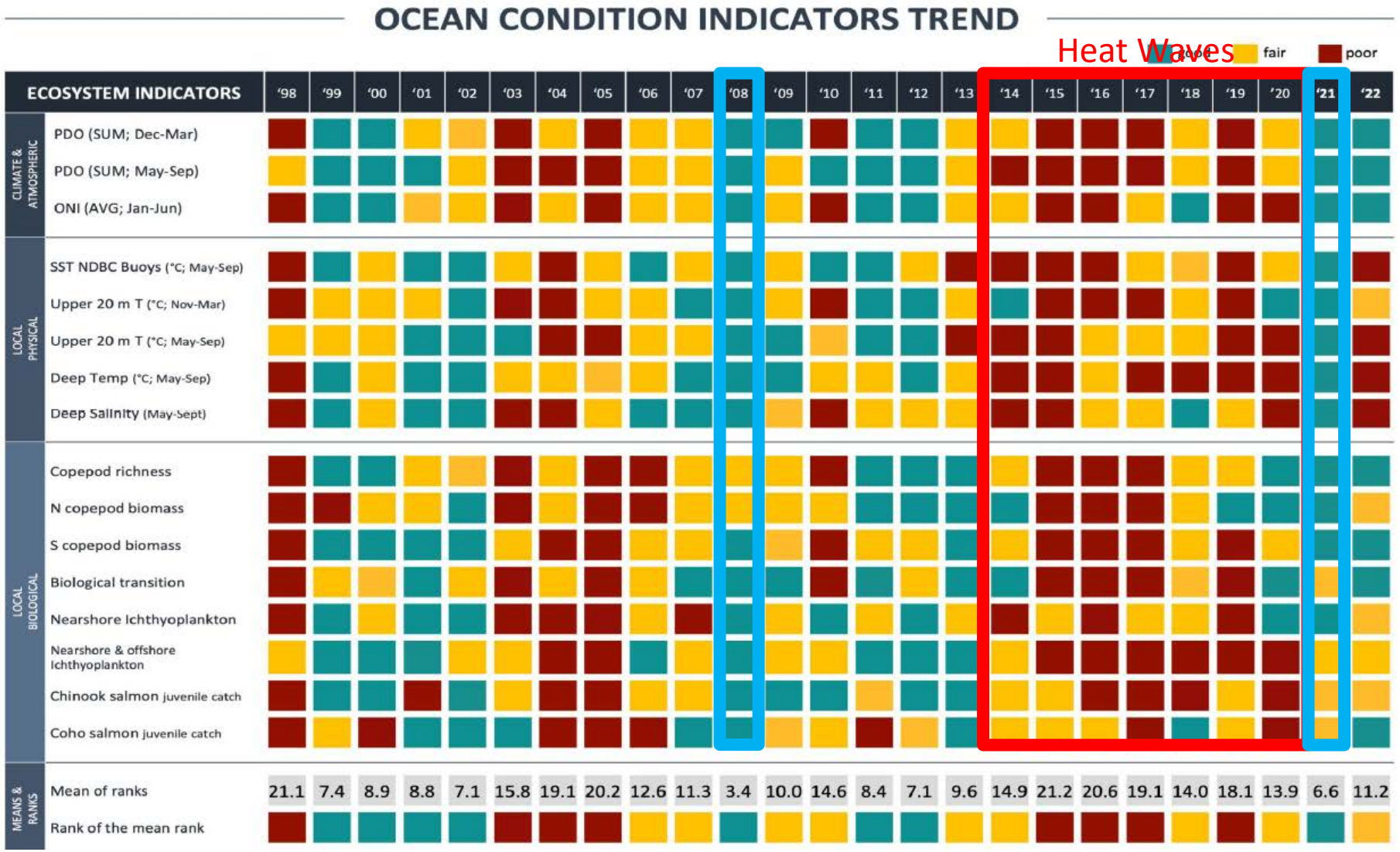
- Northwest Fisheries Science Center Stoplight Chart
- Marine Species Observations
- Salmon Responses



Photograph: WDFW

Photograph: Andrew Hendry

Salmon Indicators: Bad -> Fair -> Good



Basin-scale physical indices

Regional physical indices

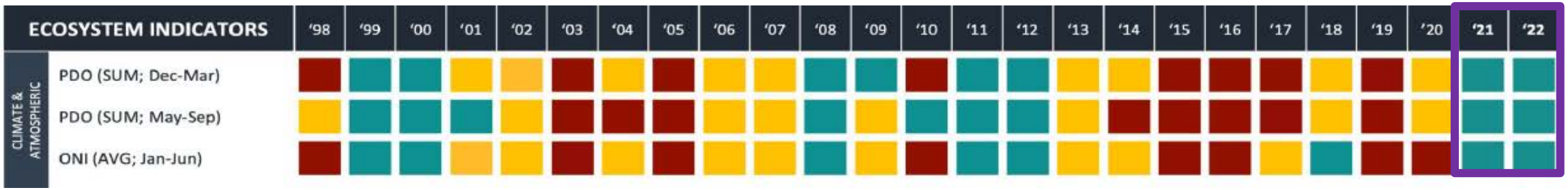
Regional biological indices

Physical
Some indicators (PDO, SST) good and bad

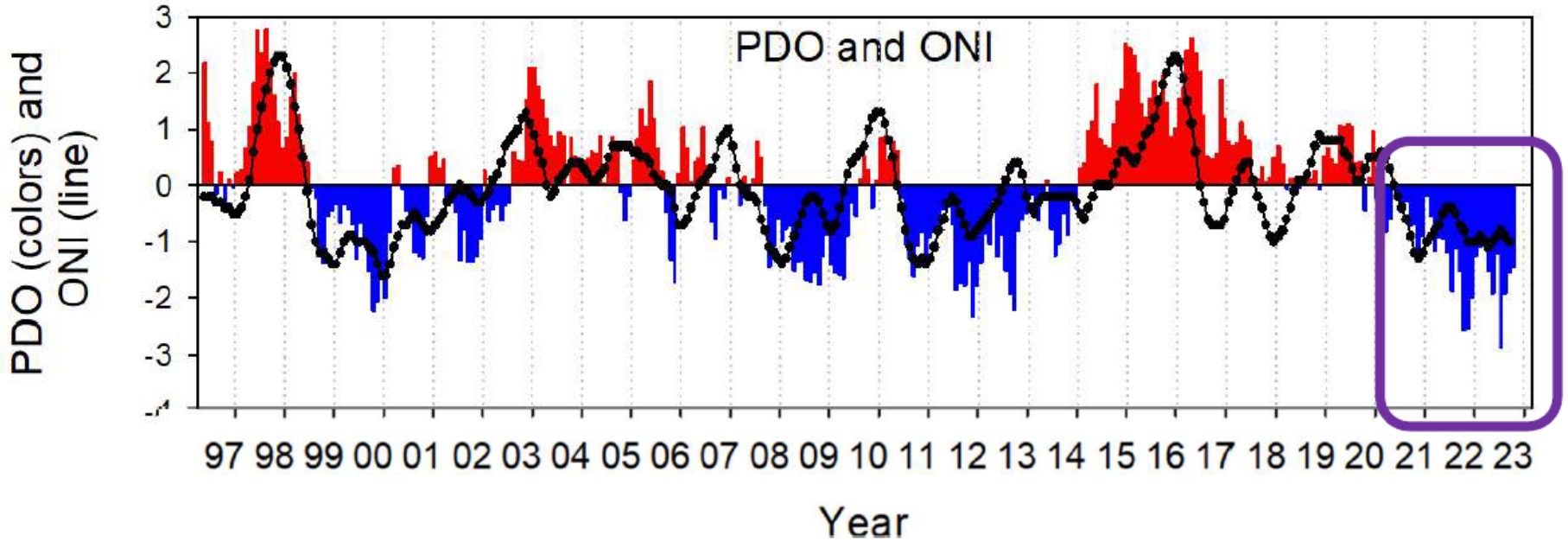
Biological
indicators (zooplankton) trended well in 2022

www.nwfsc.noaa.gov

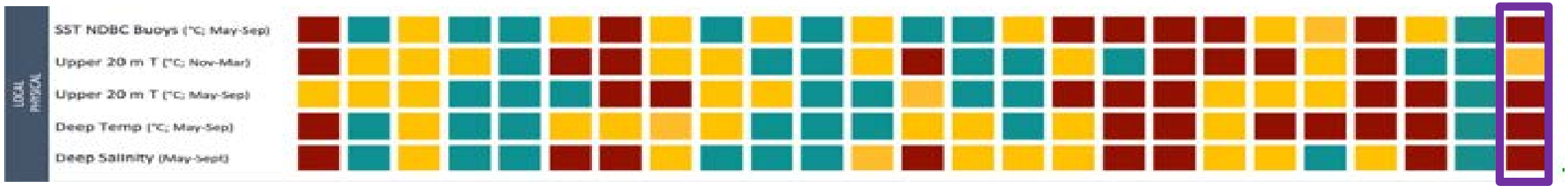
Basin Scale Indicators



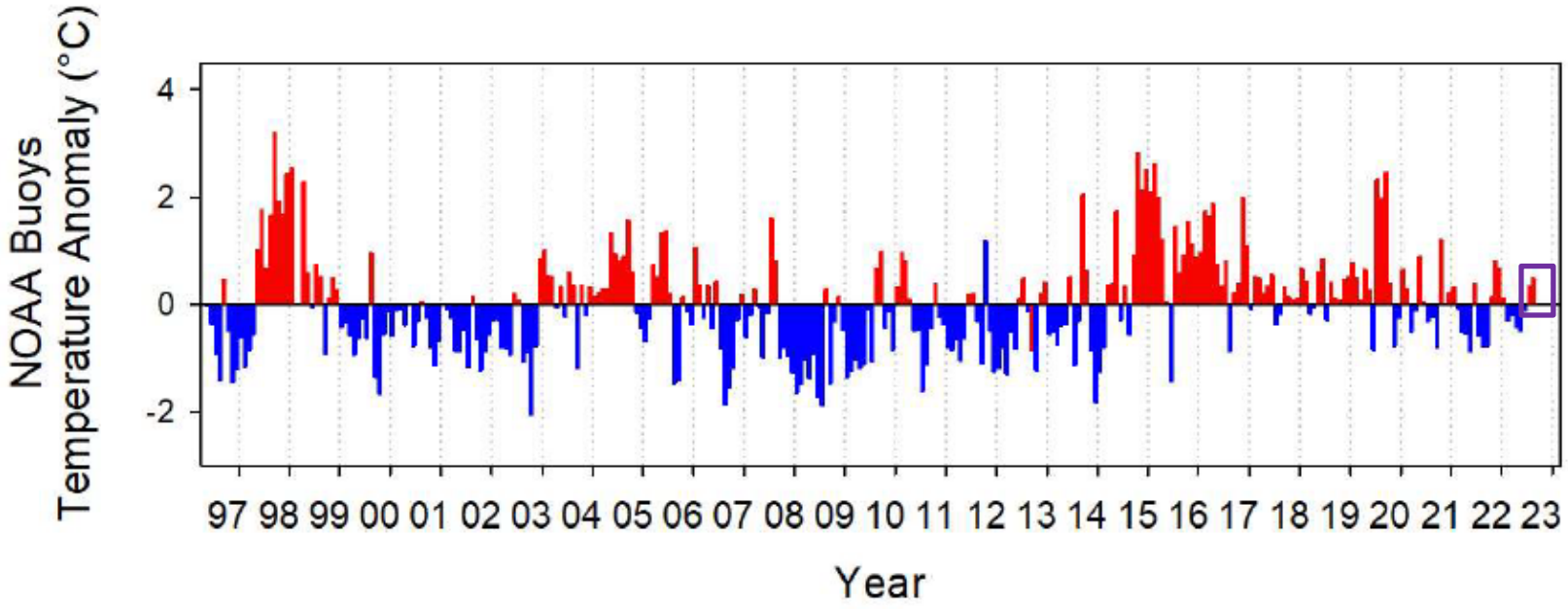
PDO strongly negative and 3-peat La Nina are both favorable for NW salmon



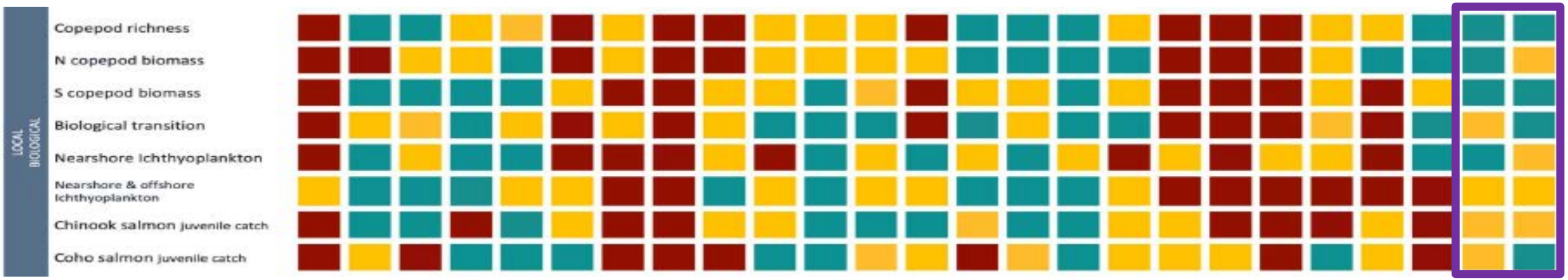
Regional Physical Indices



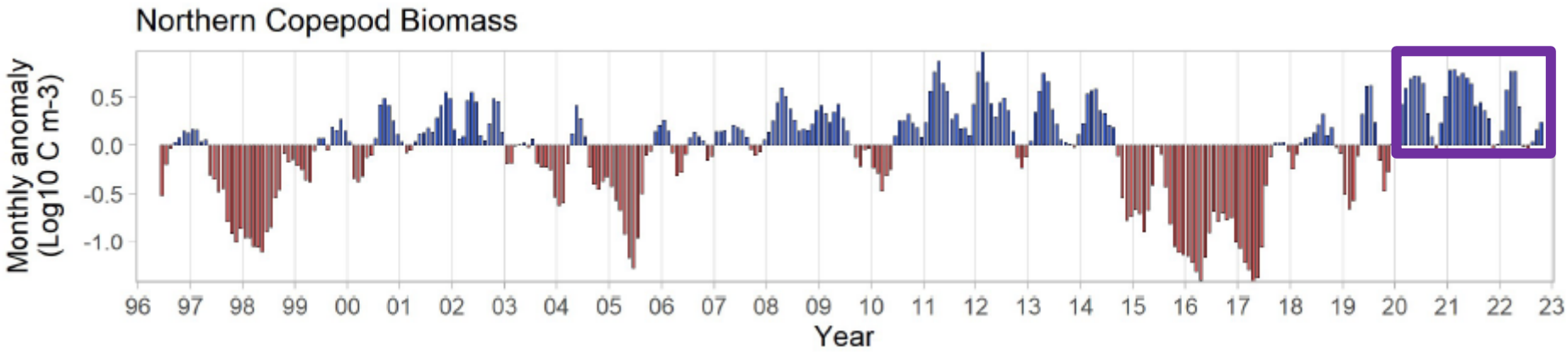
Without strong upwelling, coastal temperature were generally average to warm

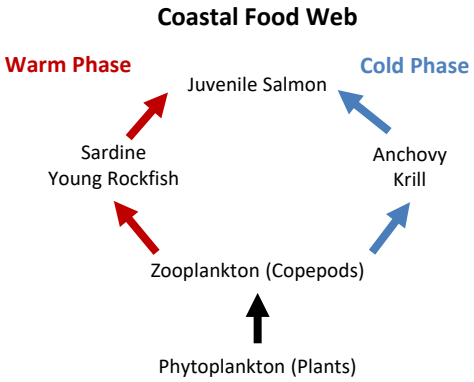


Regional Biological Indices



- Summer copepod community was dominated by northern copepods, consistent with cool period but spatially variable
- Juvenile salmon had average abundances in ocean surveys and winter ichthyoplankton (prey) was average





Marine Species Observations

- Domoic acid continues to be present along Southern Oregon and Northern California Coast
- Warm water species observations 2022 – Dorado, Shortbill spearfish
- Market Squid expansion across West Coast
- European green crab invasion continues north and east
  - 2022 had first confirmed sightings in Hood Canal and Alaska
- Snow crab collapse in Alaska


Photograph: Taylor Veary


Photograph: WDFW


Photograph: WDFW

Photograph: Ian Winder


Photograph: WDFW

Salmon Response

- 79M Bristol Bay Sockeye
- 6.77M Fraser Sockeye
- Prespawn mortality events documented in Southeast Alaska, British Columbia, and Washington State in 2022
- Declines in body size, reproductive potential, and survival across North Pacific
- Migration timing shifts across Southeast Alaska and Salish Sea stocks


Photograph: Andrew Hendry

Bristol Bay


Photograph: Scott Decker

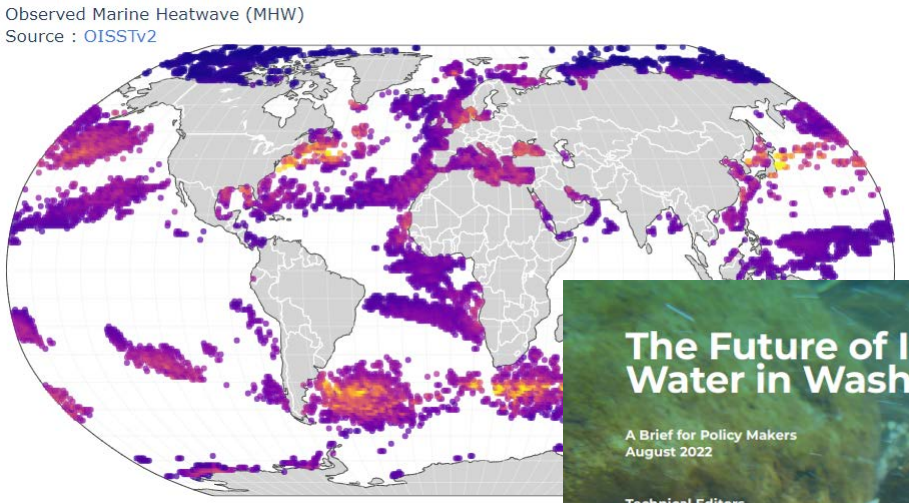
British Columbia

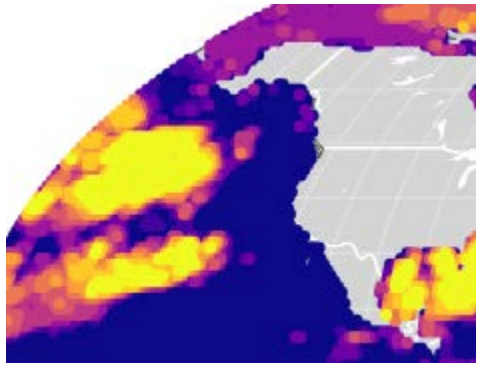

Photograph: Sarah Mund

https://www.cbc.ca/news/canada/british-columbia/salmon-dead-drought-bella-bella-1.6606418

3. 2023 Marine and Freshwater Climate Forecasts

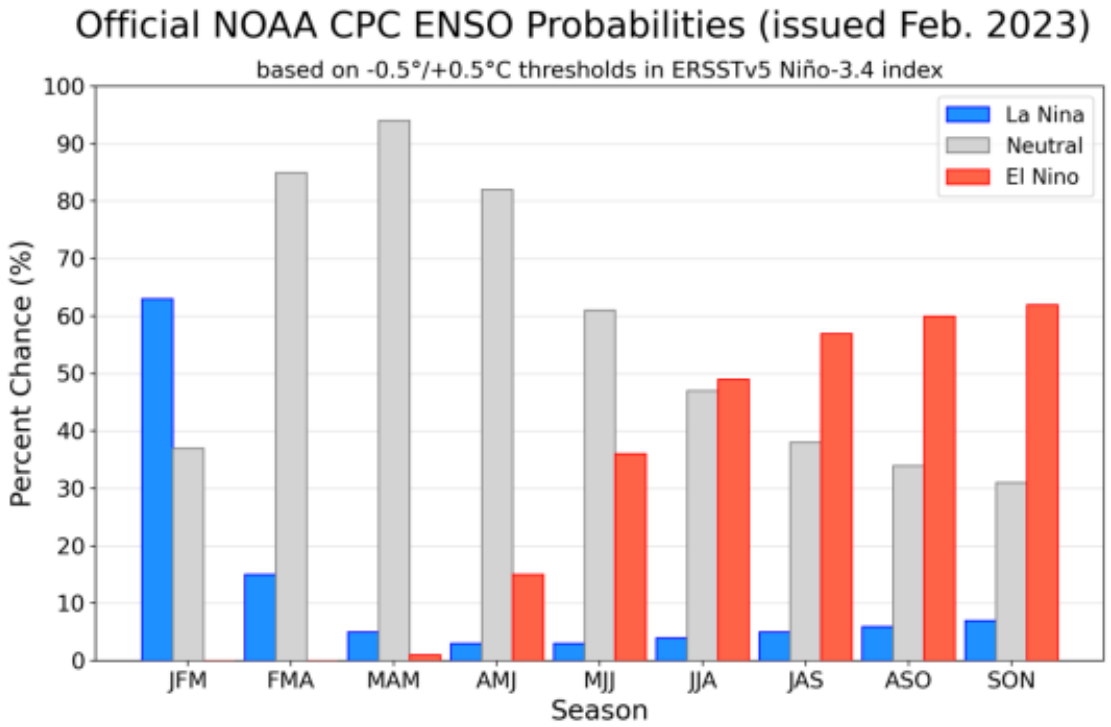
- Probabilistic EL Nino-Southern Oscillation Outlook
- Sea Surface Temperature Anomaly Outlook
- Seasonal Terrestrial Temperature Outlook

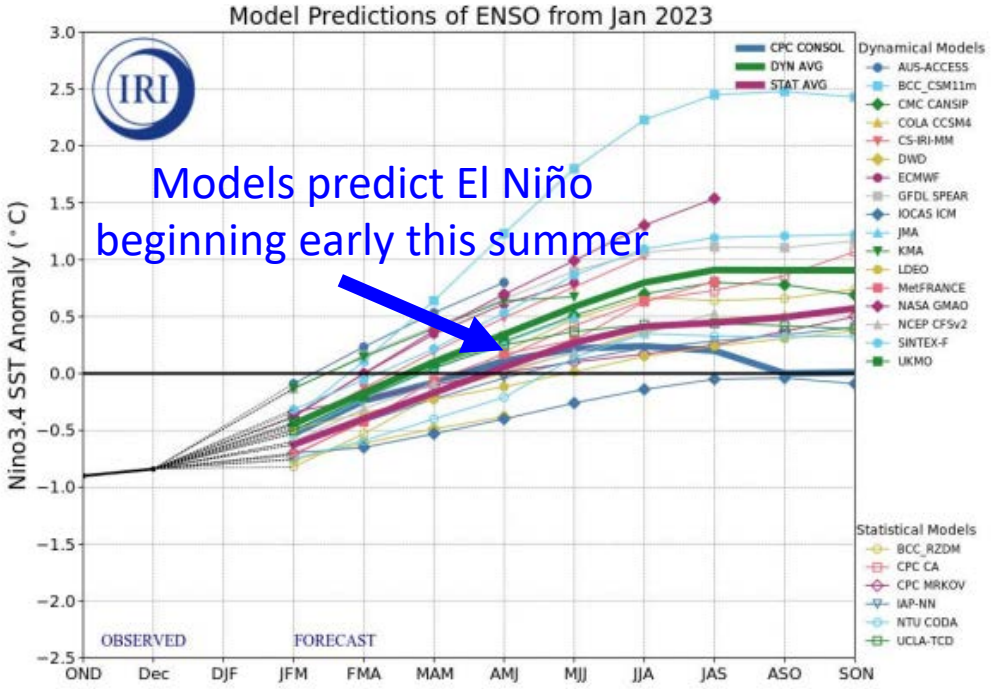




Probabilistic EL Nino-Southern Oscillation Outlook

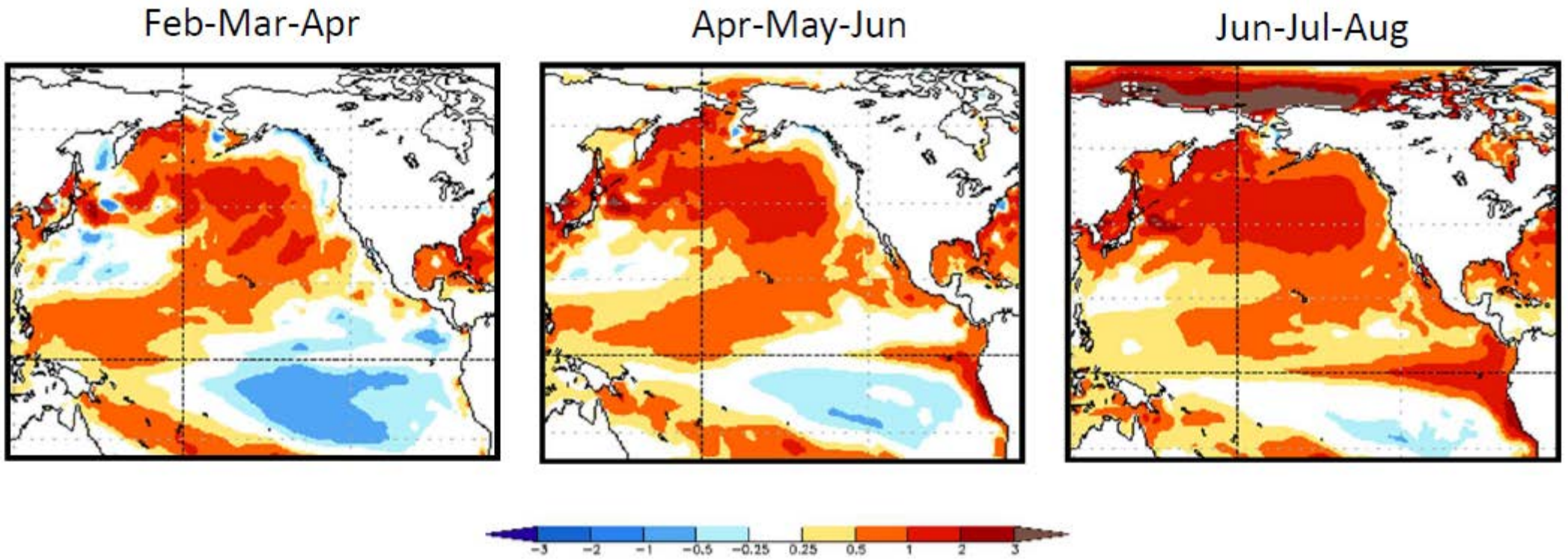
- Above average subsurface temperatures expanding eastward and increasing El Nino probability for 2023 (56-59%)





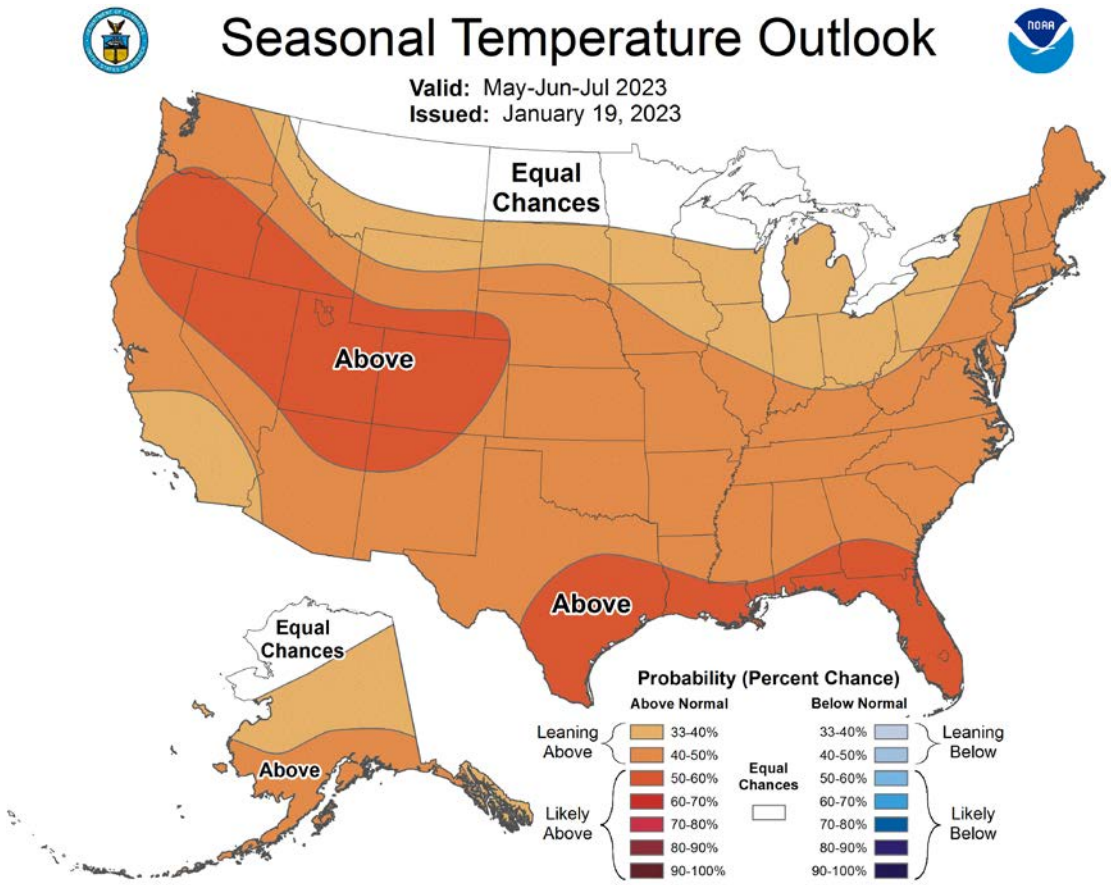
https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml

Forecast Sea Surface Temperature Anomalies 2023

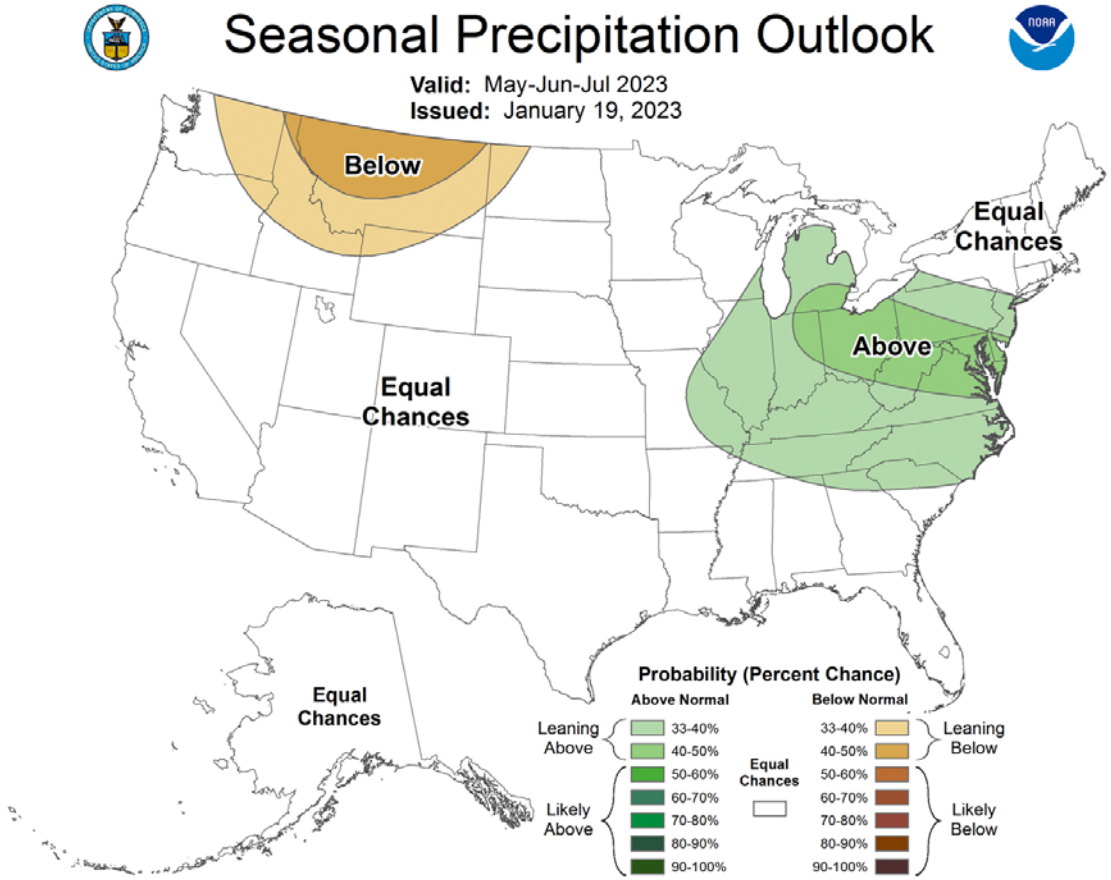


Outlook over 3.5 months (May-July)

Temperature: 40-60% chance temperatures will be ***above*** normal



Precipitation: Equal chance precipitation will be normal to 30-50% ***below*** normal



www.cpc.ncep.noaa.gov/products/forecasts

Take home messages

- Climate variability will continue to impact salmon across the state of Washington in 2023 and into 2024
  - Marine heat waves driving more extreme weather events and a shift from La Nina to El Nino conditions may negatively affect spawning and out-migrating NW salmon stocks 2023-24
  - Drought and wildfire frequency and intensity may increase in future years, negatively impacting spawning and out-migrating NW salmon stocks 2023-24
  - **Triple La Niña favorable for NW salmon stocks returning in 2023 and possibly into 2024-25 – Cautious Optimism**

Initiatives to recover salmon

- WDFW and Tribal comanagers are working together to advance conservation pathways, monitoring efforts, and adaptive management strategies to support recovery of declining salmon stocks in Washington State

- WA Governor continues support protecting and restoring habitat, invest in clean water, correct fish passage barriers, build climate resiliency via **Climate Commitment Act**, address predation and food web issues, enhance coordination across agencies, strengthen science)

- Canadian government also working on initiatives to support salmon recovery "**Pacific Salmon Strategy Initiative**"

Acknowledgements

Dr. Marisa Litz, Science Division, WDFW

Dr. Laurie Weitkamp, NOAA Fisheries, NWFSC

Pacific Salmon Commission

NOAA Climate Prediction Center

Questions

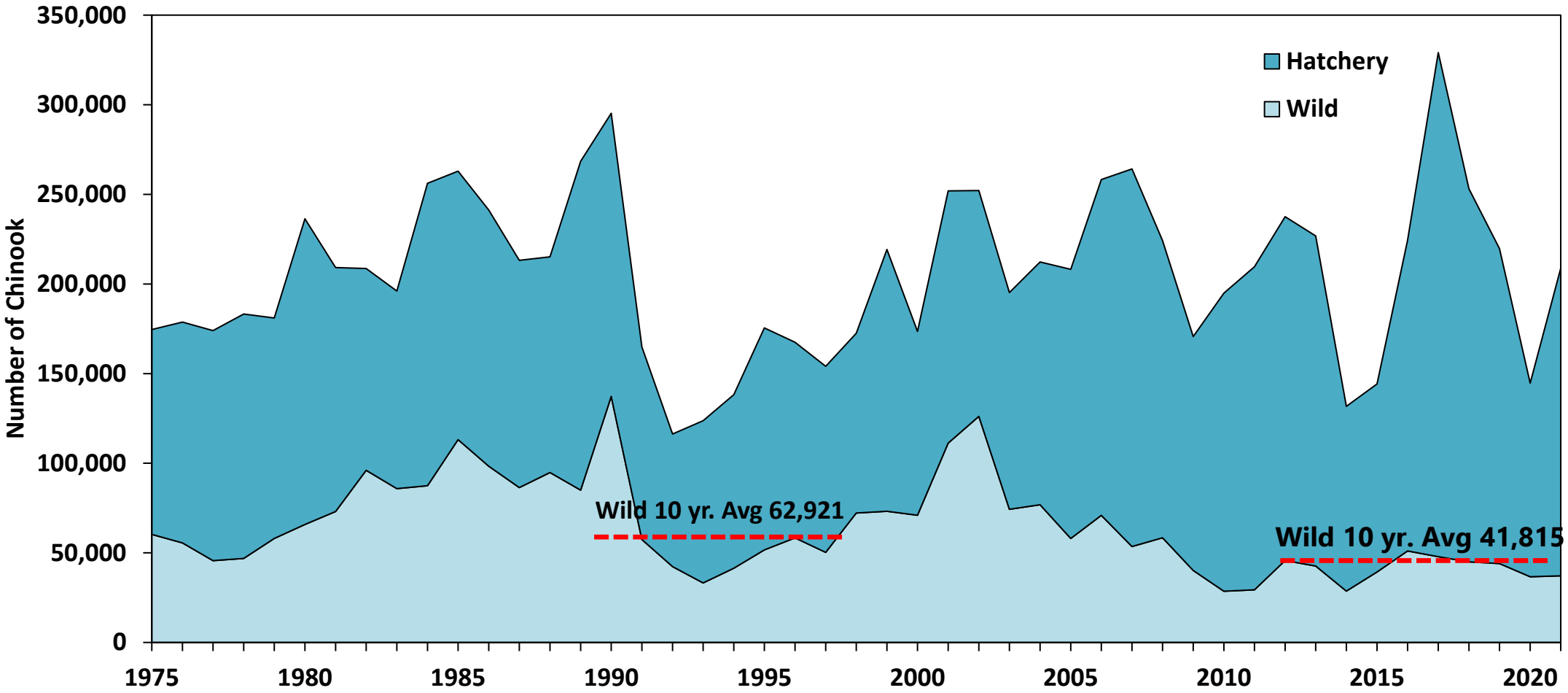
Washington Department of FISH and WILDLIFE

WA Coast and Puget Sound 2022 Returns and 2023 Forecasts

Kirsten Simonsen, PhD and Matthew Bogaard, MSc

Chinook

Chinook Historical Runsize – Puget Sound



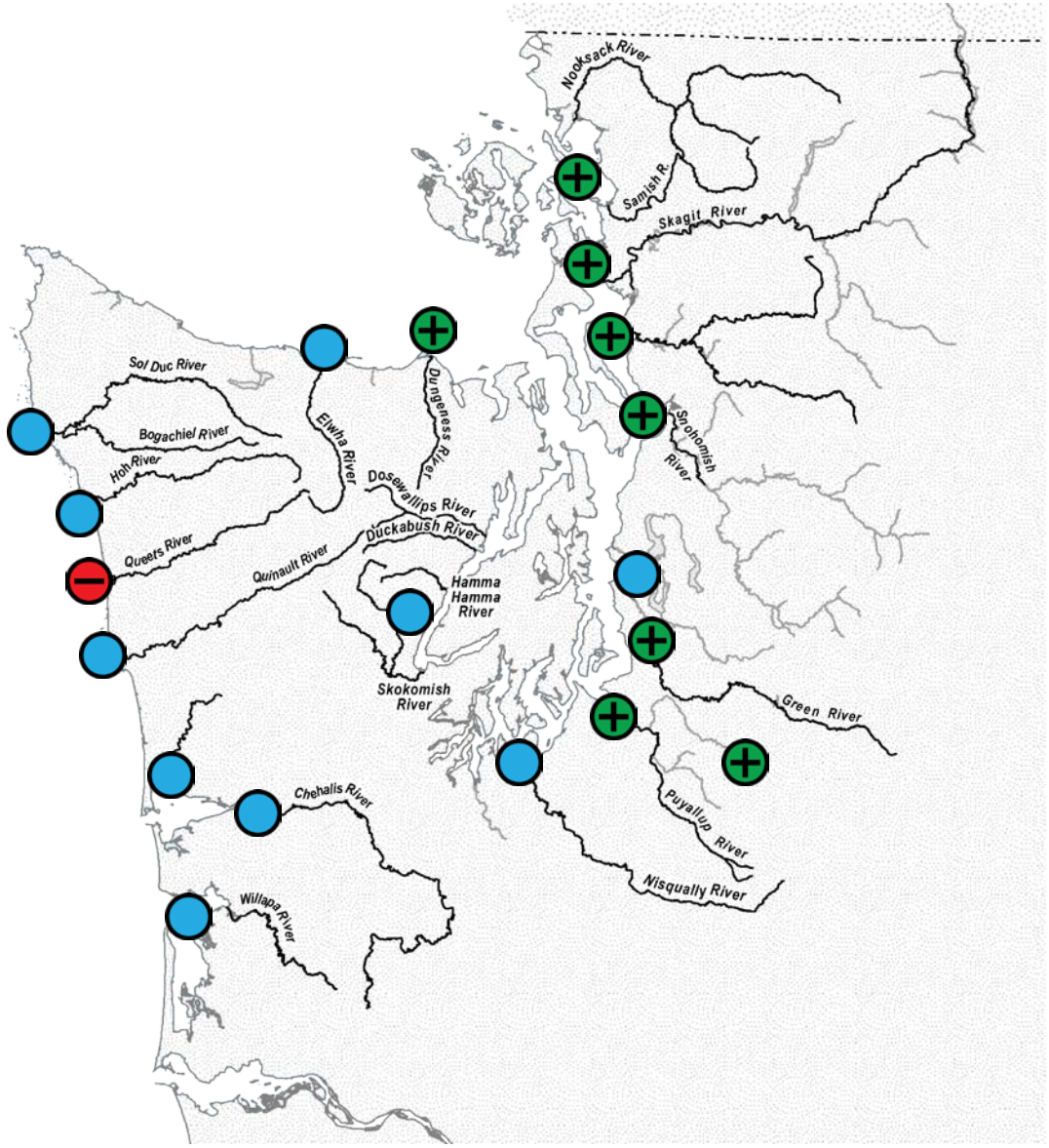
Wild Chinook ⬇~34% since 10yr avg. prior to listing under ESA in 1999

2022 Fall Chinook Returns

- All returns are preliminary
- Returns range from **Neutral** to **Good** in Puget Sound
- Returns were mostly **Neutral** on the Coast

Relative to Recent 10yr Avg. Runsize

- Good > 125%
- Neutral 75-125%
- Poor < 75%

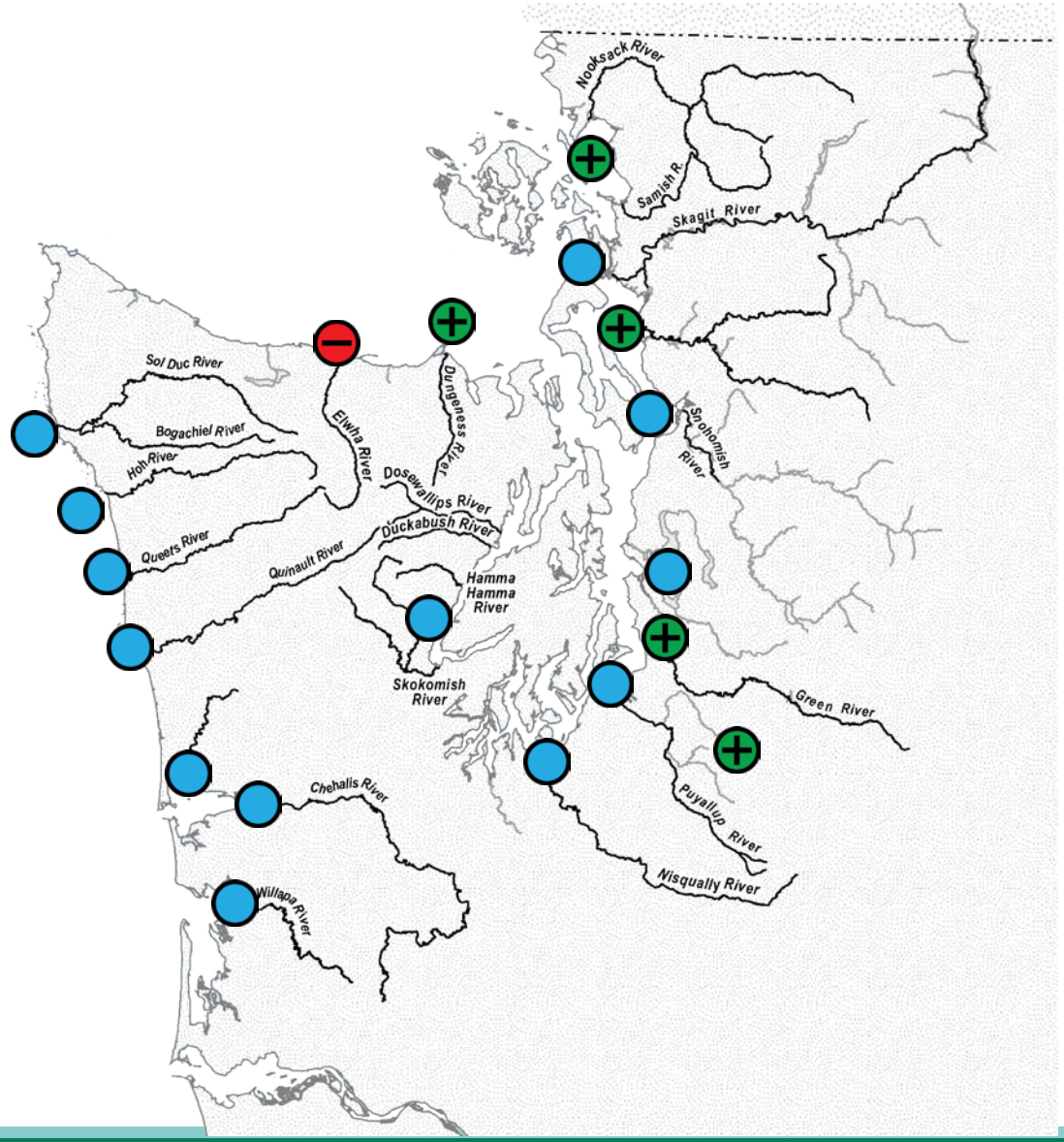


2023 Fall Chinook Forecasts

- Forecasts mostly range from **Neutral** to **Good** for Puget Sound and **Neutral** for the Coast
- Puget Sound – **258,818 Total**
  - **229,038 H / 29,780 W**
- Coast – **81,829 Total**
  - **42,676 H / 39,153 W**

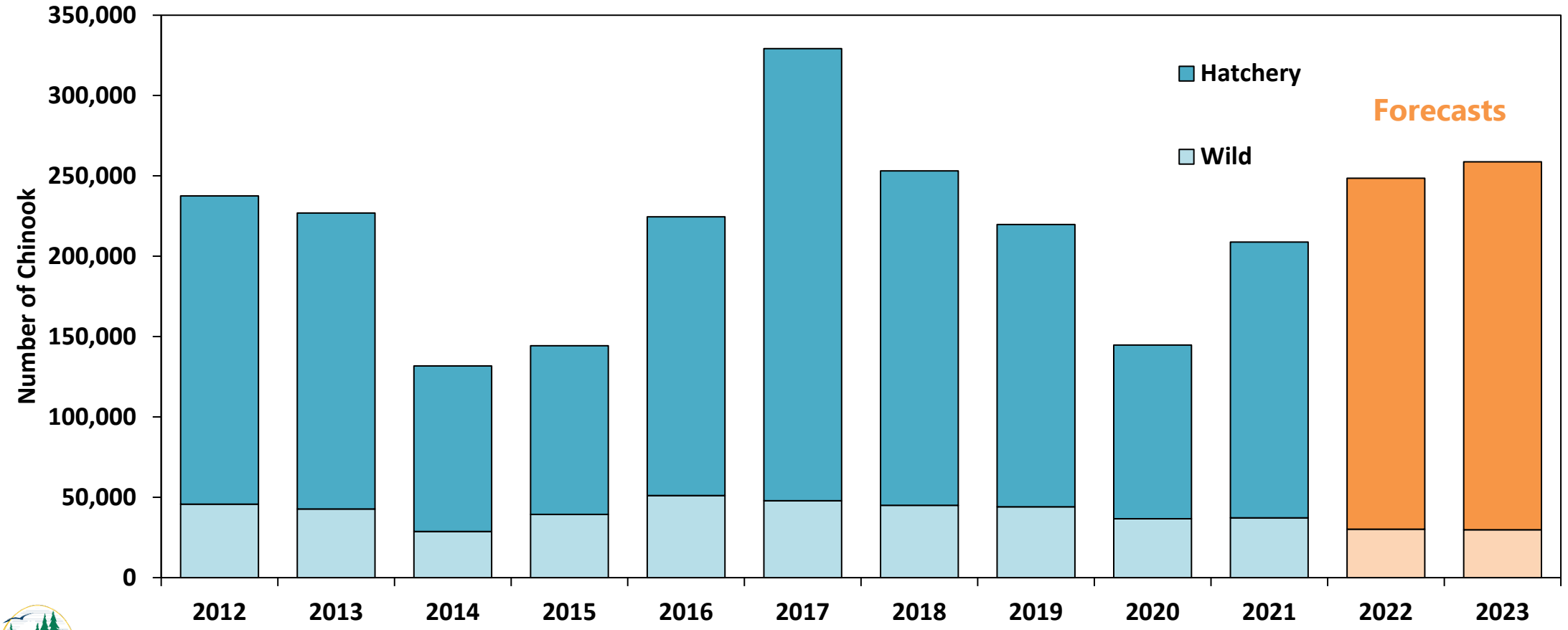
Relative to Recent 10yr Avg. Runsize

- Good > 125%
- Neutral 75-125%
- Poor < 75%



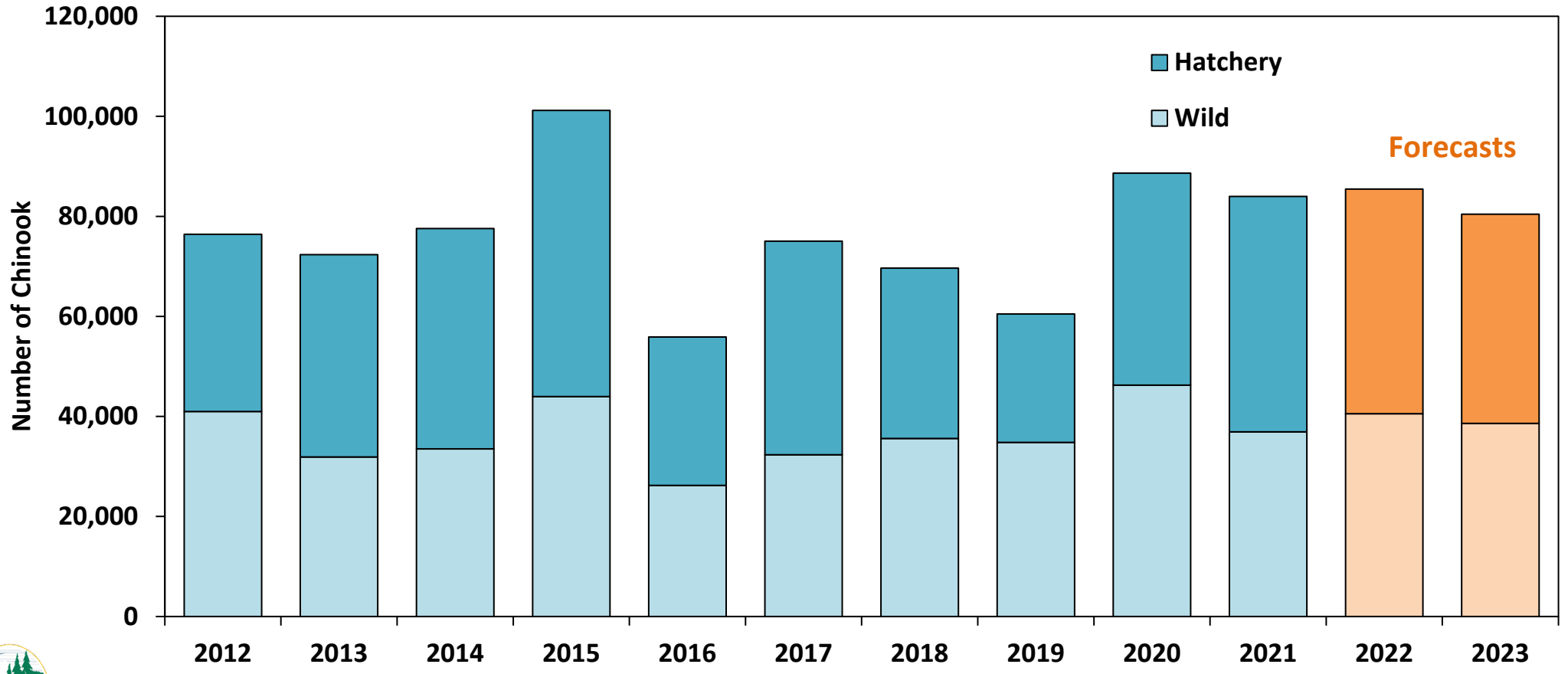
Puget Sound Chinook Forecasts

- Hatchery ⬆ **34%** and Wild ⬇ **29%** over recent 10-year average
- Hatchery ⬆ **5%** and Wild ⬇ **1%** compared to 2022 forecast
- Total PS Chinook ⬆ **22%** from the 10 yr. avg runsize and ⬆ **4%** from last years forecast



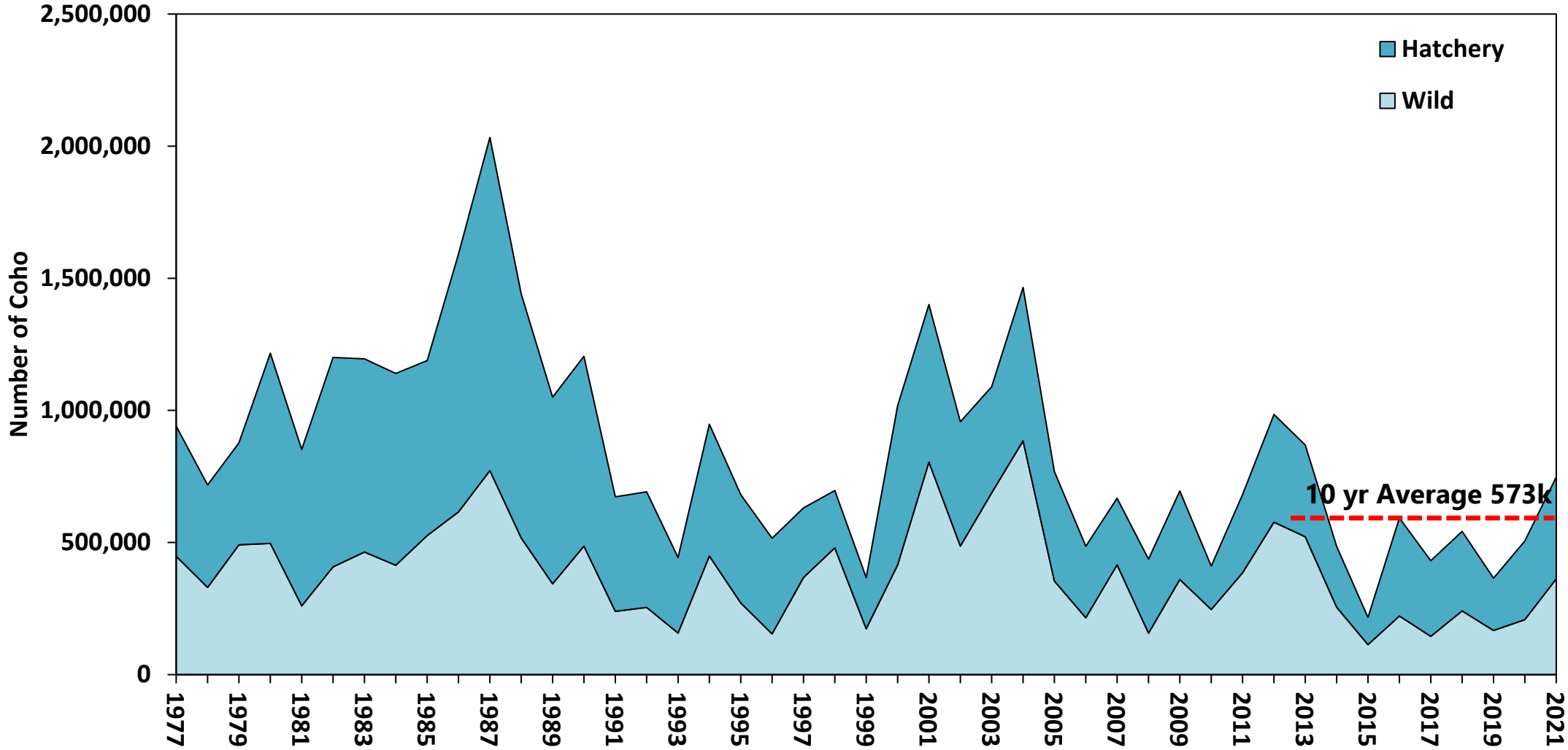
Coastal Chinook Forecasts

- Hatchery ⬆ **7%** and Wild ⬆ **8%** over recent 10-year average
- Hatchery ⬇ **5%** and Wild ⬇ **4%** compared to 2022 forecast
- Total Chinook ⬆ **7%** from the 10 yr. avg runsize and ⬇ **4%** from last years forecast



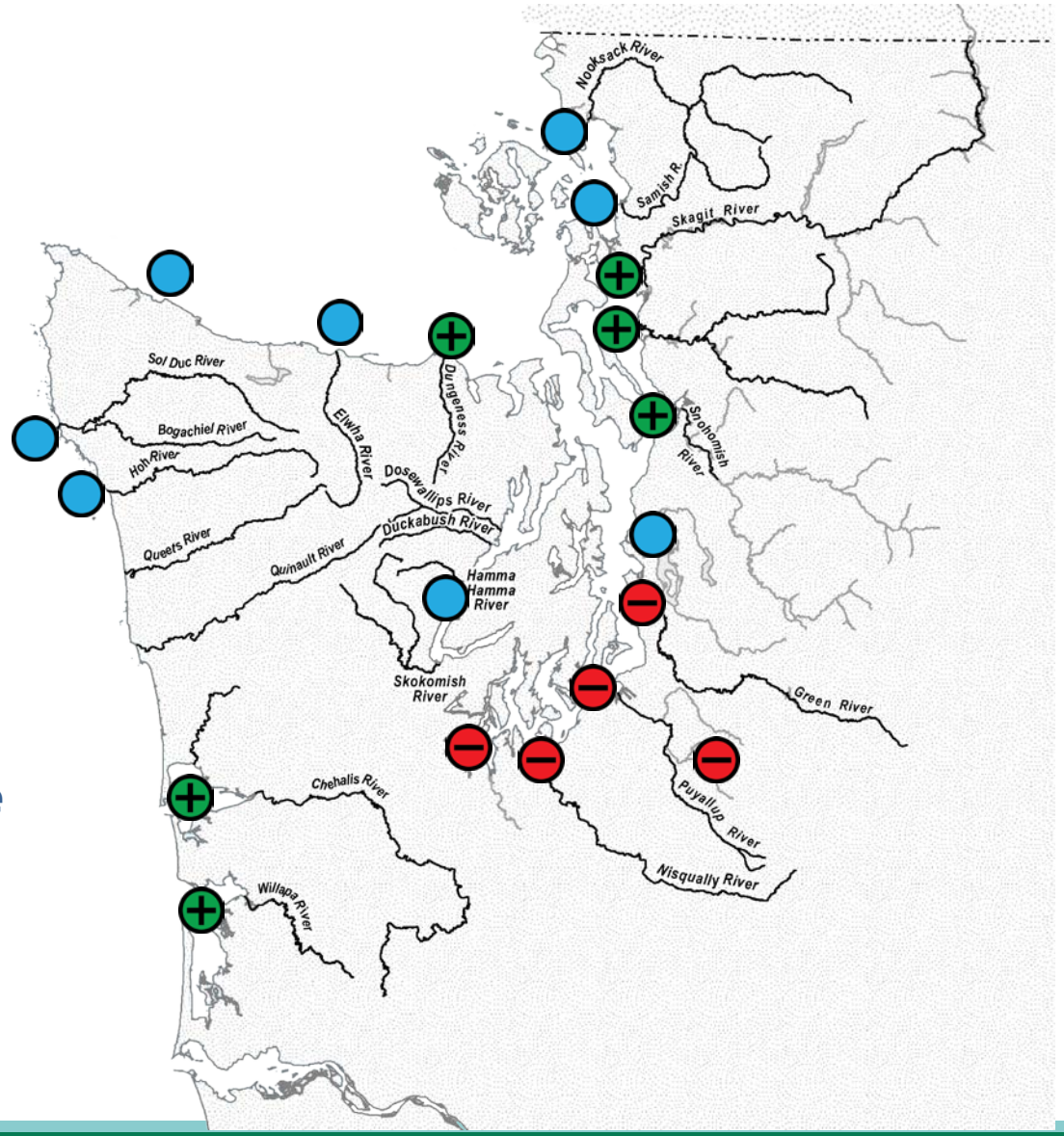
Coho

Coho Historical Runsize – Puget Sound



2022 Coho Returns

- All returns are preliminary
- Returns ranged from **Good** to **Poor** for Puget Sound
- Returns for the coast were **Neutral to Good**



Relative to Recent 10yr Avg. Runsize

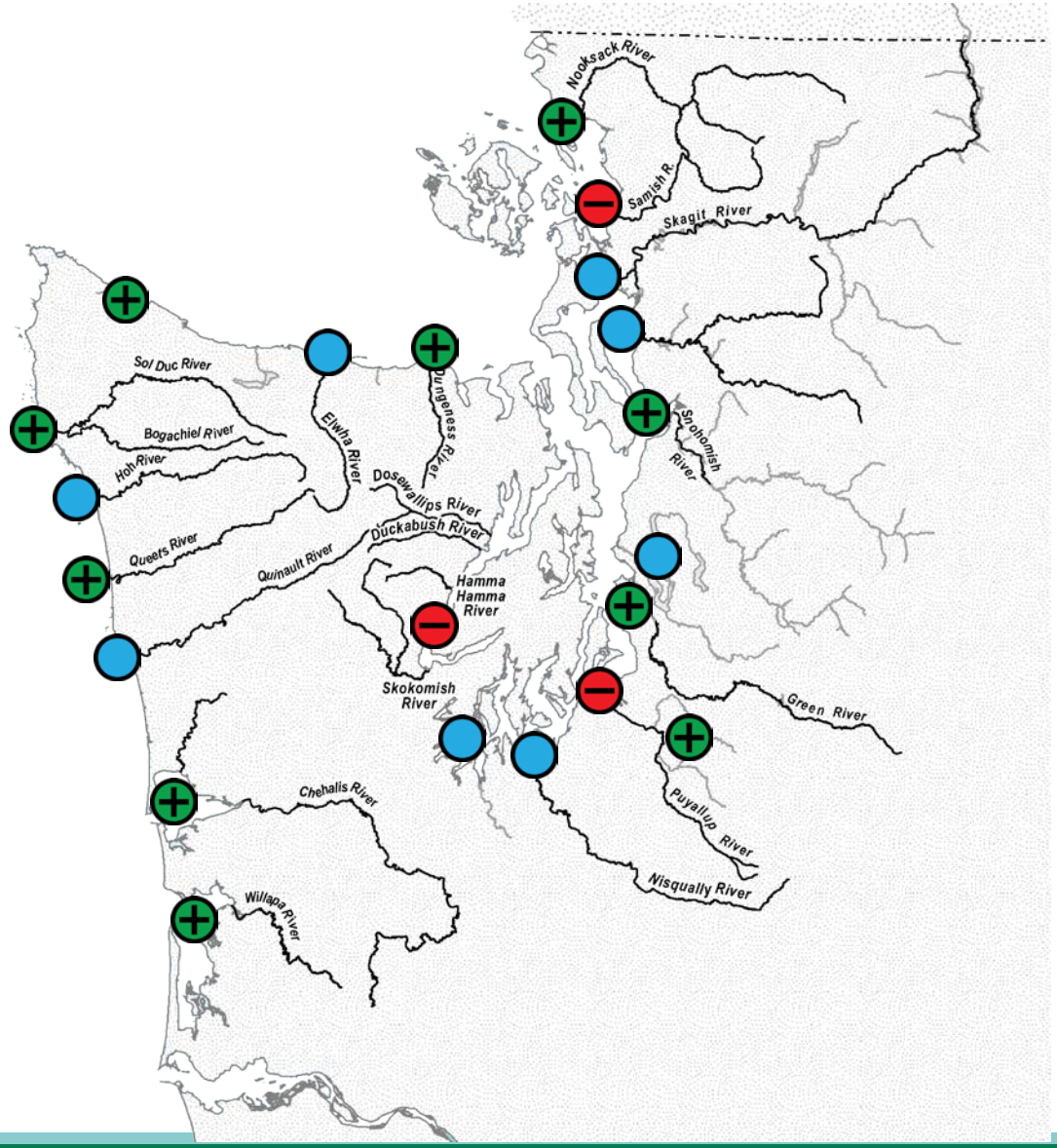
- Good > 125%
- Neutral 75-125%
- Poor < 75%

2023 Coho Forecasts

- Forecasts range from **Poor** to **Good** across Puget Sound
  - **760,029 Total**
    - **462,771 H / 297,258 W**
- Forecasts mostly **Good** on coast
  - **519,329 Total**
    - **302,642 H / 216,687 W**

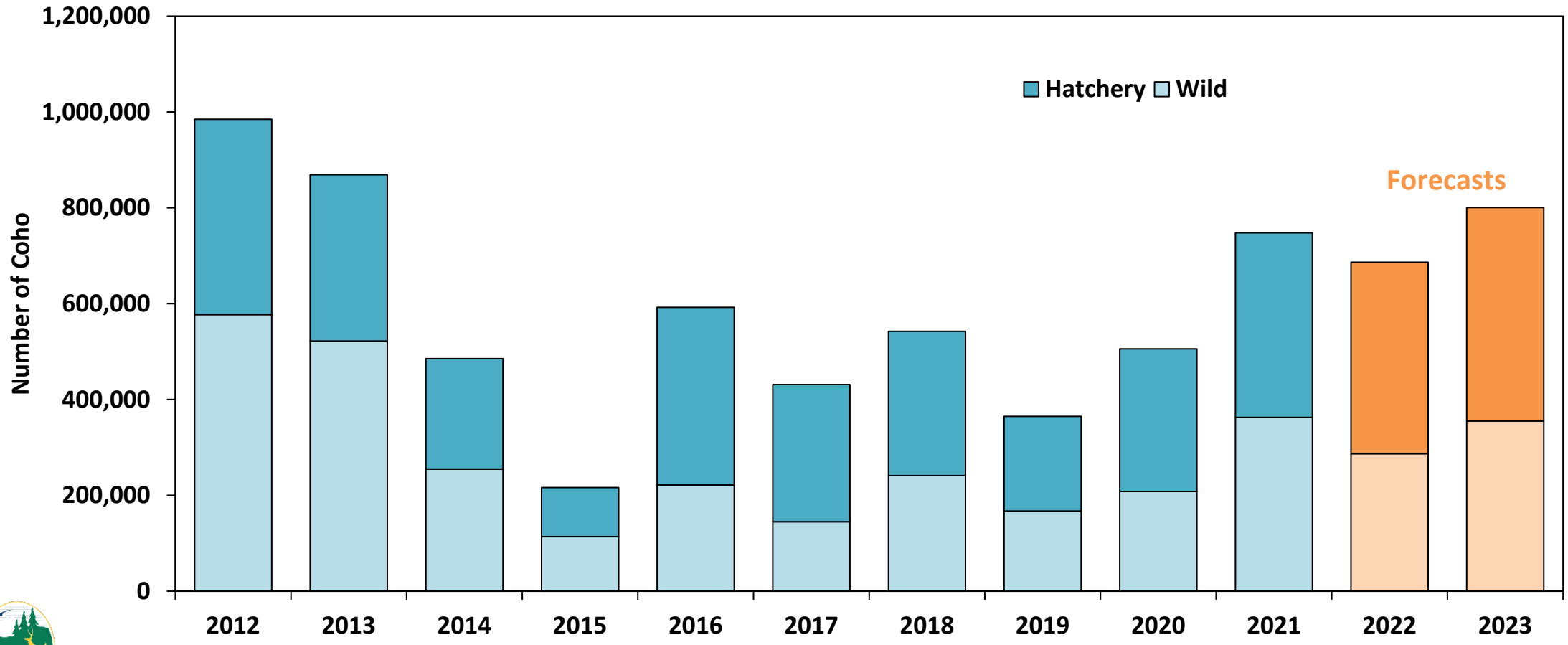
Relative to Recent 10yr Avg. Runsize

- Good > 125%
- Neutral 75-125%
- Poor < 75%



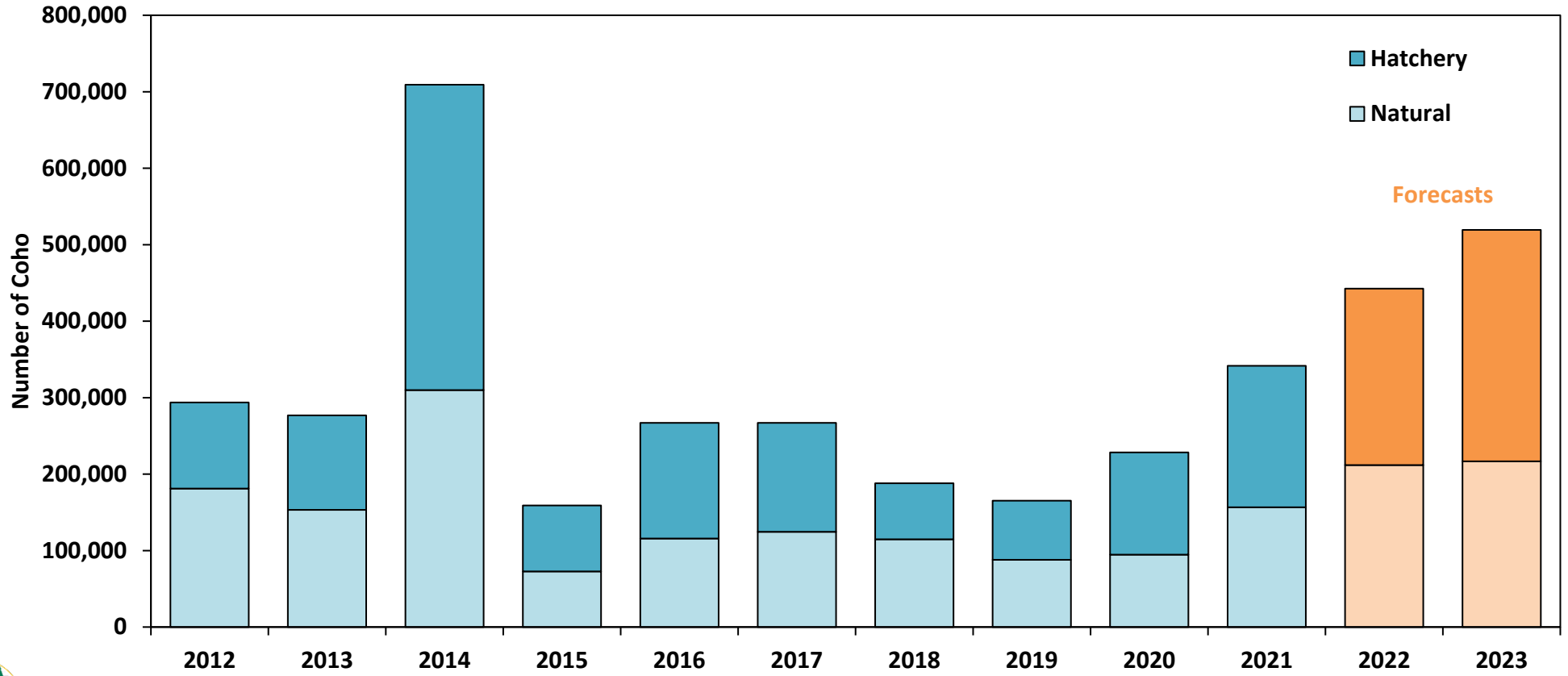
Puget Sound Coho Forecasts

- Hatchery ⬆ **50%** and Wild ⬆ **6%** over recent 10-year average
- Hatchery ⬆ **16%** and Wild ⬆ **11%** compared to 2022 forecast
- Total PS Coho ⬆ **32%** from the 10 yr. avg runsize and ⬆ **14%** from last years forecast



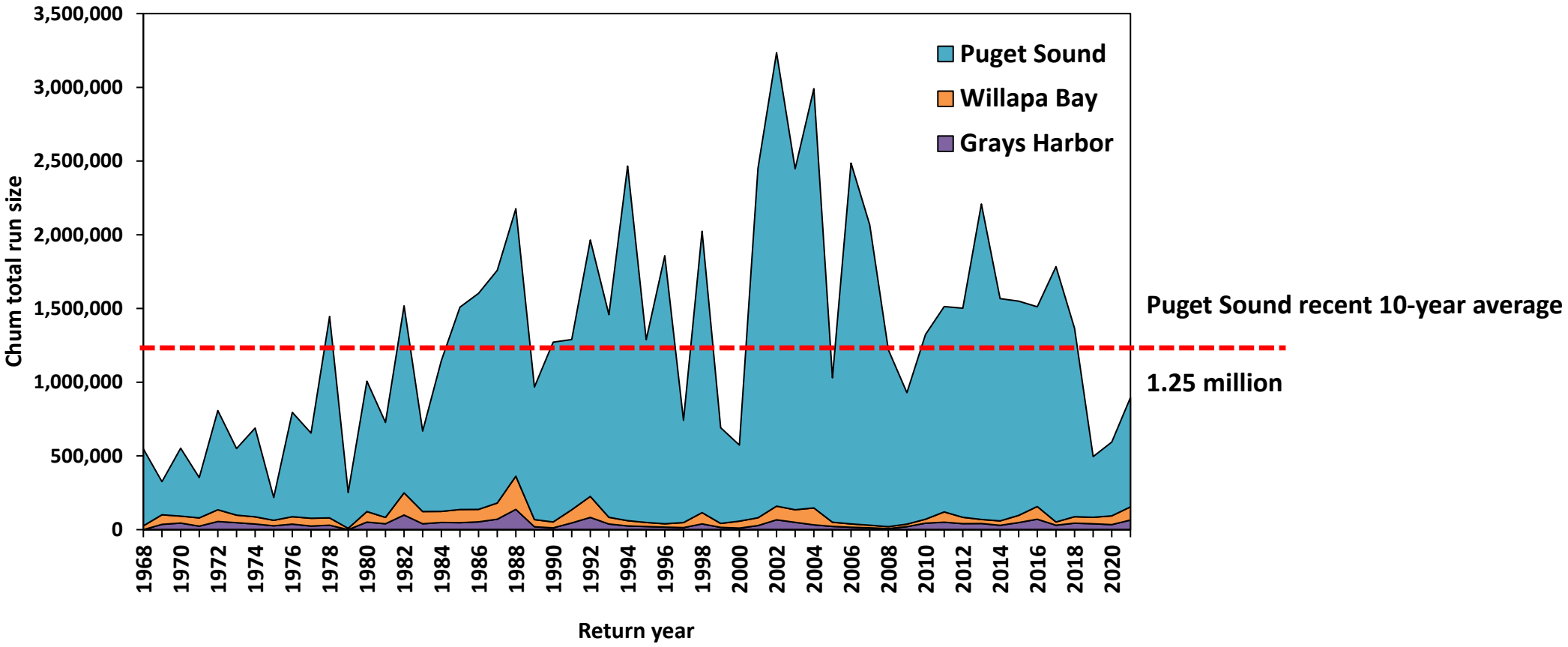
Coastal Coho Forecasts

- Hatchery ⬆ **100%** and Wild ⬆ **53%** over recent 10-year average
- Hatchery ⬆ **30%** and Wild ⬆ **2%** compared to 2022 forecast
- Total Coho ⬆ **70%** from the 10 yr. avg runsize and ⬆ **9%** from last years forecast



Chum

Chum Historical Run Size

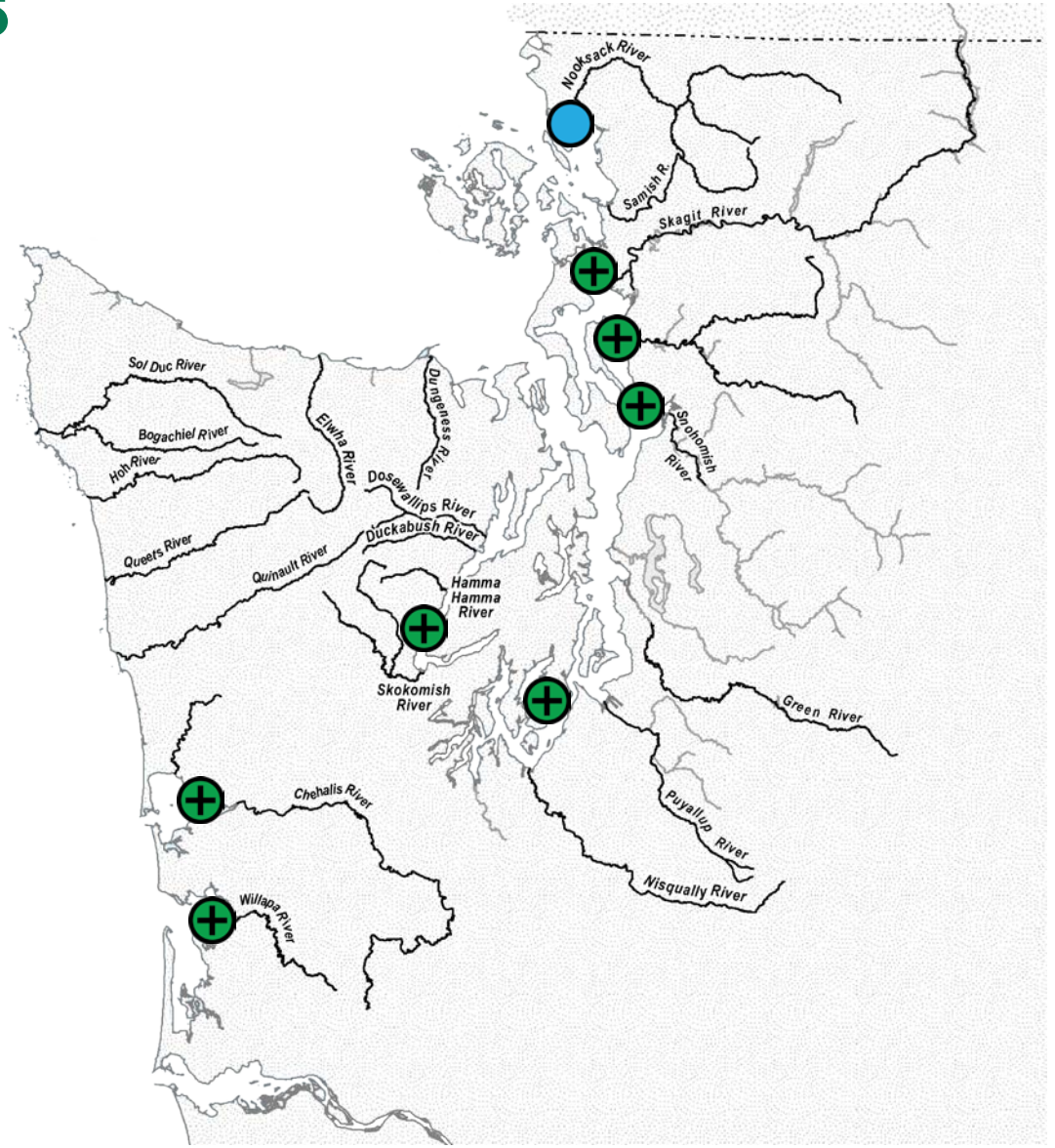


2022 Fall Chum Returns

- Returns were **Neutral** to **Good** for Puget Sound
- Returns were **Good** along the coast
- HC and SS are relative to in-season updated run sizes, not escapement

Relative to Recent 10yr Avg. Escapement

- Good > 125%
- Neutral 75-125%
- Poor < 75%

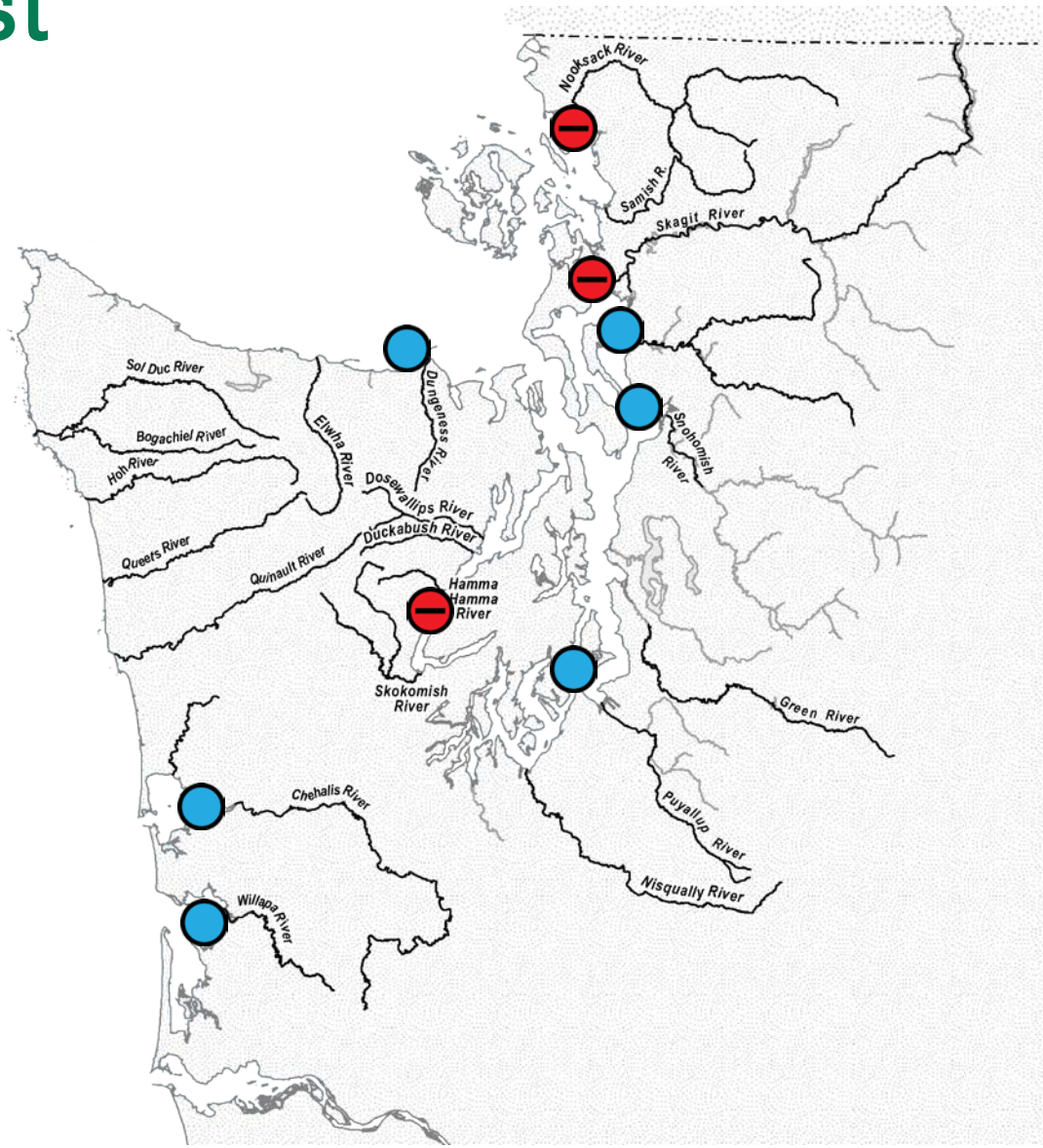


2023 Fall Chum Forecast

- Forecasts range from **Poor** to Neutral
- Hood Canal – 231k
- Central/S. Sound – 350k
- Willapa – 46k
- Grays H – 54k

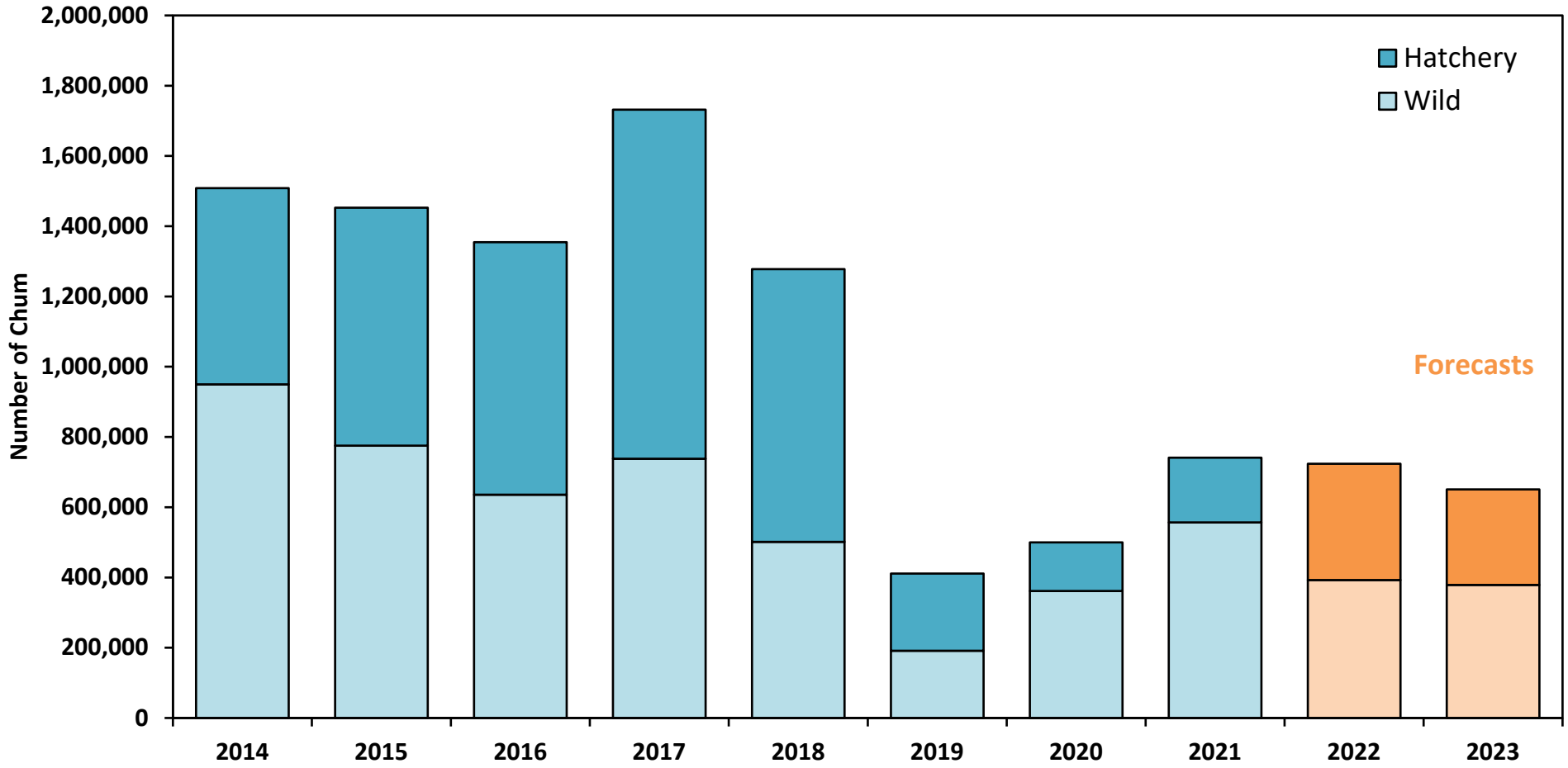
Relative to Recent 10yr Avg. Run size

- Good > 125%
- Neutral 75-125%
- Poor < 75%



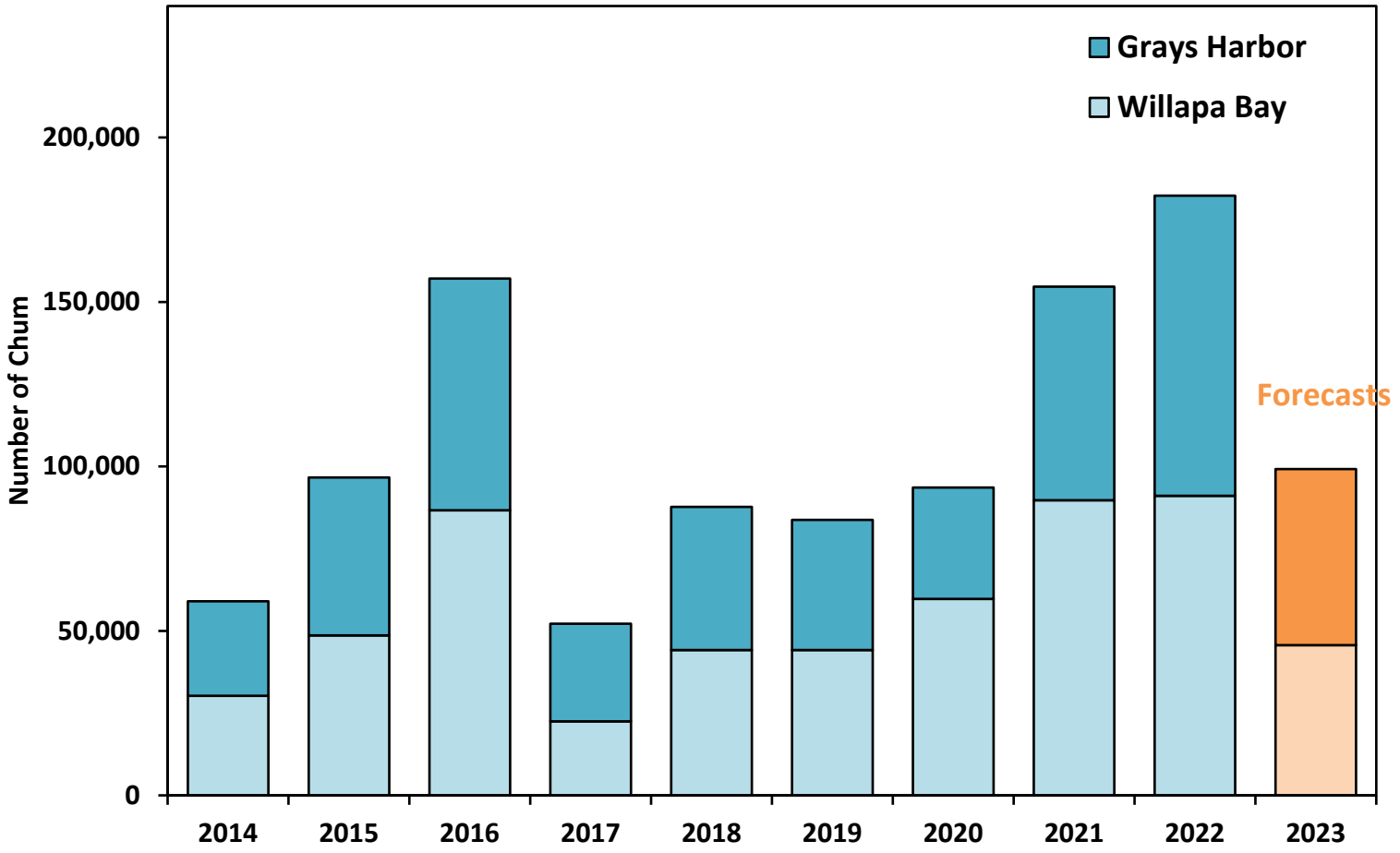
Puget Sound Chum Forecasts

Hatchery ⬇ **56%** and Wild ⬇ **40%** over recent 10-year avg.



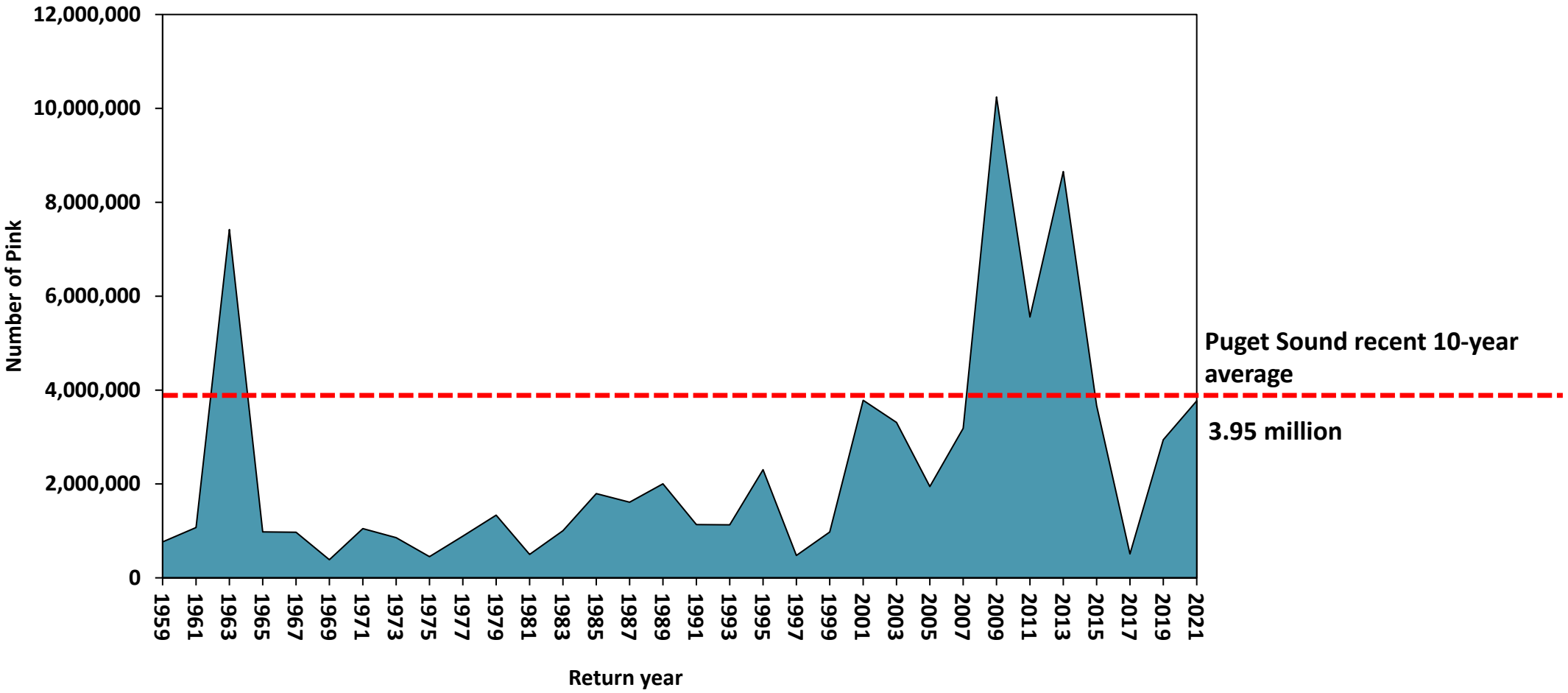
Coastal Chum Forecasts

Willapa Bay neutral and Grays Harbor ⬆ **21%** over recent 10-year avg.



Pink

Pink Historical Run Size

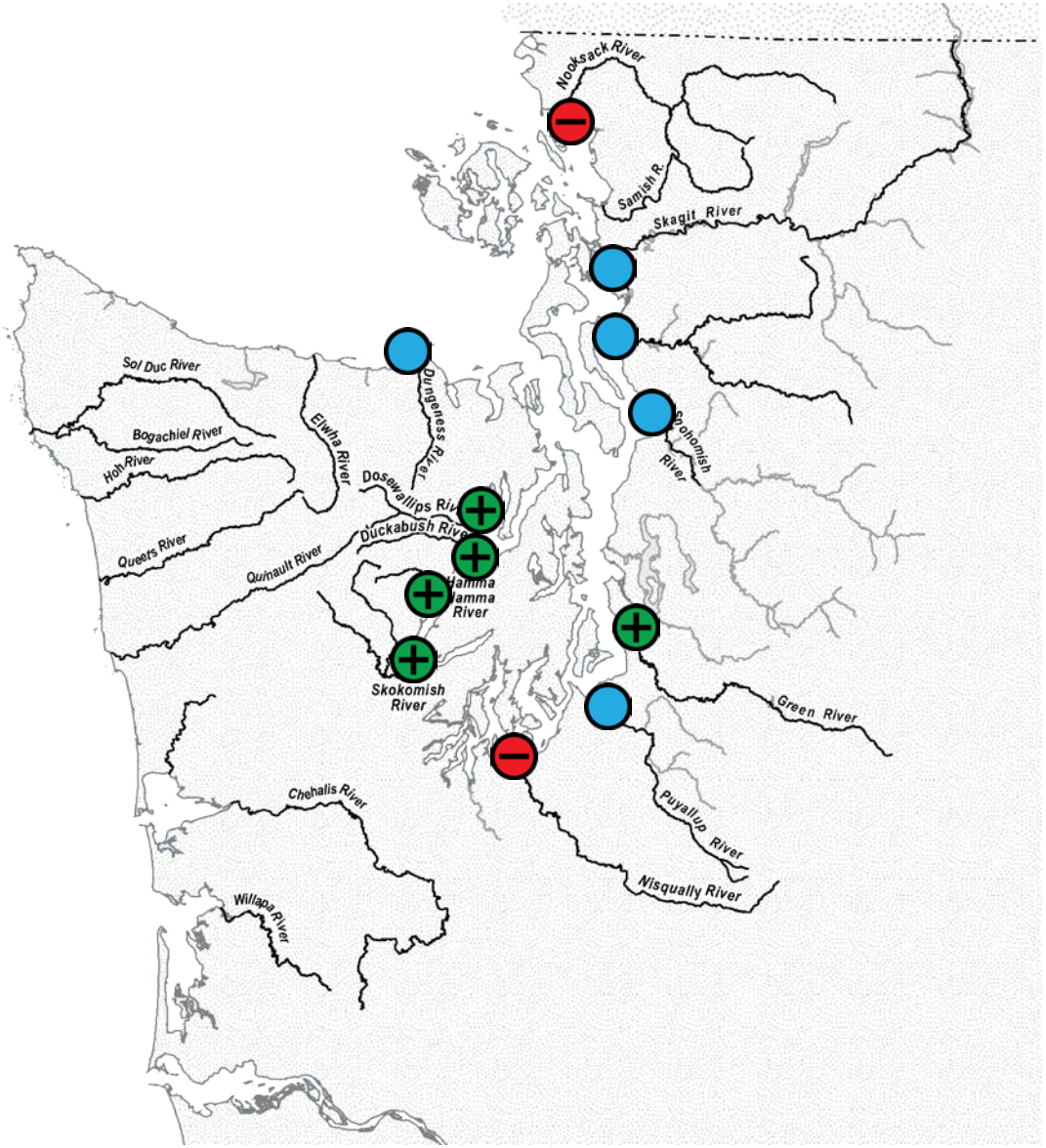


2021 Pink Returns

- Returns were **Poor** to **Good** throughout Puget Sound
- Puget Sound total: 3.7 M

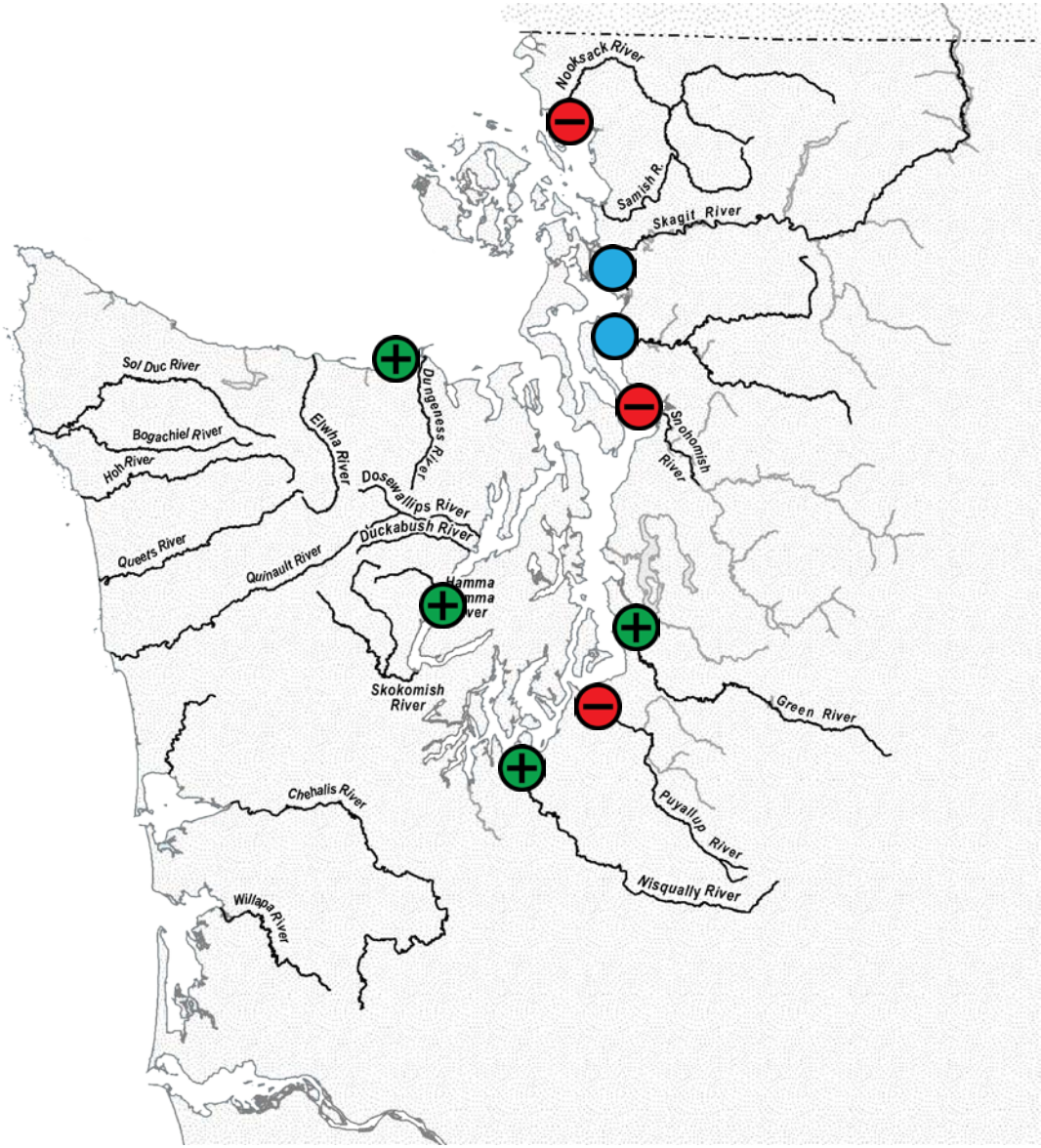
Relative to Recent 10yr Avg. Run size

- Good > 125%
- Neutral 75-125%
- Poor < 75%

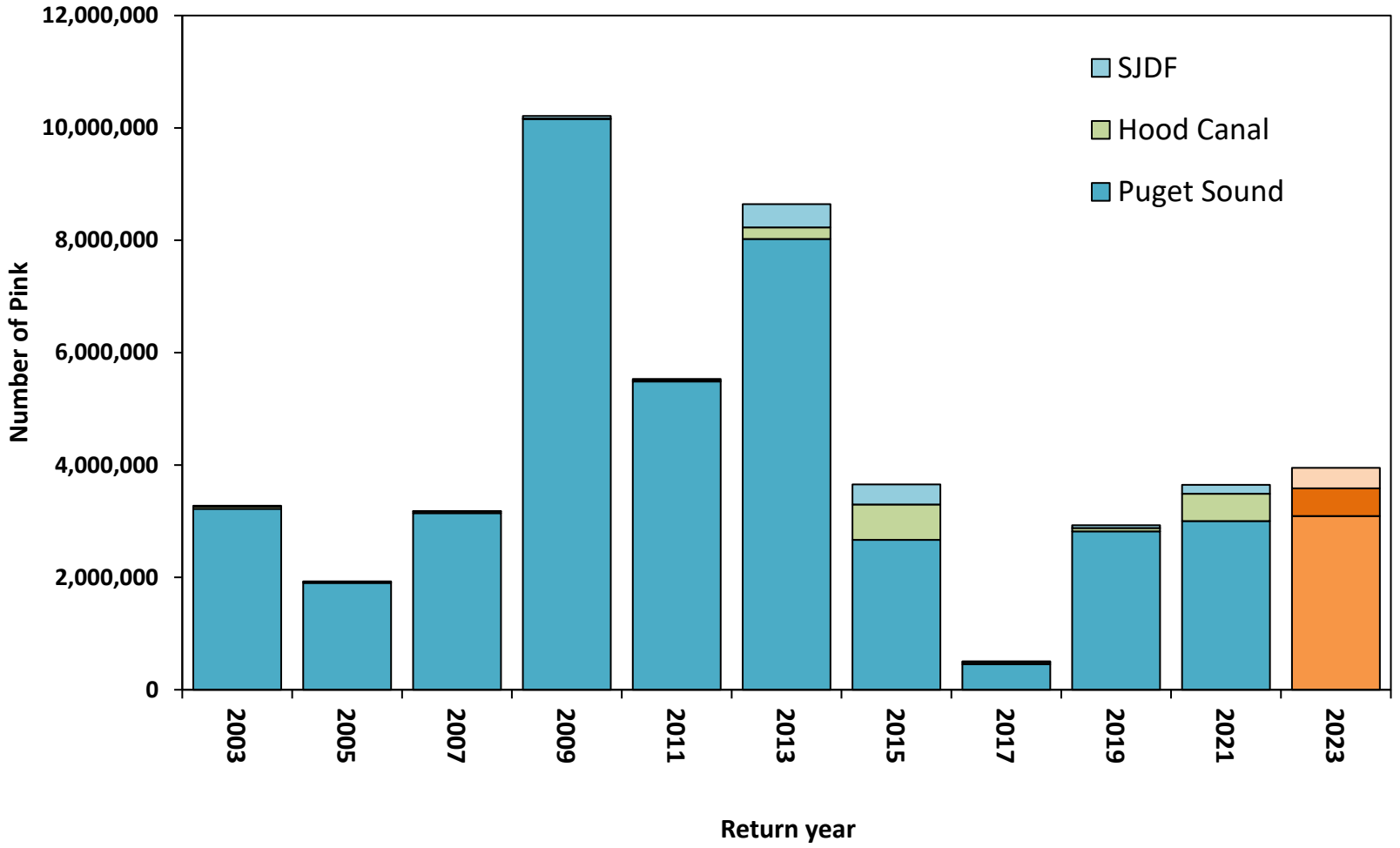


2023 Pink Forecasts

- Nooksack – 25k
- Skagit – 552k
- Stillaguamish – 200k
- Snohomish – 642k
- Green – 822k
- Puyallup – 397k
- Nisqually – 454k
- Hood Canal – 493k
- SJDF – 365k

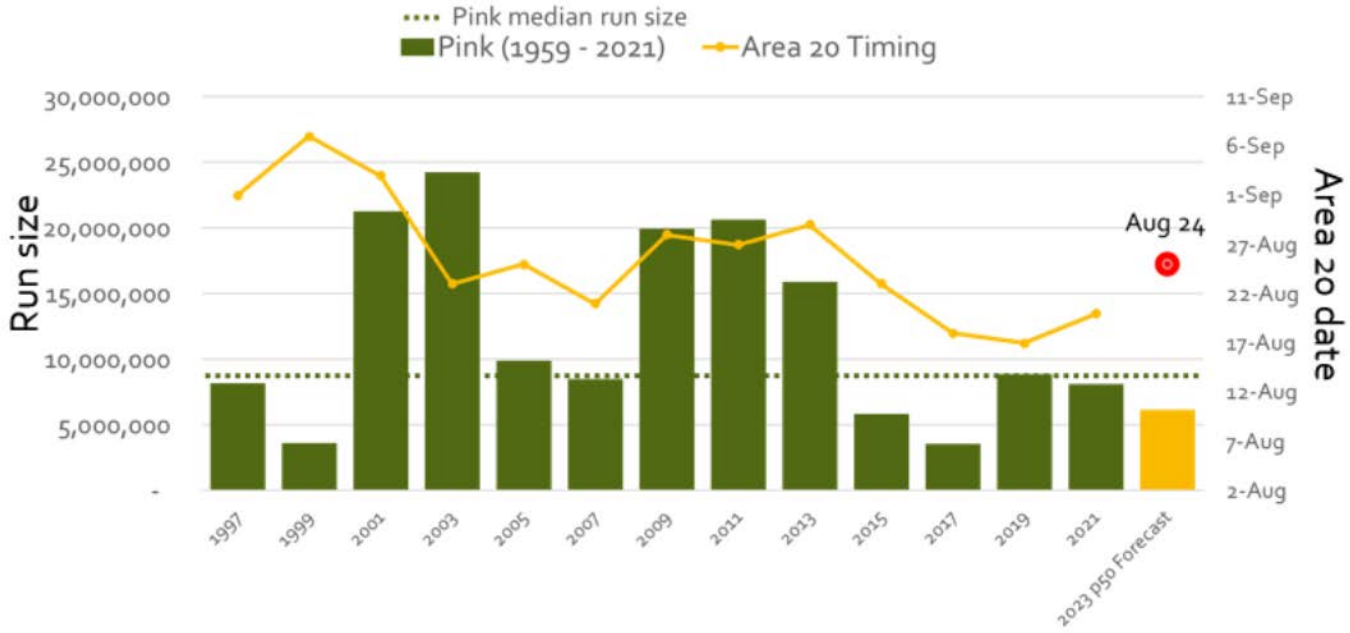


2023 Pink Forecasts



2023 Fraser River Pink Forecast

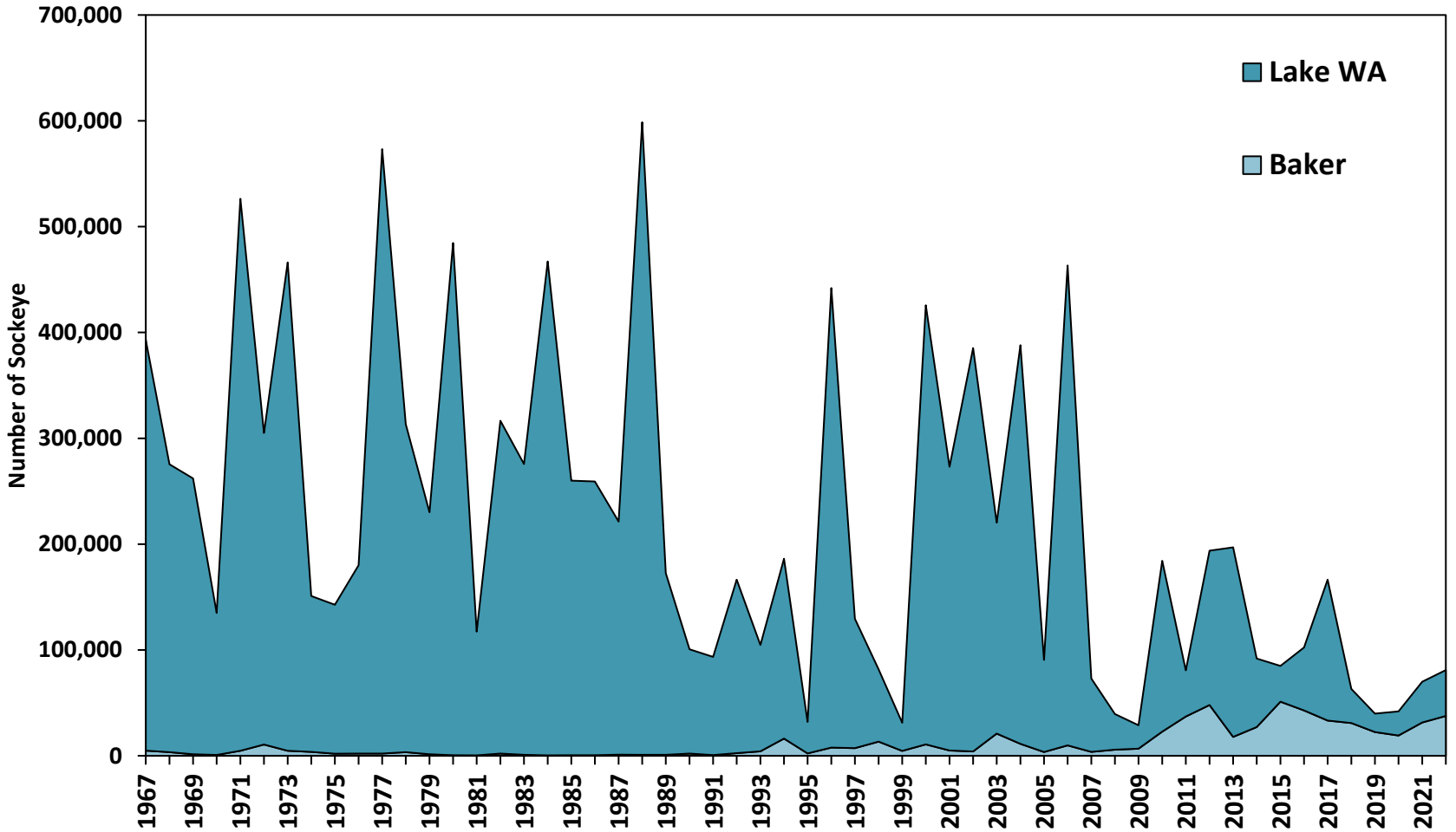
- Total Fraser Pink – 6.1 M
  - Below long-term average
  - 2021 had 3rd lowest fry outmigration on record



Rachel Hornsby, PSC

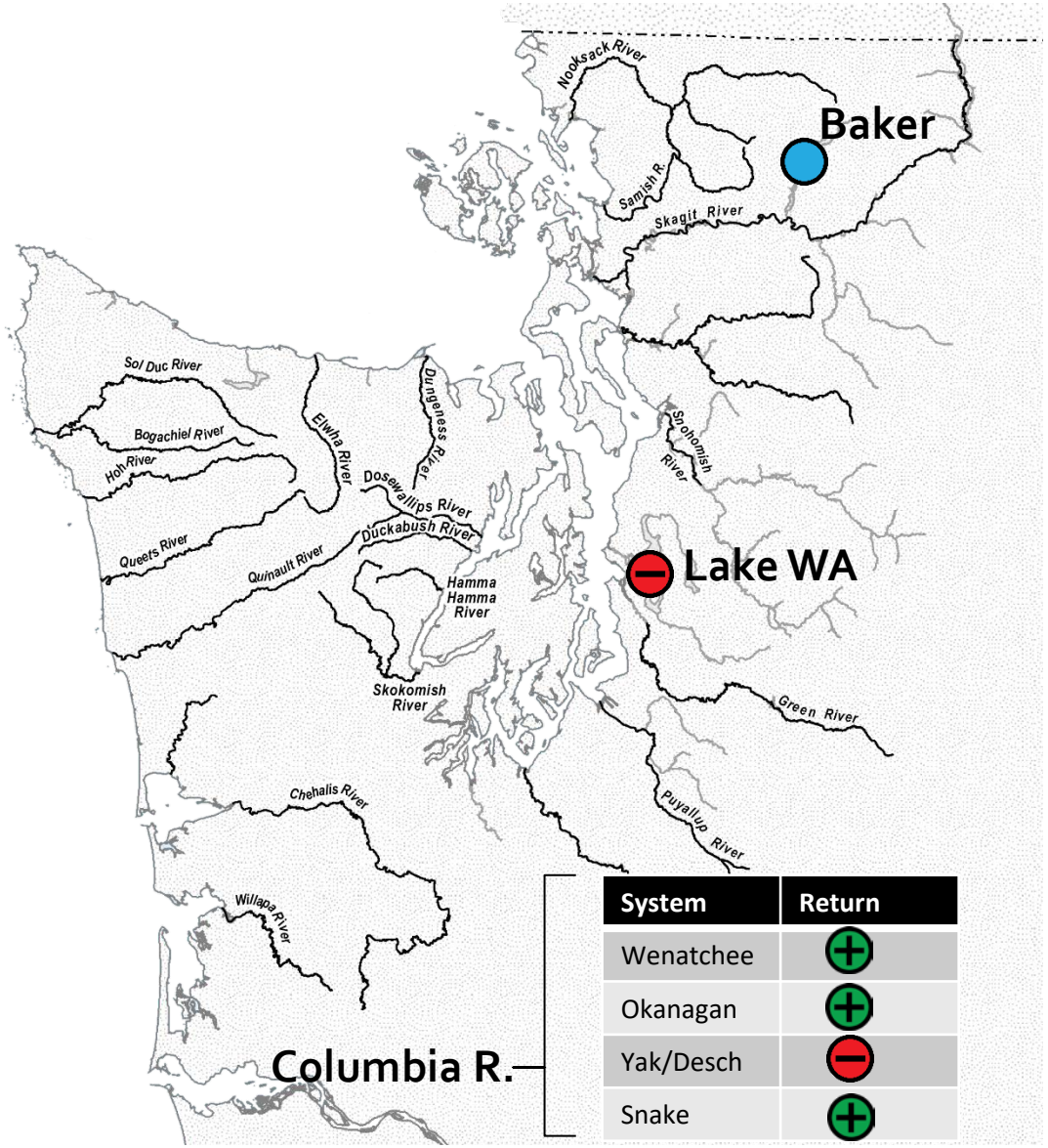
Sockeye

Puget Sound Sockeye Run Size



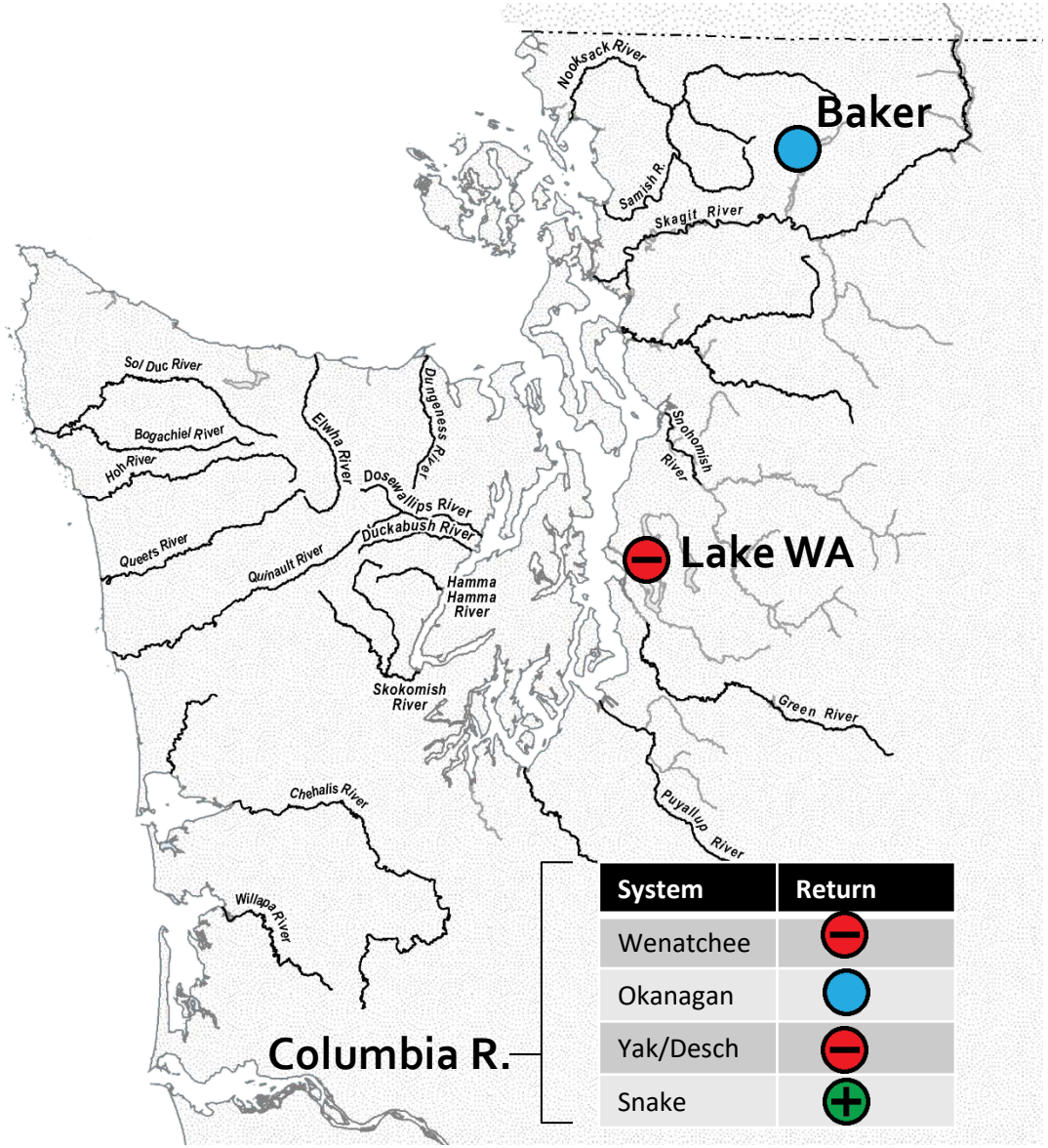
2022 Sockeye Returns

- Returns were **Neutral** and **Poor** in Puget Sound despite coming back above forecast
- Columbia River returns were Good, with the exceptions of Yakima & Deschutes



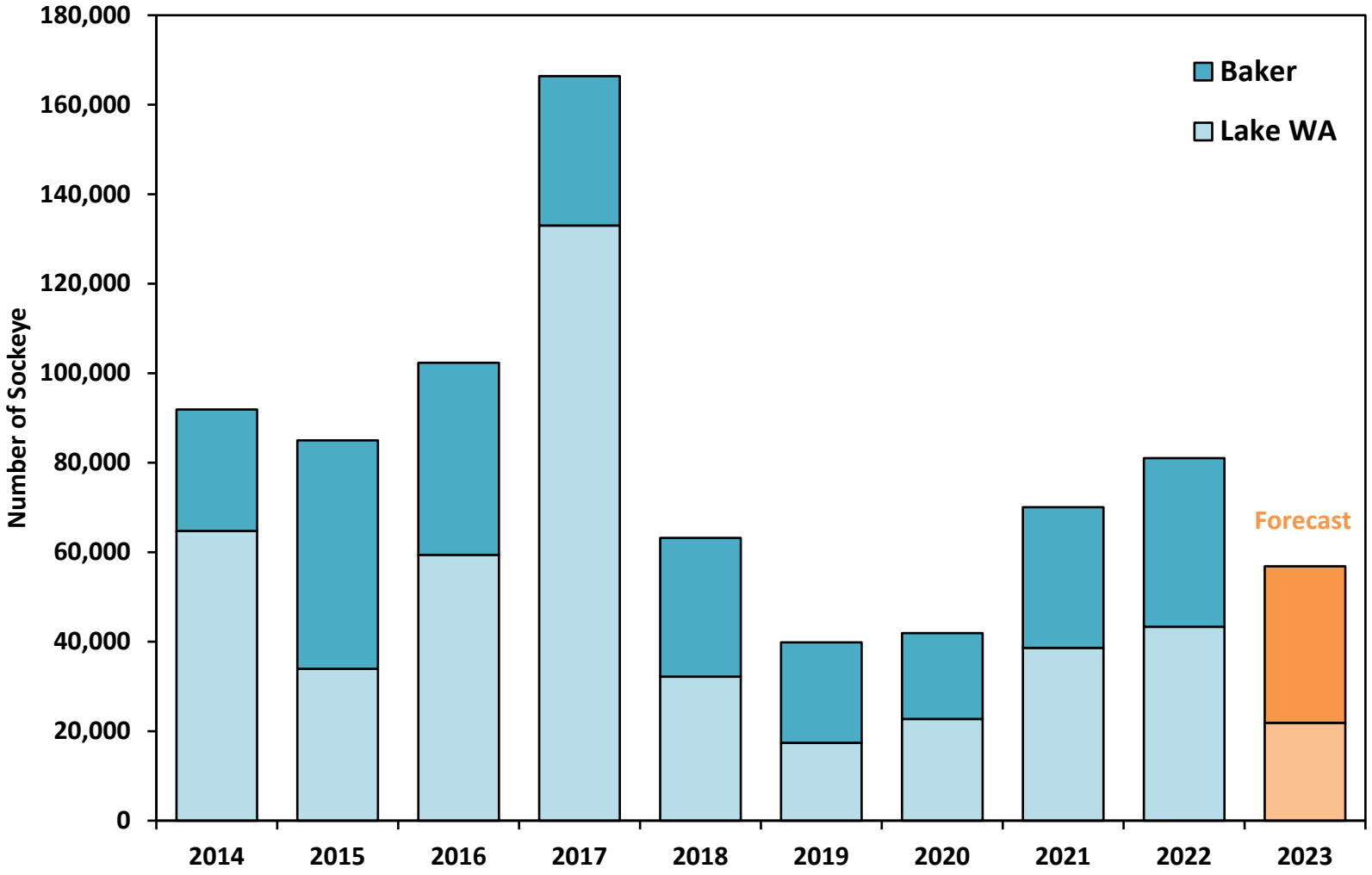
2023 Sockeye Forecast

- Baker Lake – 31,296
- Lake WA – 21,851
- Columbia River – 234,500



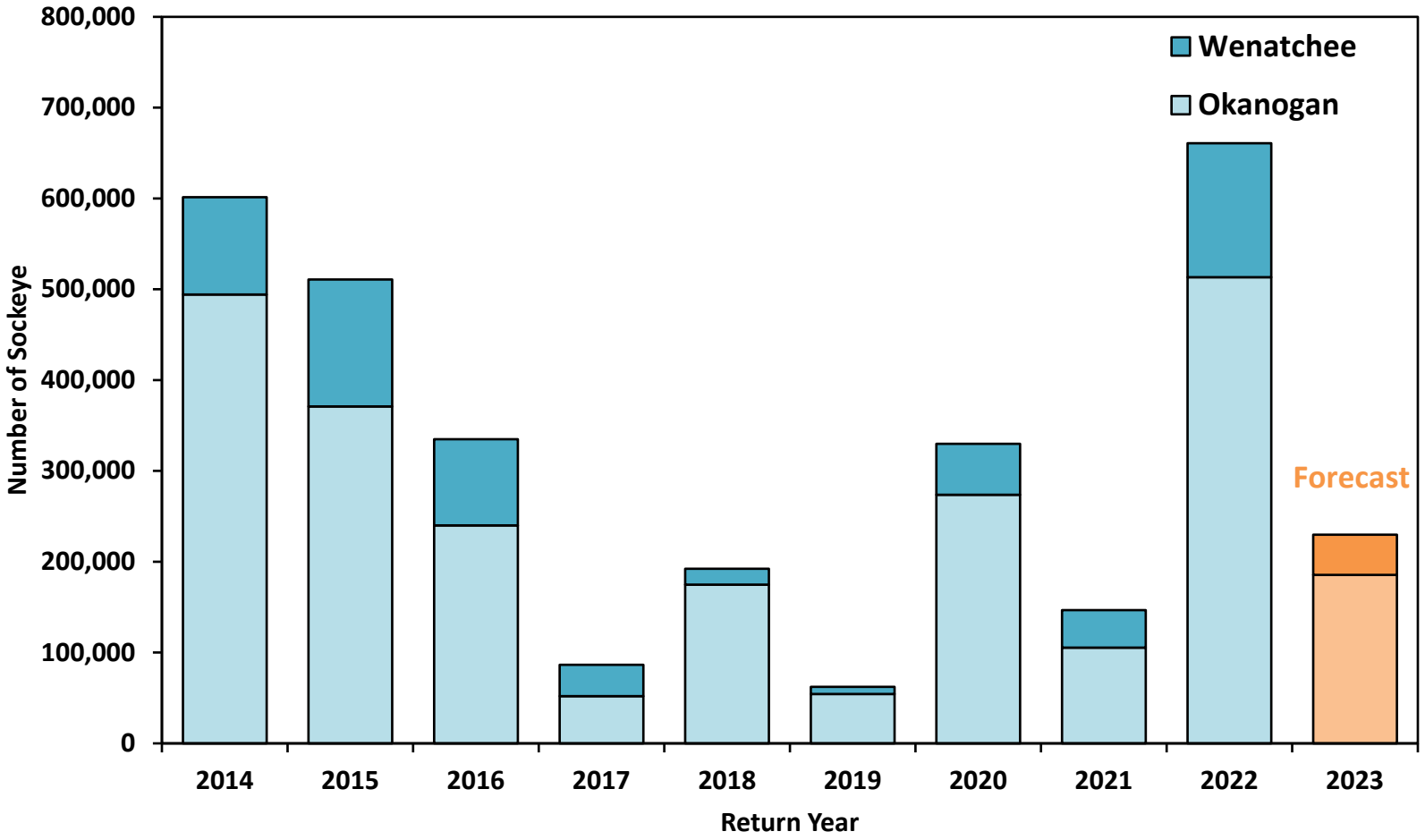
Puget Sound Sockeye Forecasts

Lake WA ⬇ **65%** and Baker neutral over recent 10-year avg.



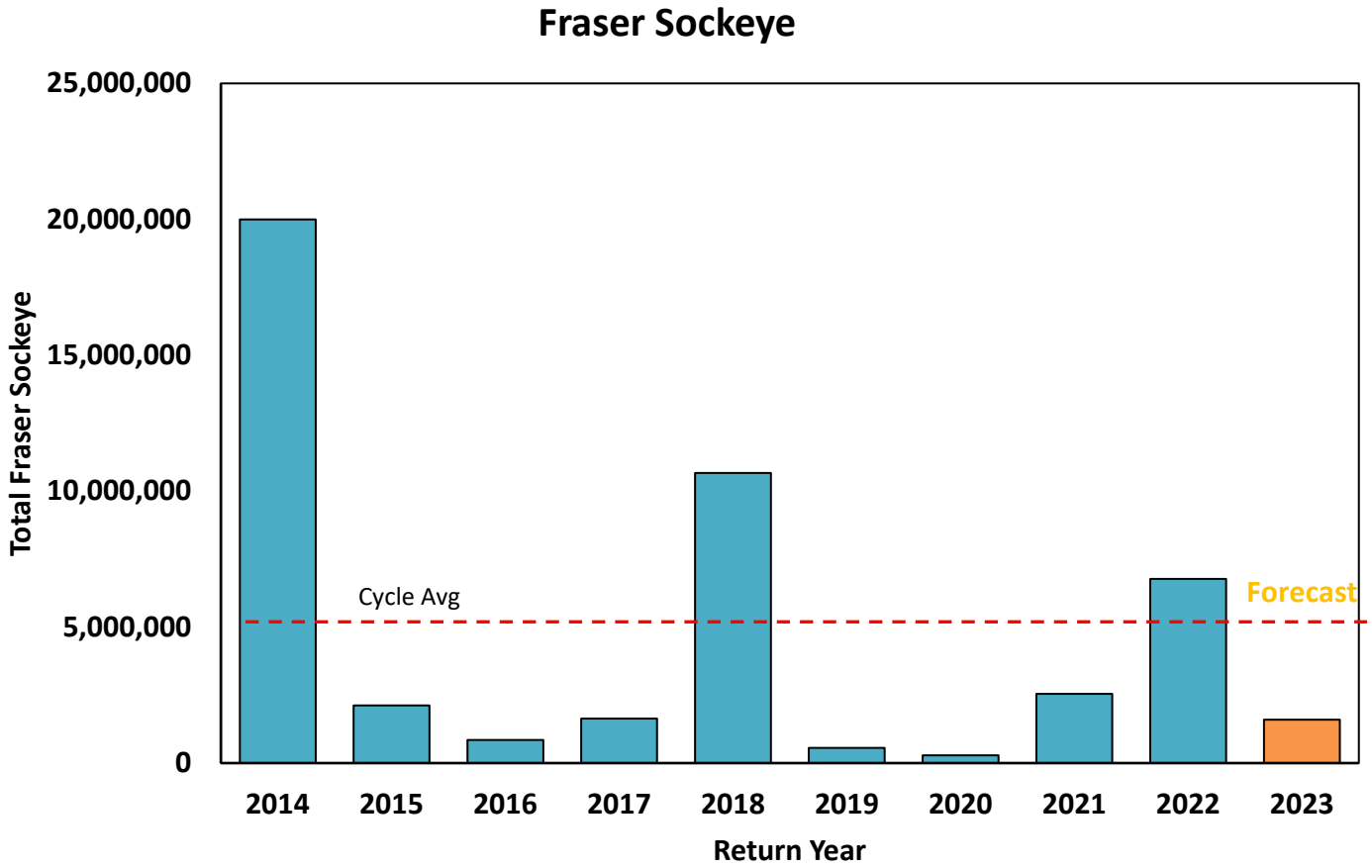
Columbia Sockeye Forecasts

Lake Wenatchee ⬇ **35%** and Okanogan ⬇ **23%** over recent 10-year avg.



2023 Fraser River Sockeye Forecast

- Total Fraser Sockeye – 1.6M
  - Early Stuart – 23k
  - Early Summer – 186k
  - Summer – 1.2M
  - Late – 188k
- 2022 Sockeye Returns were far below forecast
- Historically low productivity in 2019



Questions

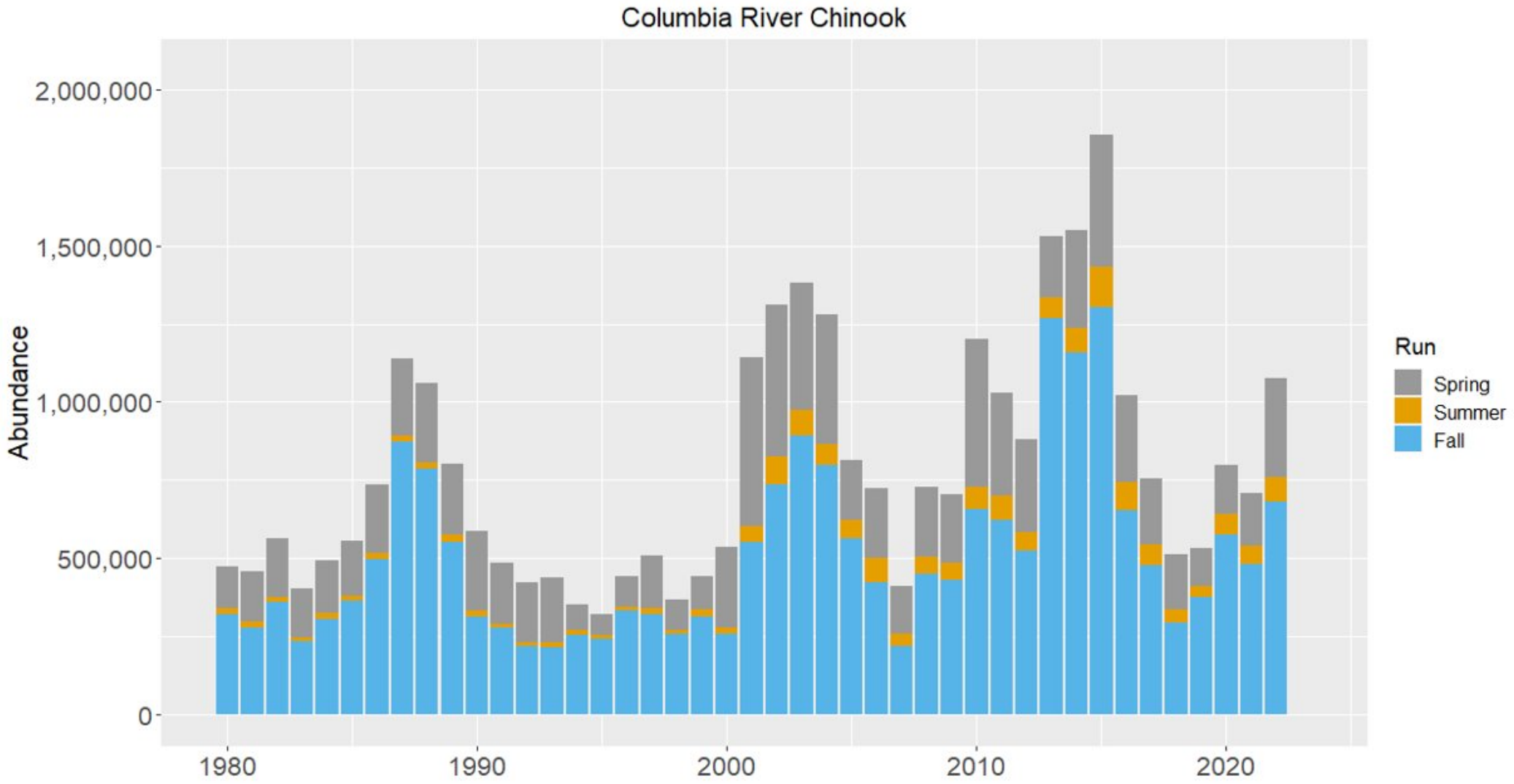
Washington Department of FISH and WILDLIFE

Columbia River 2022 Returns and 2023 Forecasts

Matt Sorel

Columbia River

Chinook



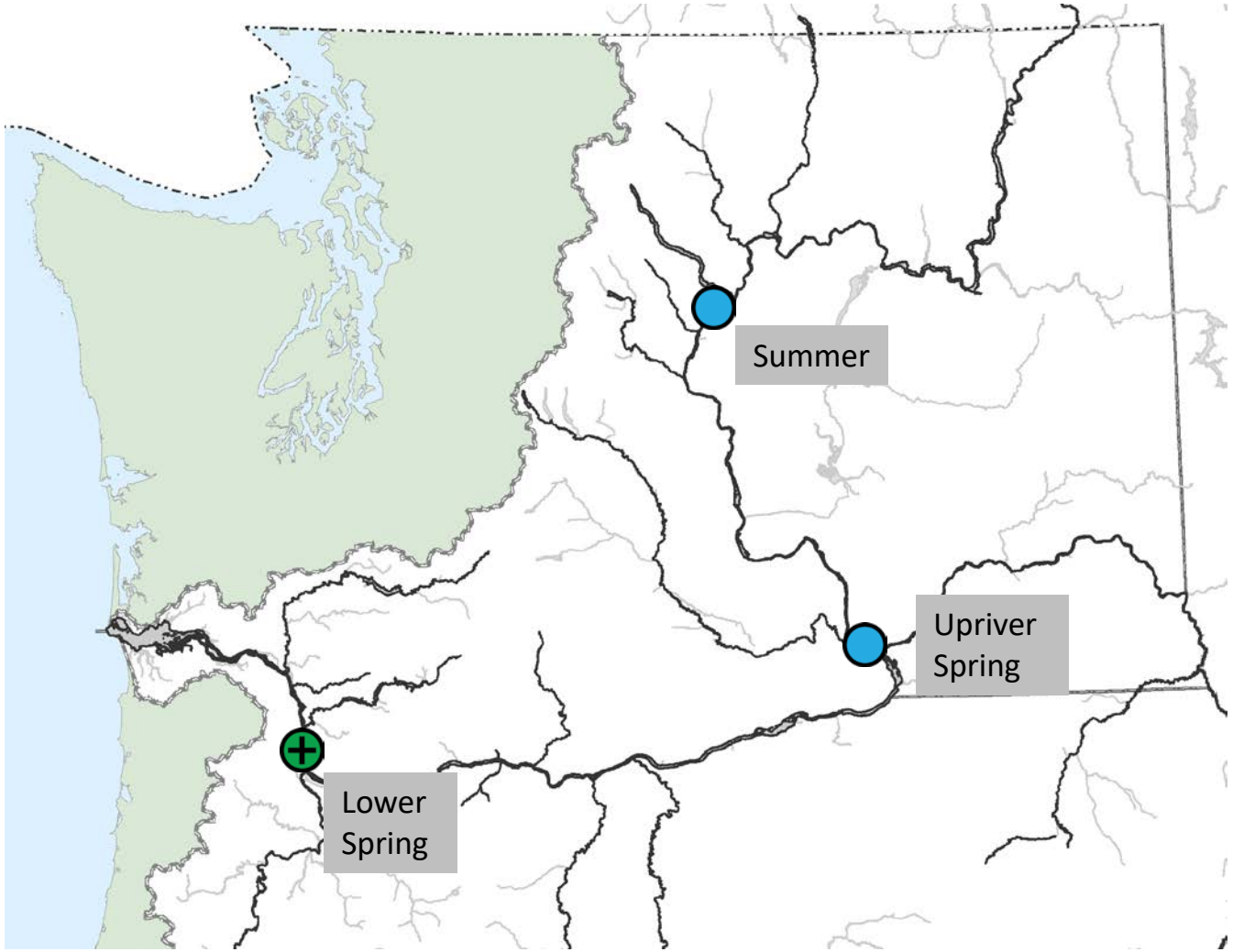
**Run sizes to river mouth*

2022 Spring/Summer Chinook Returns

Relative to Recent 10yr Avg. Run Size

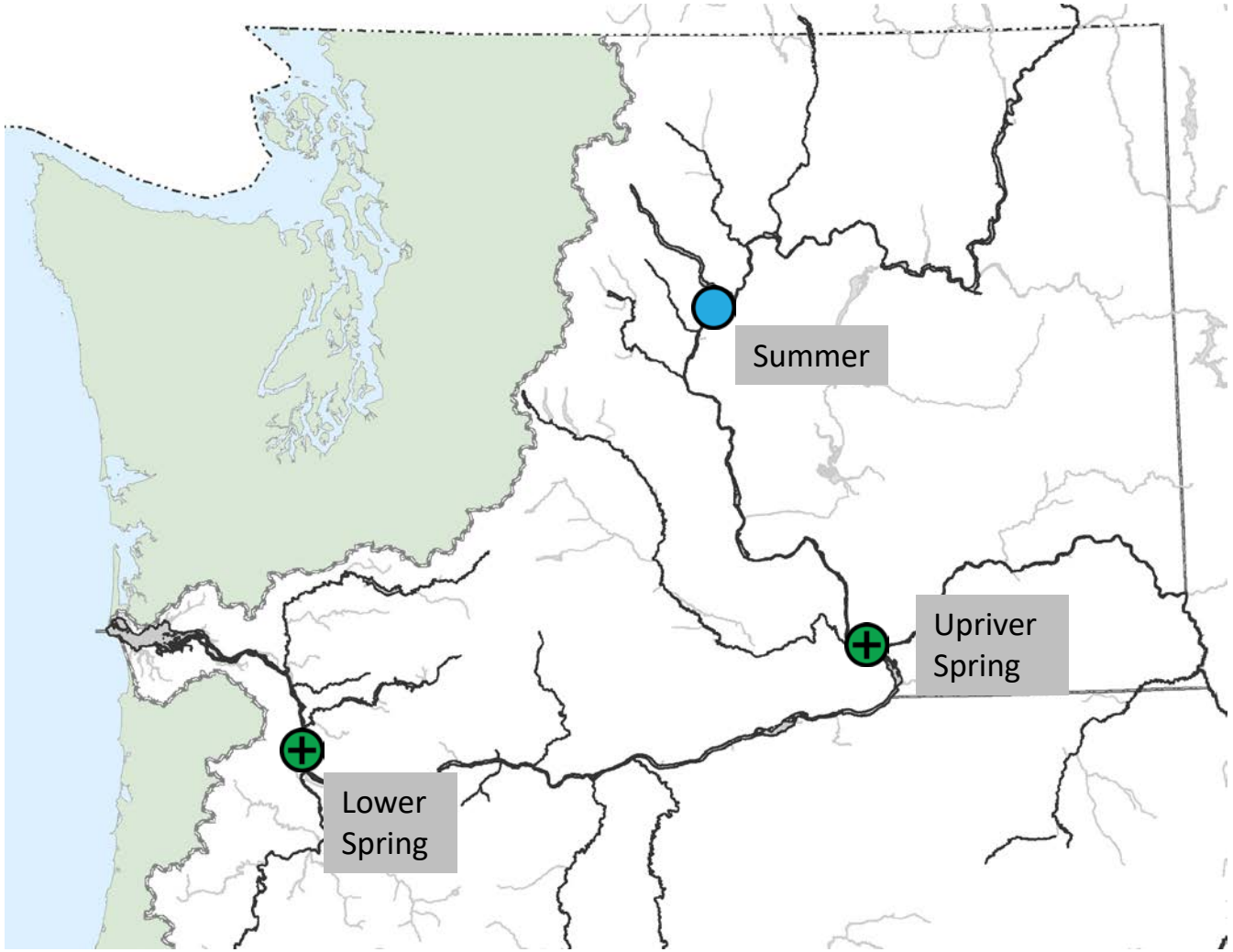
- ⊕ > 125%
- 75-125%
- ⊖ < 75%

- Lower Spring – 101,745 (132%)
  - Cowlitz, Kalama, Lewis, Sandy, Willamette, and Select Areas
- Upriver Spring – 185,209 (122%)
  - Above Bonneville Dam
- Summer – 78,494 (114%)
  - Upper Columbia



2023 Spring/Summer Chinook Forecasts

- Lower Spring – 117,000 (150%)
- Upriver Spring – 198,600 (132%)
  - Snake River wild forecast is 6.6% of the total upriver run
- Summer – 84,800 (120%)



2022 Fall Chinook Returns

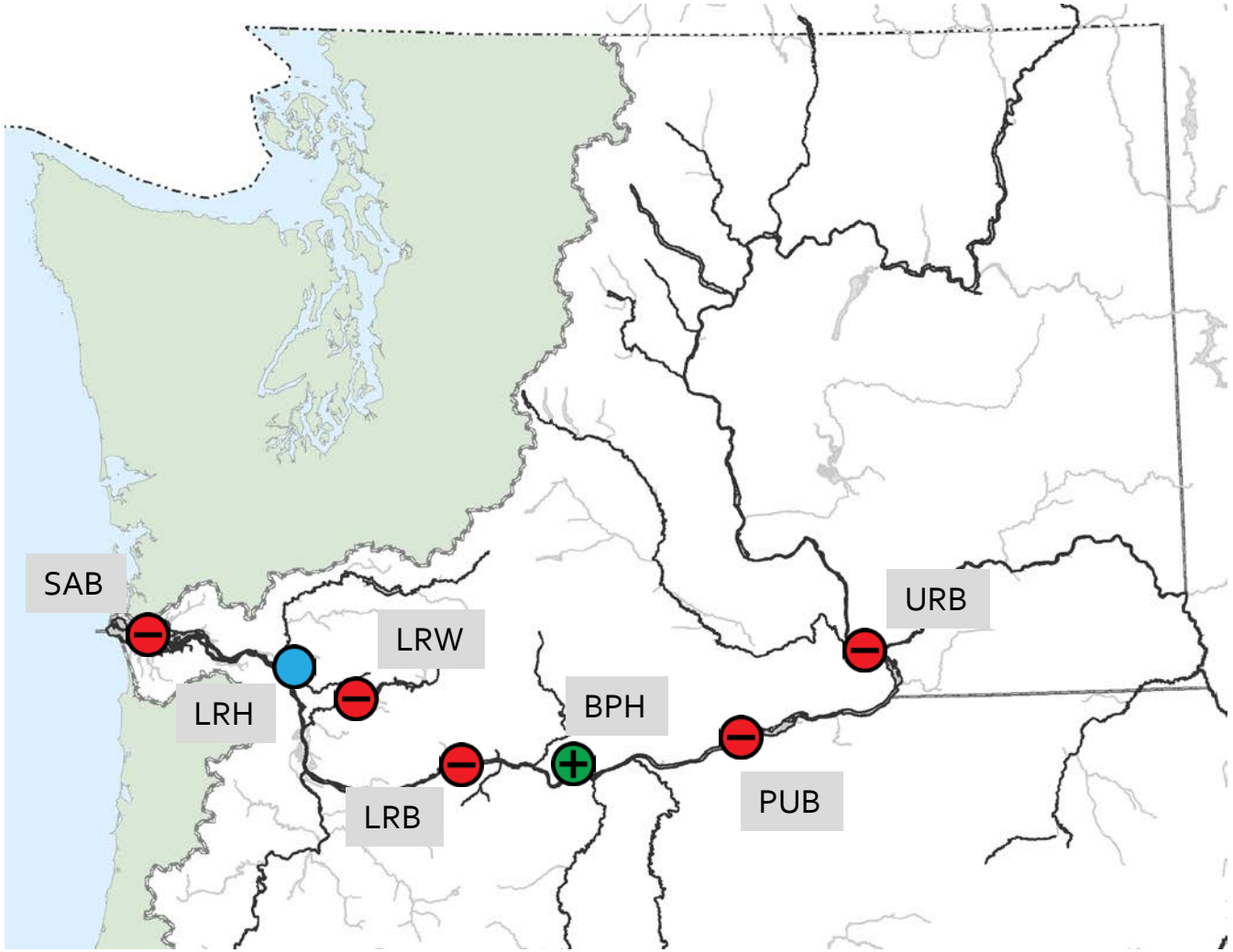
Tule stock

- LRH (Lower River Hatchery) – 87,542 (107%)
- BPH (Bonneville Pool Hatchery) – 258,271 (363%)

Bright Stock

- SAB (Select Area Bright) – 1,331 (16%)
- LRW (Lower River Wild) – 9,375 (48%)
- LRB (Lower River Bright) – 3,039 (52%)
- PUB (Pool Upriver Bright) – 64,622 (69%)
- URB (Upriver Bright) – 254,880 (61%)

Total Fall – 679,060 (95%)



2023 Fall Chinook Forecasts

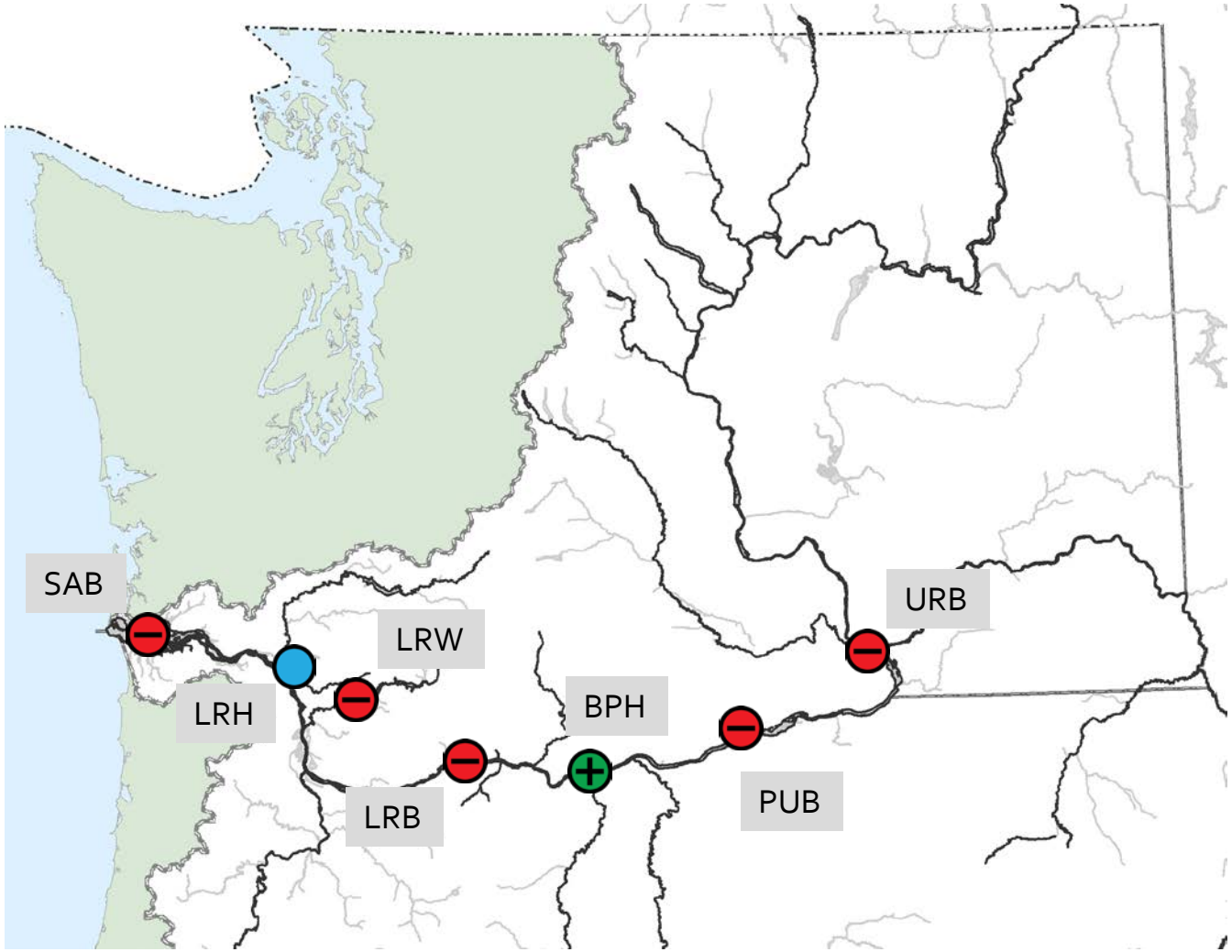
Tule stock

- LRH (Lower River Hatchery) – 77,100 (94%)
- BPH (Bonneville Pool Hatchery) – 136,100 (149%)

Bright Stock

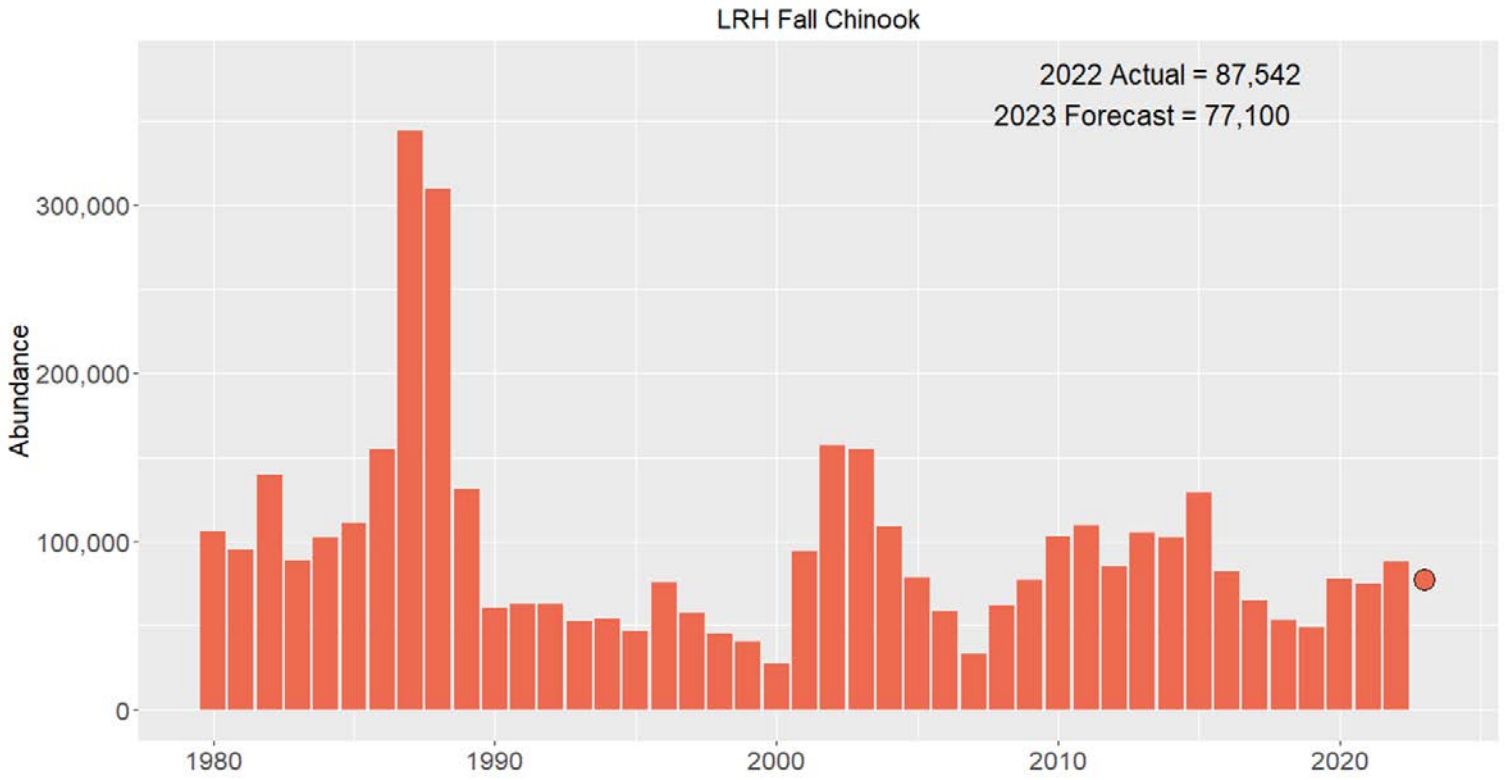
- SAB (Select Area Bright) – 600 (8%)
- LRW (Lower River Wild) – 8,600 (45%)
- LRB (Lower River Bright) – 4,300 (70%)
- PUB (Pool Upriver Bright) – 48,300 (51%)
- URB (Upriver Bright) – 272,400 (66%)

Total Fall – 547,400 (75%)



Lower Columbia River Tule Exploitation Rate (ER) Matrix

LRH Run Size	LCR Tule ER
<30,000	30%
30,000 – 40,000	35%
40,000 – 85,000	**38%**
>85,000	41%

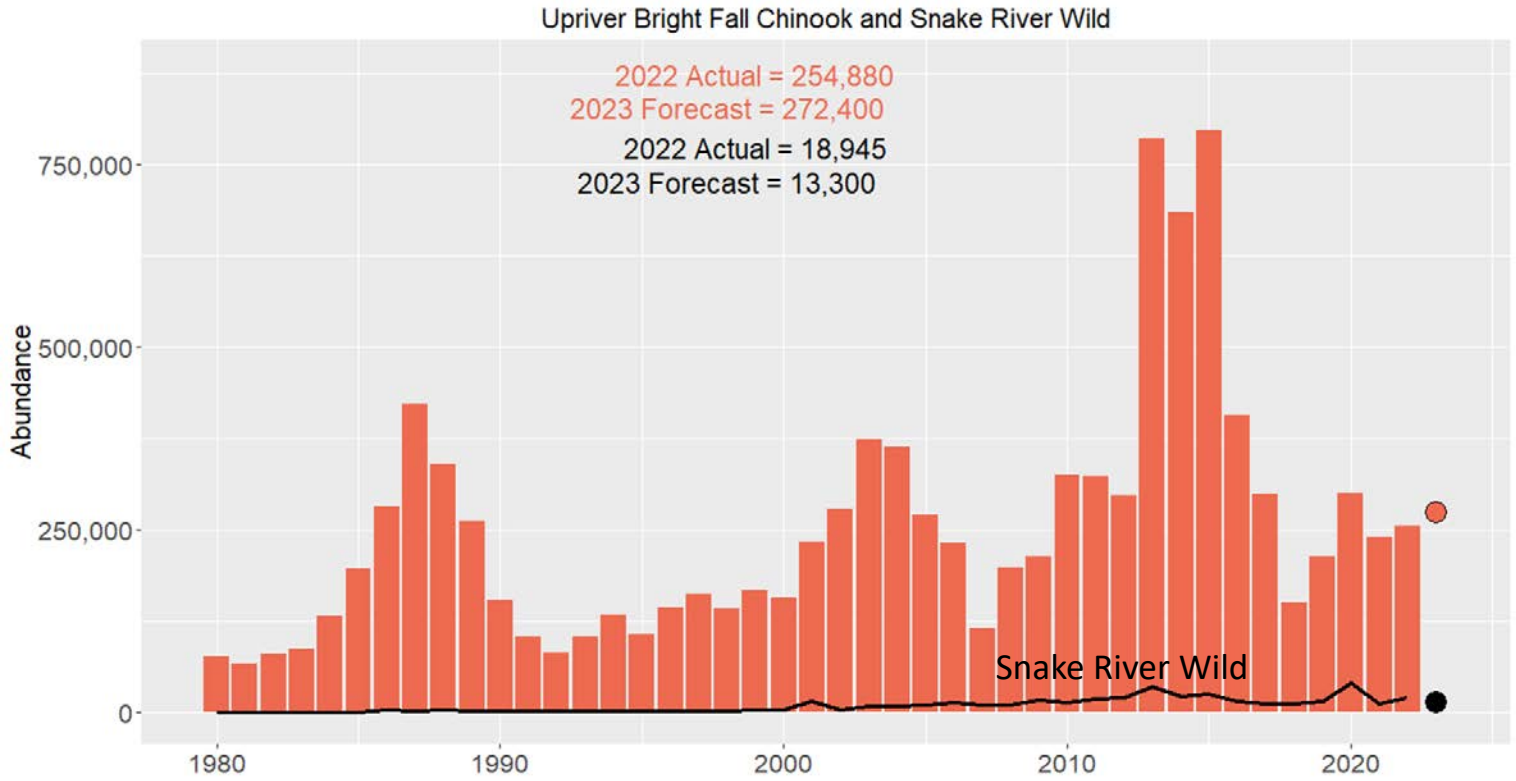


- LRH expected to be managed to a limit of 38% ER for ocean and in-river fisheries combined.

URB Harvest Rate Schedule

URB Run Size	NT Harvest Rate
<60,000	1.5%
60,000-119,999	4%
120,000-200,000	8.25%
>200,000	**15%**

Snake River Wild Run Size	NT Harvest Rate
<1,000	1.5%
1,000-1,999	4%
2,000-4,999	8.25%
5,000-5,999	8.25%
6,000-7,999	11%
8,000+	**15%**



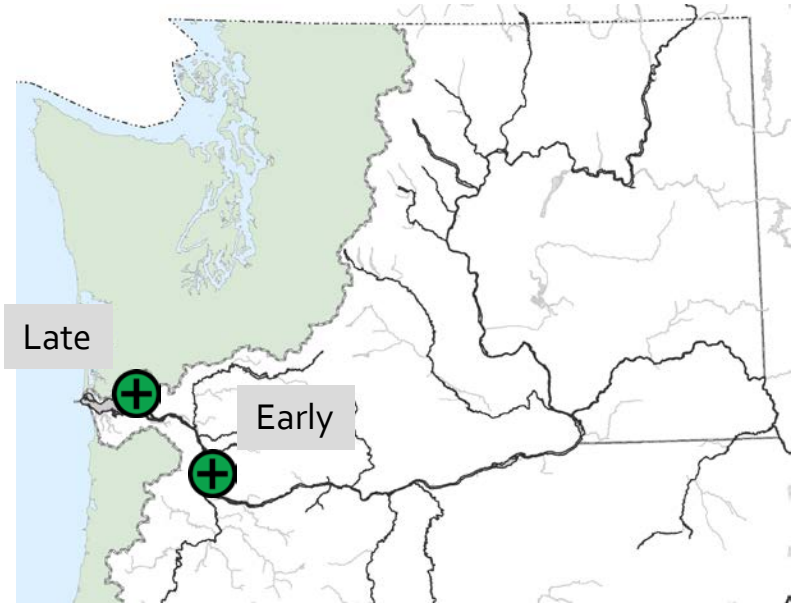
- The most constraining of the URB and Snake River Wild run sizes determine the in-river non-treaty harvest rate within the *US vs OR* 2018-2027 Management Agreement.
  - URB/SRW expected to be managed to a limit of 15% harvest rate for in-river fisheries.

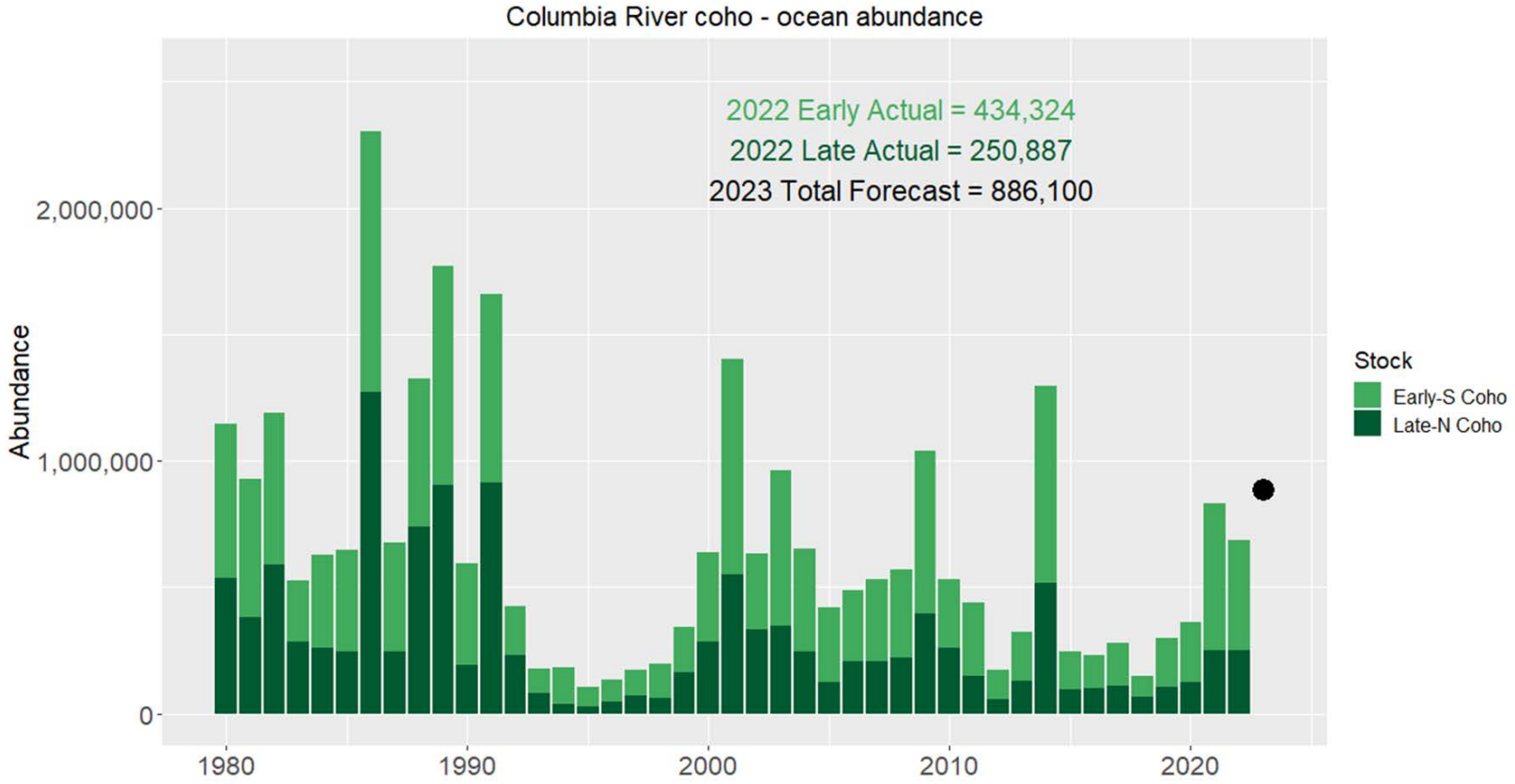
Coho

2022 Coho Returns (ocean abundance*)

- Early – 434,300 (161%)
- Late – 250,900 (158%)

Total – 685,200 (160%)



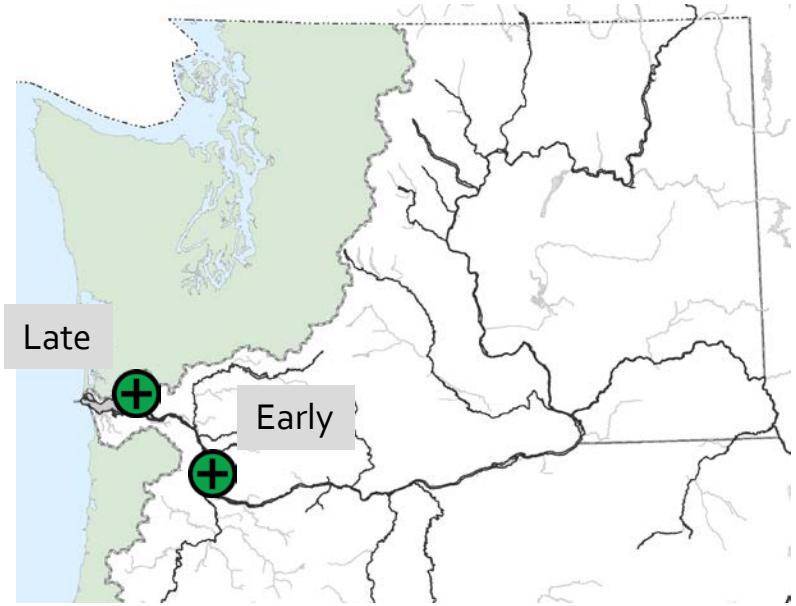


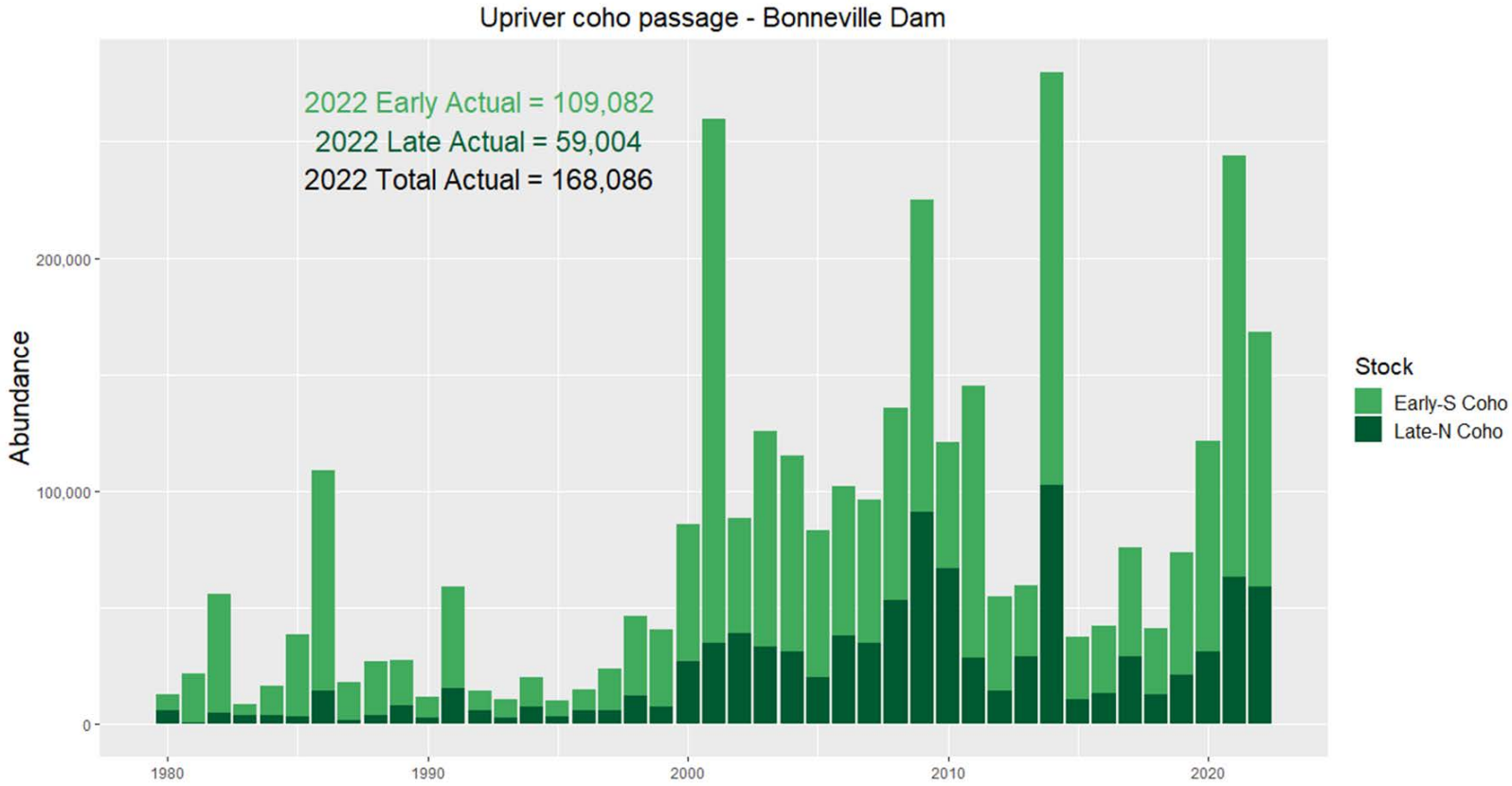
**Pre-ocean and in-river fisheries estimate*

2023 Coho Forecasts (ocean abundance)

- Early – 481,800 (160%)
- Late – 404,300 (227%)

Total – 886,100 (185%)





Lower Columbia Natural Coho Exploitation Rate (ER) Matrix

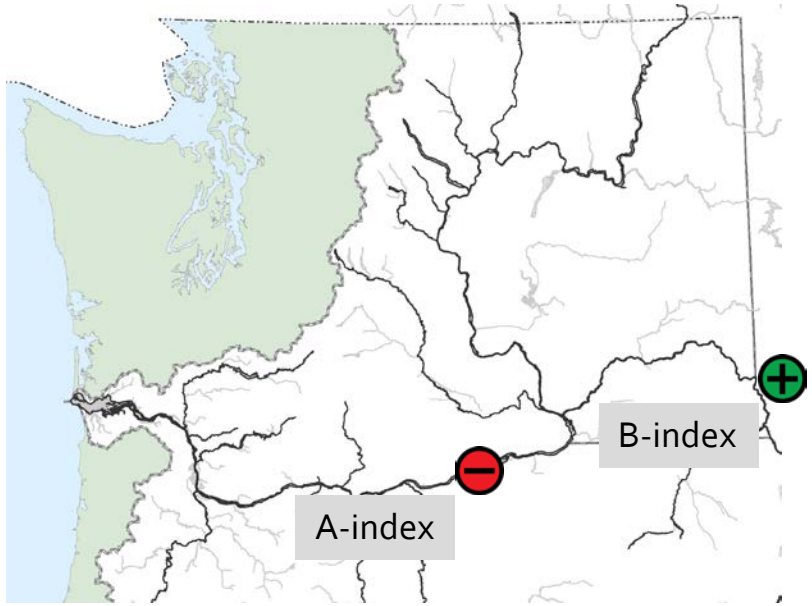
Marine Survival Index		ER
Very Low	≤ 0.06%	10%
Low	≤ 0.08%	15%
Medium	≤ 0.17%	18%
High	**≤ 0.40%**	**23%**
Very High	> 0.40%	30%

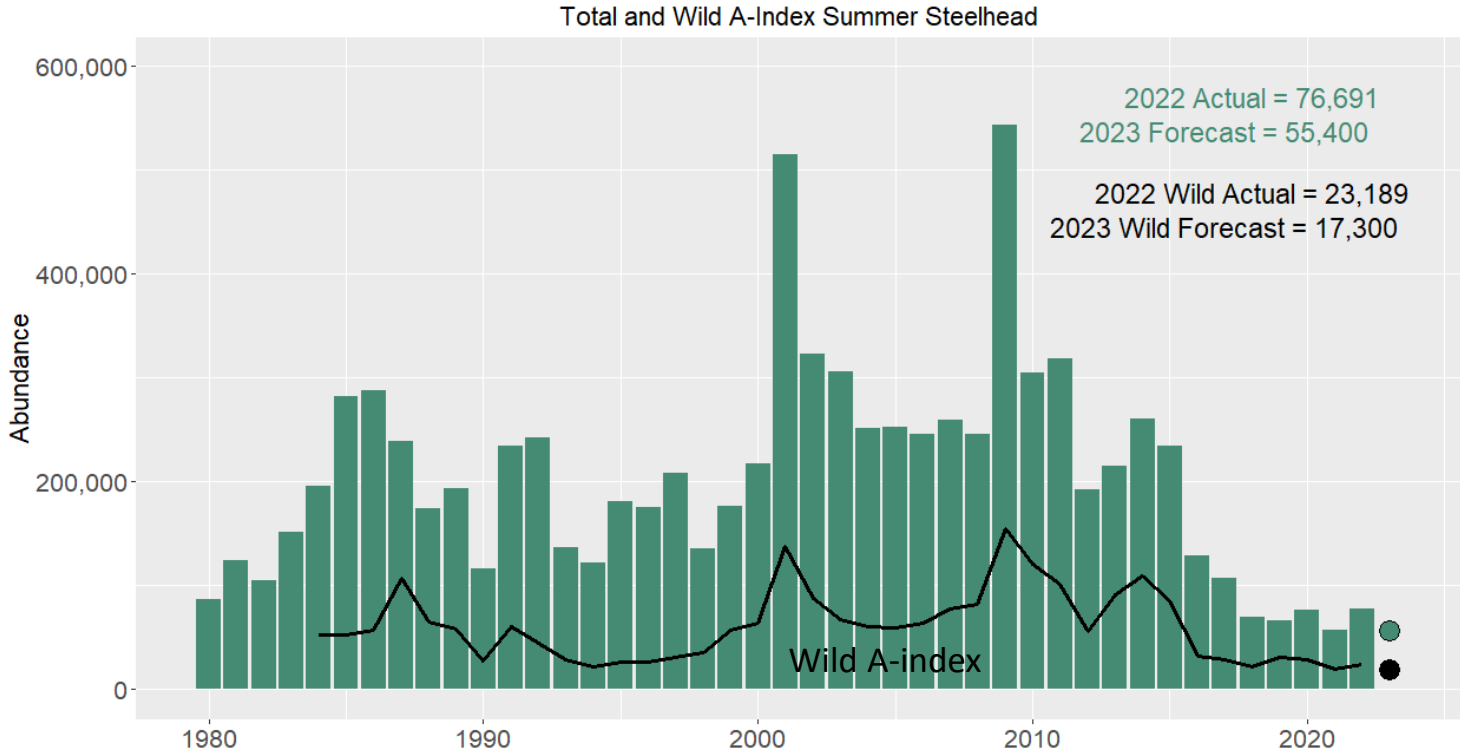
- Marine survival index is 0.30% (high).
- LCN Coho expected to be managed to a limit of 23% ER for ocean and in-river fisheries combined.

Steelhead

2022 Steelhead Returns

- A-index* – 76,691 (55%)
  - Wild – 23,189 (47%)
- B-index* – 40,278 (176%)
  - Wild – 6,737 (155%)

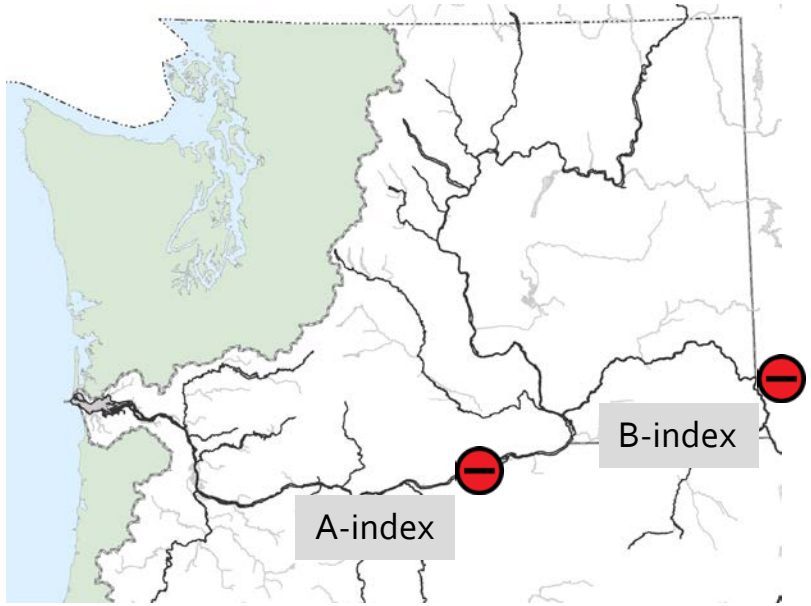


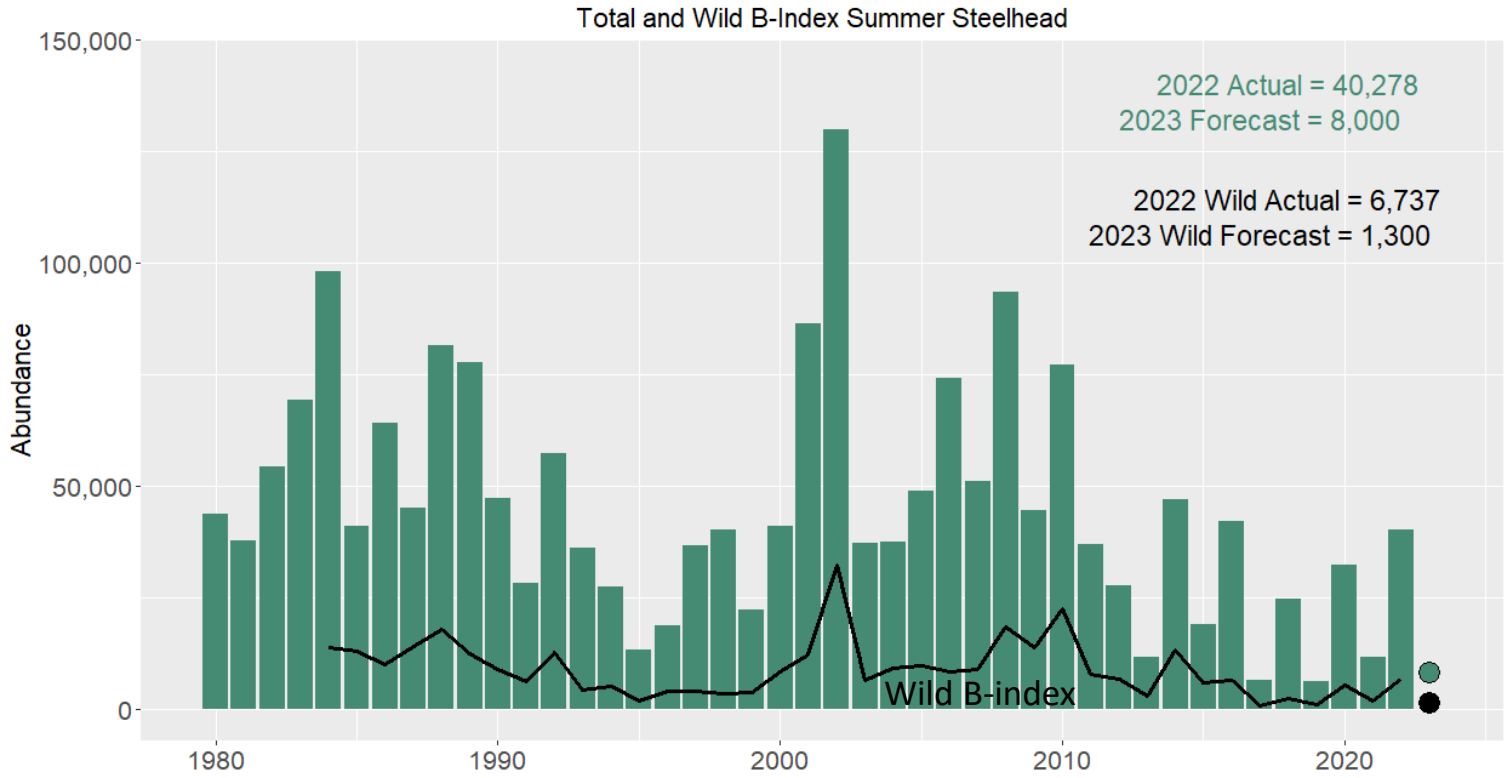


*Includes hatchery and wild combined

2023 Steelhead Forecast

- A-index* – 55,400 (43%)
  - Wild – 17,300 (37%)
- B-index* – 8,000 (33%)
  - Wild – 1,300 (30%)





*Includes hatchery and wild combined

Questions

Washington Department of FISH and WILDLIFE

Pacific Fishery Management Council Salmon Technical Team Review

Kyle Van de Graaf

PFMC Pre-I Table I-1

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 1 of 3)

Production Source and Stock or Stock Group	2018	2019	2020	2021	2022	2023
Sacramento River						
Fall (Sacramento Index)	229.4	379.6	473.2	271.0	396.5	169.8
Winter (age-3 absent fishing)	1.6	1.9	3.1	9.1	6.0	4.5
Klamath River (Ocean Abundance)						
Fall	359.2	274.2	186.6	181.5	200.1	103.8
Oregon Coast						
North and South/Local Migrating	--	--	--	--	--	--
Columbia River (Ocean Escapement)						
Cowlitz Spring	5.2	1.3	1.4	1.8	4.1	9.0
Kalama Spring	1.5	1.4	1.0	2.2	2.0	2.4
Lewis Spring	3.7	1.5	1.4	2.4	2.4	4.7
Willamette Spring	53.8	40.2	40.8	50.1	51.2	71.0
Sandy Spring	5.3	5.5	5.2	5.3	5.6	7.8
Upriver Spring a/	166.7	99.3	81.7	75.2	122.9	198.6
Upriver Summerb/	67.3	35.9	38.3	77.6	57.5	84.8
LRW Fall	7.6	13.7	19.7	20.0	10.8	8.6
LRH Fall	62.4	54.5	51.0	73.1	73.0	77.1
SCH Fall	50.1	46.0	46.2	46.8	91.2	136.1
MCB Fall	36.4	56.7	71.8	77.4	70.2	48.3
URB Fall	200.1	158.4	233.4	354.2	230.4	272.4

PFMC Pre-I Table I-1 (cont.)

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 2 of 3)

Production Source and Stock or Stock Group		2018	2019	2020	2021	2022	2023
Washington Coast							
Willapa Bay Fall	Natural	3.8	4.3	2.9	3.9	3.1	2.8
	Hatchery	40.3	23.6	28.3	30.5	30.1	27.5
Grays Harbor Fall	Natural	16.4	18.0	15.0	15.5	17.9	15.0
	Hatchery	4.8	7.7	6.9	7.6	8.6	5.9
Quinault Spring/Summer	Natural	NA	NA	NA	NA	NA	NA
	Hatchery	4.8	NA	NA	NA	NA	NA
Quinault Fall	Natural	5.2	5.3	4.2	6.0	3.2	4.0
	Hatchery	3.1	2.7	4.5	4.9	5.6	7.6
Queets Spring/Sum	Natural	0.5	0.6	0.6	0.6	0.6	0.4
Queets Fall	Natural	3.3	3.4	4.1	4.3	5.3	4.3
	Hatchery	0.6	0.8	0.7	0.6	0.5	0.8
Hoh Spring/Summer	Natural	1.1	1.0	0.8	1.0	0.7	1.0
Hoh Fall	Natural	2.6	2.5	2.6	2.6	3.4	2.6
Quillayute Spring	Hatchery	2.1	2.1	2.4	2.6	3.0	2.8
Quillayute Sum/Fall	Natural	8.0	7.9	9.8	9.6	8.8	11.3
Hokoc/	Natural	1.5	2.8	2.6	1.3	0.9	2.8
North Coast Totals							
Spring/Summer	Natural	1.6	1.7	1.4	1.5	1.3	1.4
Fall	Natural	19.1	19.2	20.6	22.5	20.7	22.1
Spring/Summer	Hatchery	2.1	2.1	2.4	2.6	3.0	2.8
Fall	Hatchery	3.7	3.5	5.2	5.5	6.1	8.4

PFMC Pre-I Table I-1 (cont.)

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 3 of 3)

Production Source and Stock or Stock Group		2018	2019	2020	2021	2022	2023
Puget Sound summer/falld/							
Nooksack/Samish	Hatchery	24.6	21.3	18.2	18.9	28.1	41.2
East Sound Bay	Hatchery	0.7	0.3	0.3	0.6	0.4	0.2
Skagit	Natural	13.3	13.6	12.9	10.5	12.5	12.2
	Hatchery	0.3	0.3	0.5	0.5	0.5	0.5
Stillaguamishe/	Natural	1.6	0.9	0.9	0.9	0.9	1.2
Snohomishe/	Natural	3.5	3.2	3.0	2.9	2.4	3.4
	Hatchery	6.5	7.0	6.8	6.1	6.0	7.5
Tulalipe/	Hatchery	7.5	12.5	6.0	5.8	7.7	5.5
South Puget Sound	Natural	4.8	8.4	5.8	7.0	6.9	7.0
	Hatchery	123.6	99.9	100.7	78.8	90.3	90.4
Hood Canal	Natural	3.9	1.2	4.6	5.7	5.4	3.2
	Hatchery	57.6	66.0	67.6	64.1	51.9	53.6
Strait of Juan de Fuca Including Dungeness spring run	Natural	6.0	8.3	5.0	5.5	5.0	3.7

PFMC Pre-I Table I-2

TABLE I-2. Preseason ocean abundance adult coho salmon stock forecasts in thousands of fish. (Page 1 of 2)

Production and Stock or Stock Group	Source	2018	2019	2020	2021	2022	2023
OPI Area Total Abundance (California, Oregon Coasts, and Columbia River)		349.0	1,009.6	268.7	1,732.9	1,225.9	1,135.7
OPI Public	Hatchery	294.1	933.5	185.7	1607.9	1003.5	896.9
Columbia River Early		164.7	545.0	130.7	1014.0	592.5	481.8
Columbia River Late		121.5	360.6	50.3	576.0	404.7	404.3
Coastal N. of Cape Blanco		3.3	12.0	2.4	6.4	1.9	3.0
Coastal S. of Cape Blanco		4.6	15.9	2.3	11.5	4.4	7.8
Lower Columbia River	Natural	21.9	36.9	24.8	39.2	65.7	45.5
Oregon Coast (OCN)	Natural	54.9	76.1	83.0	125.0	222.4	238.8
Washington Coast							
Willapa	Natural	20.6	63.4	17.9	19.0	35.8	42.7
	Hatchery	44.5	94.0	51.8	61.6	74.7	111.0
Grays Harbor	Natural	42.4	71.5	50.0	44.8	120.4	102.8
	Hatchery	51.4	64.3	42.3	31.7	78.3	111.4
Quinault	Natural	25.4	13.9	17.5	15.0	19.4	23.6
	Hatchery	29.6	26.9	27.0	24.6	42.7	30.6
Queets	Natural	7.0	11.1	7.8	3.9	18.2	12.4
	Hatchery	10.8	13.2	10.9	11.8	22.2	14.9
Hoh	Natural	5.8	7.0	4.2	3.0	4.7	6.5

PFMC Pre-I Table I-2 (cont.)

TABLE I-2. Preseason adult coho salmon stock forecasts in thousands of fish. (Page 2 of 2)

Production Source and Stock or Stock Group		2018	2019	2020	2021	2022	2023
Quillayute Fall	Natural	10.6	14.7	9.2	7.5	12.5	13.5
	Hatchery	16.5	17.0	13.0	15.1	20.3	19.1
Quillayute Summer	Natural	2.7	1.2	0.8	0.3	0.9	1.6
	Hatchery	3.3	3.4	3.4	3.4	4.6	3.9
North Coast Independent Tributaries	Natural	4.1	8.1	5.1	4.7	18.0	13.5
	Hatchery	7.9	12.5	1.3	0.1	0.1	11.8
WA Coast Total	Natural	118.7	191.0	112.4	98.4	229.8	216.6
	Hatchery	164.1	231.3	149.6	148.2	243.0	302.7
Puget Sound							
Strait of Juan de Fuca	Natural	7.2	8.8	7.5	6.7	7.3	15.6
	Hatchery	10.6	16.8	20.6	12.5	12.7	21.8
Nooksack-Samish	Natural	20.6	25.1	15.4	35.3	36.0	29.5
	Hatchery	61.3	59.8	42.5	54.6	73.8	49.2
Skagit	Natural	59.2	57.9	31.0	58.4	80.4	43.1
	Hatchery	13.1	9.9	18.2	22.0	21.3	21.1
Stillaguamish	Natural	19.0	23.8	19.5	26.8	24.9	30.2
	Hatchery	0.0	2.2	2.3	4.0	1.9	1.7
Snohomish	Natural	65.9	62.6	39.0	60.0	64.2	76.5
	Hatchery	38.3	43.7	26.6	29.9	22.6	64.0
South Sound	Natural	15.0	30.4	7.3	27.5	31.0	58.3
	Hatchery	103.0	180.4	164.0	192.7	208.5	218.8
Hood Canal	Natural	59.5	40.1	35.0	28.8	20.2	37.9
	Hatchery	84.5	87.9	72.2	55.7	61.4	74.8
Puget Sound Total	Natural	246.4	248.8	154.6	243.5	264.0	291.2
	Hatchery	310.8	400.7	346.3	371.4	402.3	451.4

Questions

Washington Department of FISH and WILDLIFE

2023 Legislative Update

Tom McBride

Select Legislation

- HB 1758 – Providing for routine hatchery maintenance
- SB 5306 – Voluntary disease check points
- HB 1226 – Licensing freshwater eulachon/smelt/crawfish
- HB 1720 – Riparian easement program
- HB 1735 – Voluntary Net Ecological Gain
- HB 1740 – Small forest riparian easements

2023 – 2025 Budget

- **2023-25 Operating Budget Request**
  - Maintenance Level
  - Essential Ongoing Workload
  - Policy Level

Ongoing Work

Title (in thousands)	Notes	Biennial Amount
Wolf Recovery	Custom	954
Wolf Advisory Group	One-time	260
Streamflow Policy Support	Ongoing	1,037
Columbia River Pinniped Predation	Ongoing	1,506
Salish Sea Marine Mammal Surveys	Ongoing	940
Increase Fish Populations (Hatchery Maintenance)	Ongoing	1,000
Salmon and Steelhead Monitoring	Ongoing	1,644
Crab Fishery and Humpbacks	One-time	570
Toutle & Skamania Hatcheries	One-time	1,896
Fish Passage Rulemaking	Ongoing	388
Prioritization of Fish Barriers	Ongoing	584
Riparian Systems Assessment	Ongoing	1,994

- These items were all funded in the 21-23 biennial budget or the 2022 supplemental budget.

Priority Requests

Title (in thousands)	Request	Proposal	Note
Restoring Washington's Biodiversity	47,596	0	No funding
Critical Infrastructure Maintenance	3,542	1,771	Partial
Fish Passage Maintenance Team	1,482	1,482	Full Funding
Expand Wildlife Conflict Response	9,899	1,540	Partial
Wildlife Disease Surveillance	644	0	No funding
Columbia River ESA Permitting	1,394	0	No funding
Hatchery Investment Strategy	4,970	176	Partial
Engaging Volunteers in Conservation	2,314	0	No funding
Building a Carbon-Neutral WDFW	1,752	1,752	Full Funding
Building a Climate-Resilient WDFW	5,306	5,306	Full Funding
Body Cameras and Public Records	1,589	1,589	Partial in outyears
Emerging Fishery Implementation	3,133	0	No funding
Manage Impact to State Lands	1,310	1,310	Full Funding
Emerging Toxics in Chinook and Orca	4,816	4,816	Full Funding

Questions

Washington Department of FISH and WILDLIFE

Puget Sound/Coast Pinniped Conservation and Management

Dr. Casey Clark and Nate Pamplin

March 3, 2023

OUTLINE

Puget Sound pinnipeds

- Abundance
- Current research

WA State Academy of Sciences Report

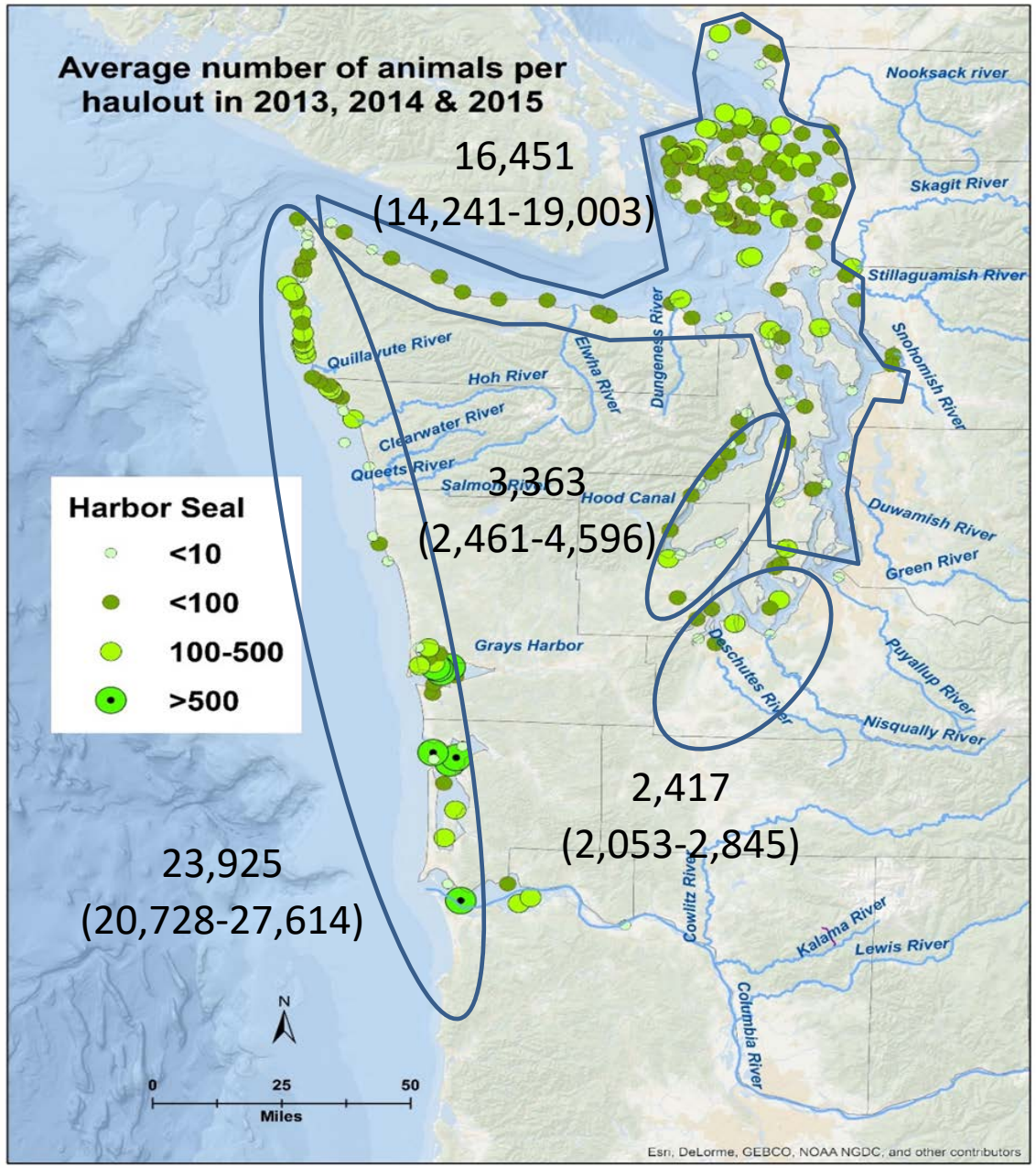
Next Steps

Harbor seals in WA

Year-round resident

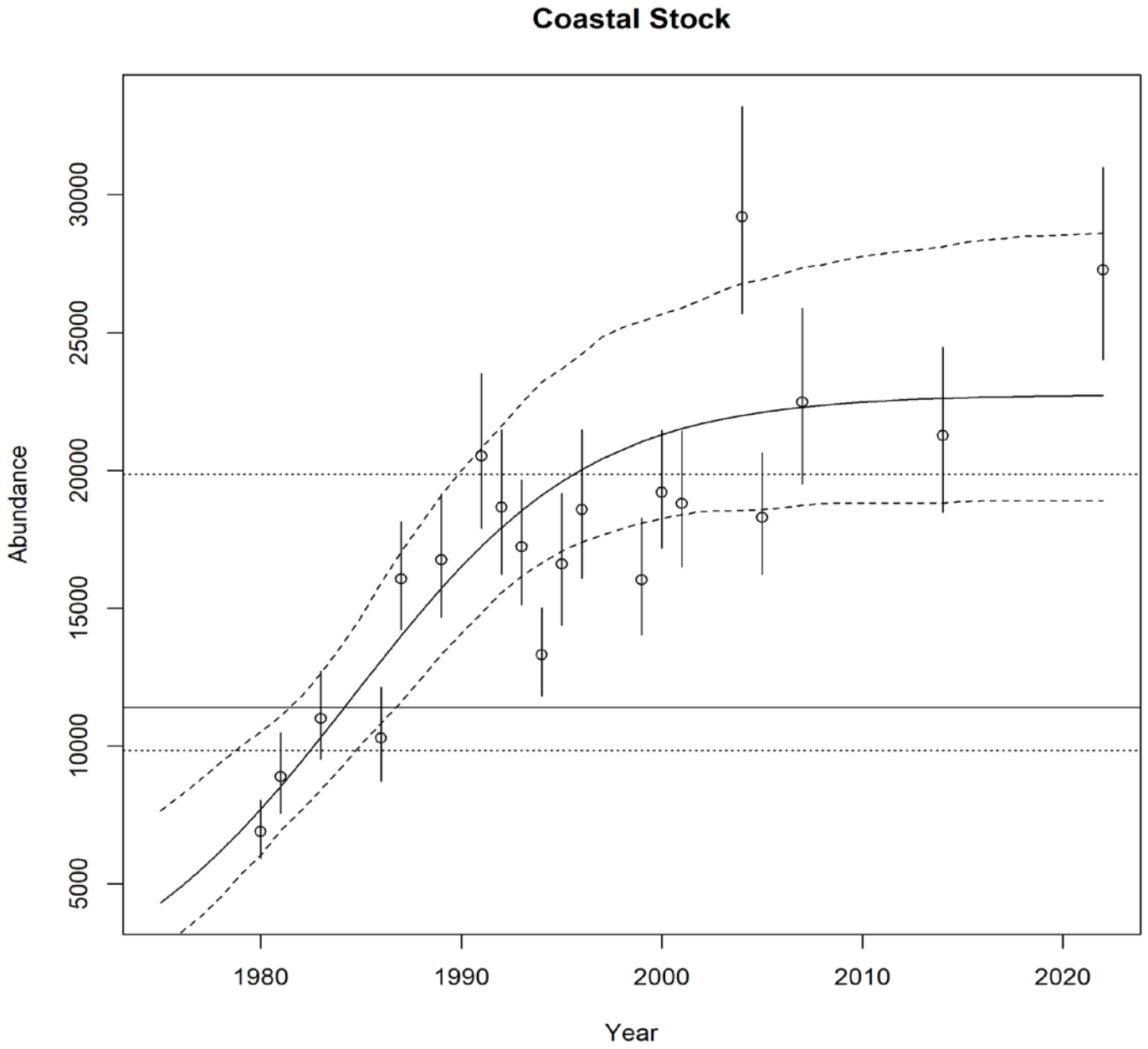
1 coastal stock and three stocks in inland marine waters

- –Washington/Oregon coast
- –Northern inland waters
- –Hood Canal
- –South Puget Sound



Results – Coastal Stock (Washington)

- Outer coast and coastal estuaries (not including the Columbia River)
- Shared stock with Oregon
- ~25,000 individuals in 2022
- Generally stable since mid-2000s



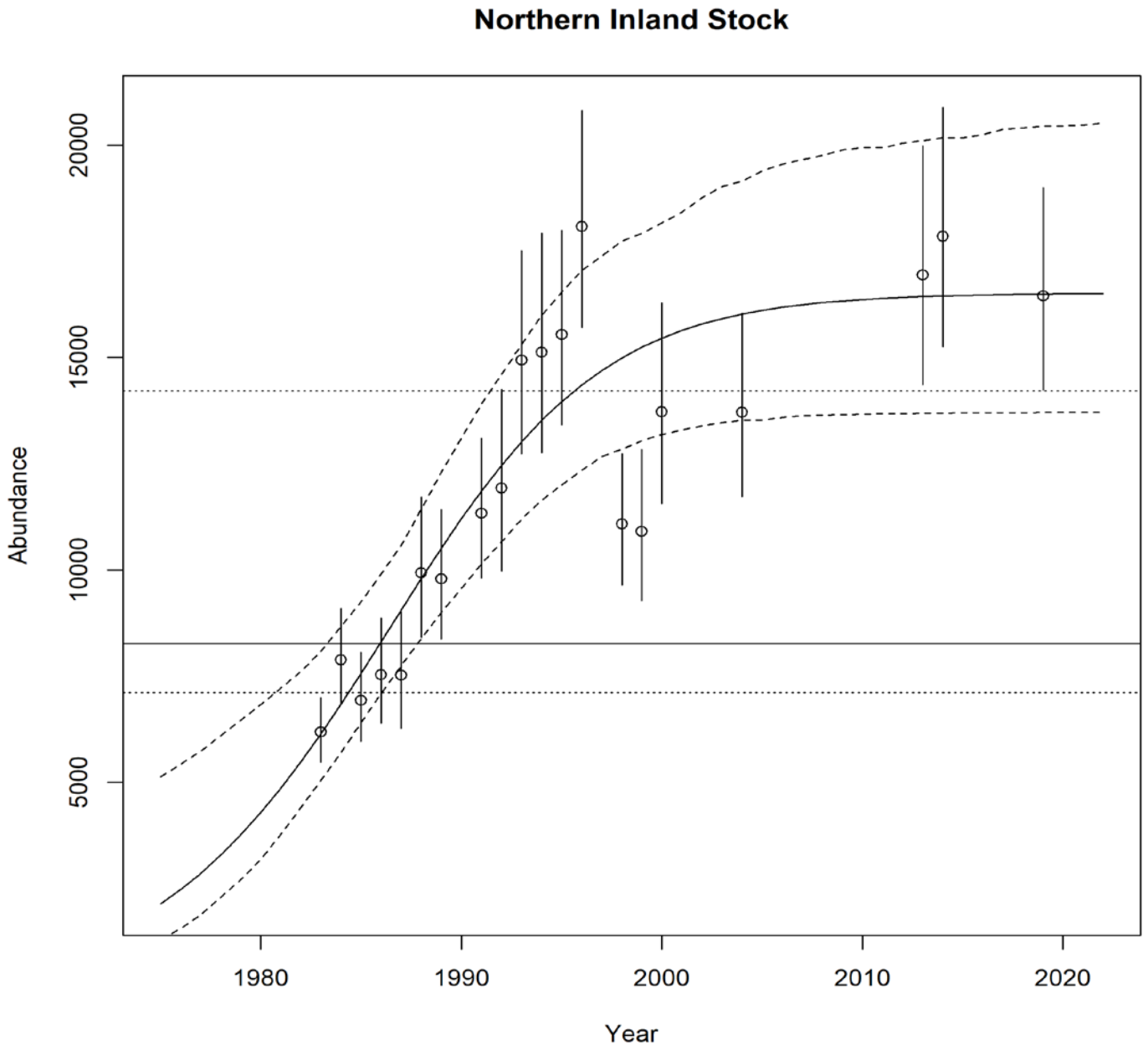
Results – Northern Inland Stock

Strait of Juan de Fuca, San Juan Islands, and eastern bays down to Edmonds

Transboundary stock with Canada (our counts = WA only)

~15,000 individuals in 2019

Generally stable since mid-2000s

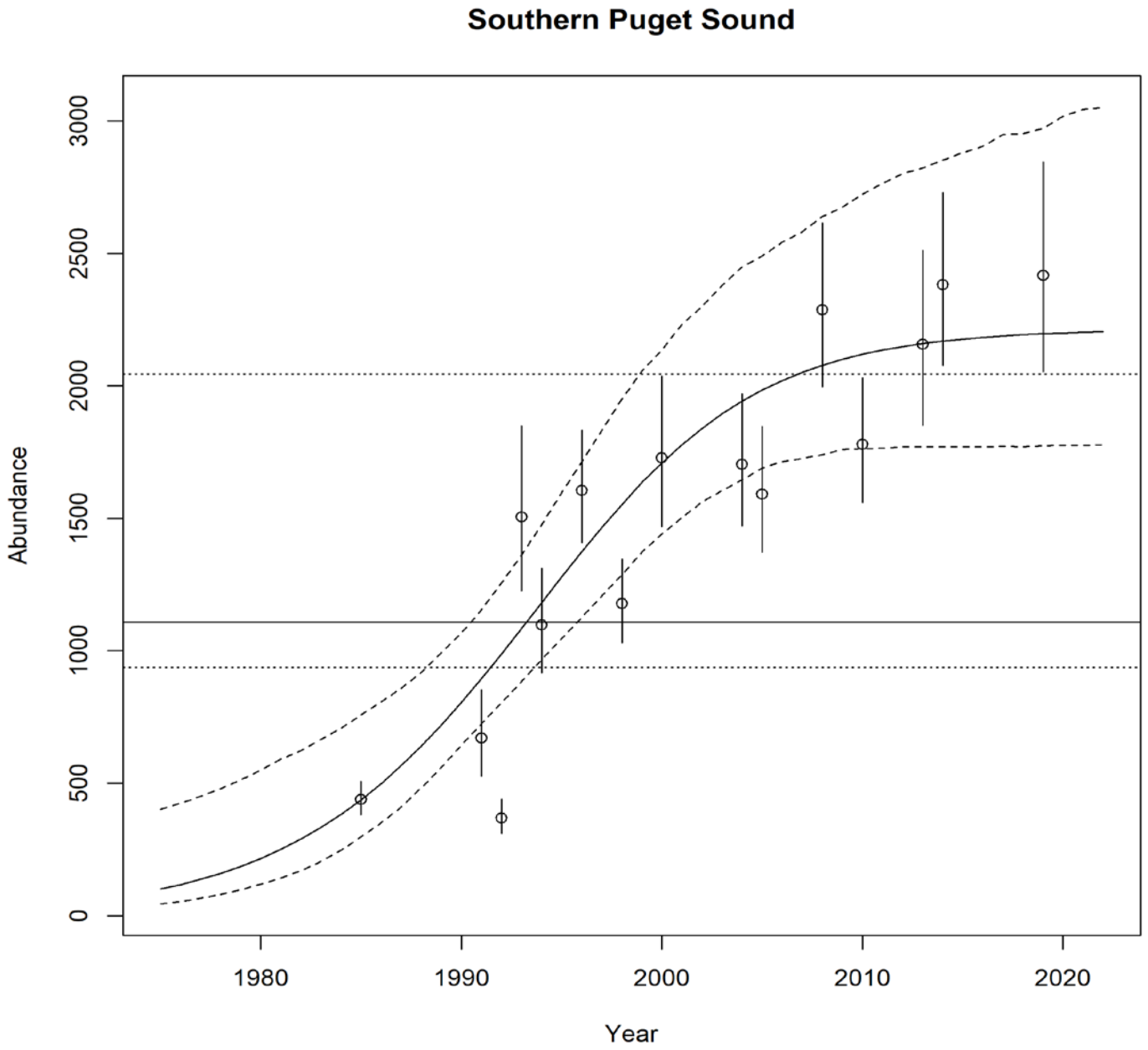


Results – Southern Puget Sound

Contiguous waters of Puget Sound south of Edmonds

~2,250 individuals in 2019

Generally stable since ~2010



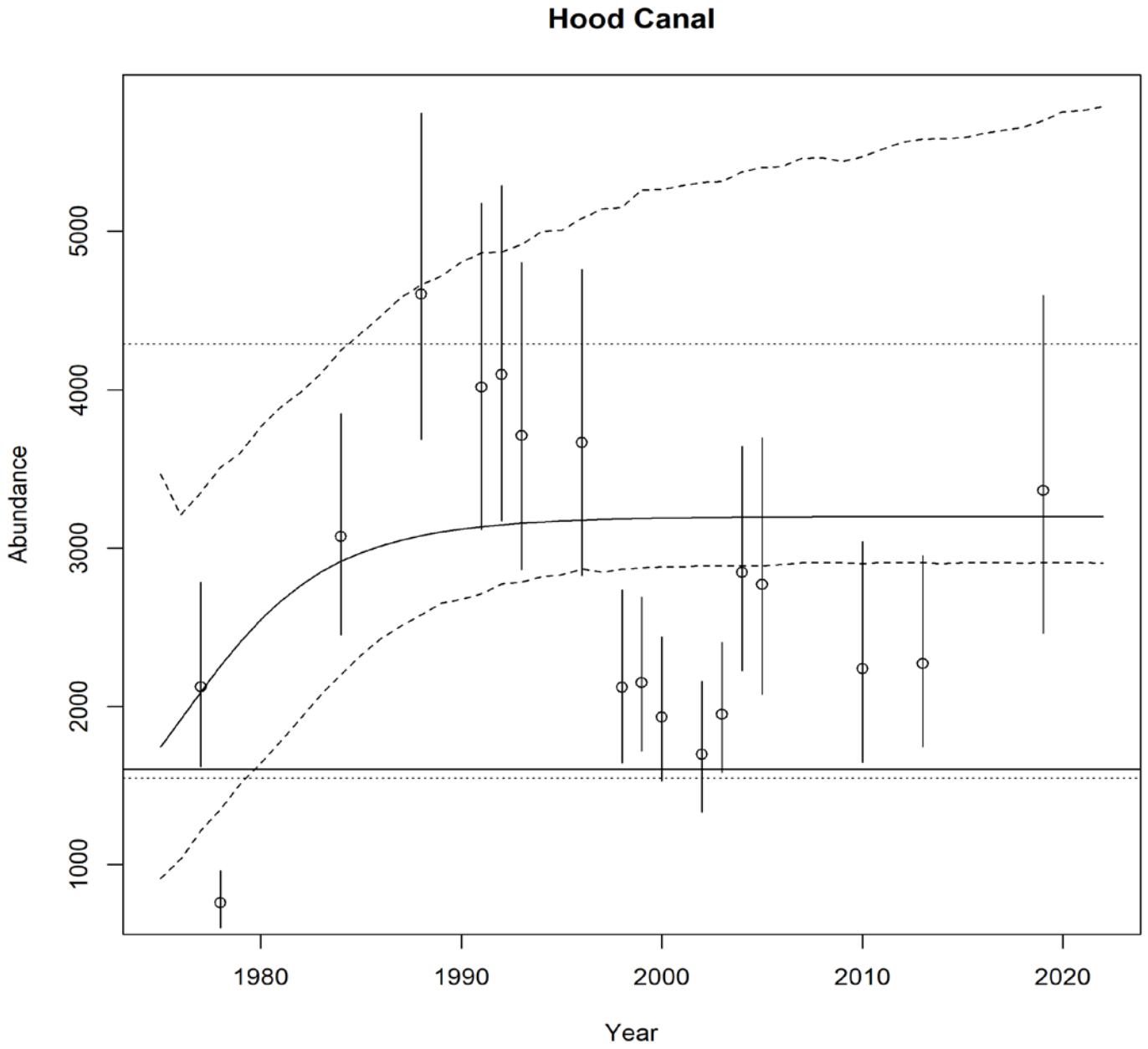
Results – Hood Canal Stock

All contiguous waters south of the Hood Canal Bridge, plus Port Gamble

Stock appears to have recovered earlier than others, surveys caught tail end

~3,000 individuals in 2019

Generally stable since ~1990



Population Summary

Analysis completed and abundance estimates derived

NOAA's stock assessment in progress

South Puget Sound (2019), Northern Inland (2019), and the Washington portion of the WA/OR Coastal (2022) stocks appear to be at Optimum Sustainable Population levels (OSP)

Uncertainty too high to confirm whether Hood Canal is at OSP

Potential Biological Removal will be calculated for South Puget Sound and Northern Inland stocks in SAR update

Comprehensive Southern Puget Sound diet study

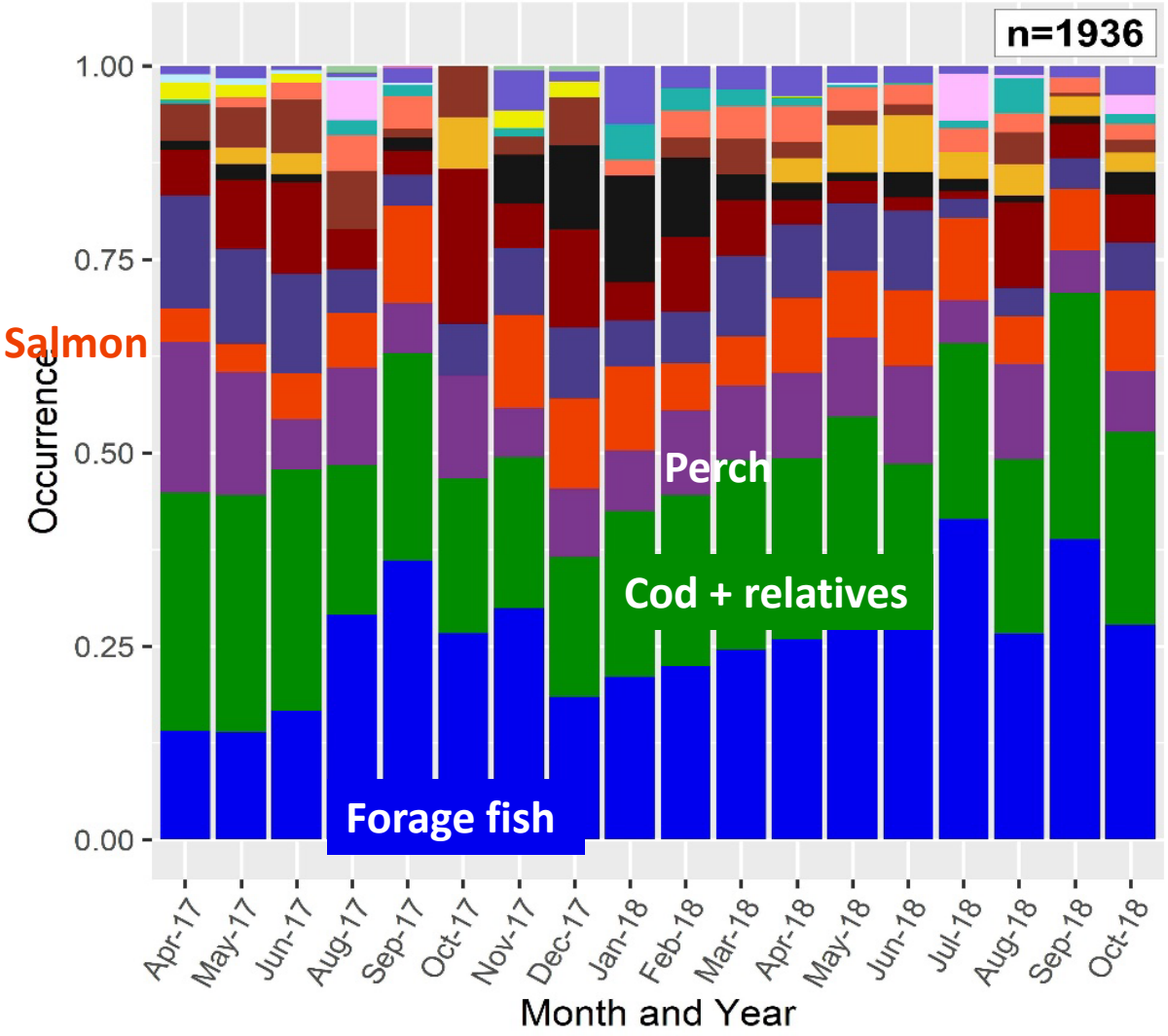
Will combine all diet samples discussed previously + more

- ~4,000 samples, all months, various locations around Southern Puget Sound

Analysis of hard part and DNA in scat for complete picture

Developing new and improved DNA methods analyses, will obtain sex and individual seal ID from scats

- Specialization by individuals (are there salmon specialists?)



Assessing predation impacts on Stillaguamish Chinook

2021 – present: Partnering with Stillaguamish Tribe to investigate Chinook predation in Stillaguamish River and Port Susan Bay

Understanding predator abundance in space and time using shore- and boat-based, aerial surveys

Harbor seal captures and GPS tagging to study fine-scale habitat use

Scat sample collection for diet analysis

Measuring predator scar rates on Chinook captured for hatchery program

MMPA/ESA Permit #22678

Targeted Acoustic Startle Technology (TAST)

- Provided logistical support for tests of the TAST device, a non-lethal pinniped deterrent, by Oceans Initiative
- Tests conducted under WDFW's MMPA 109(h) authority:
  - 2020: Whatcom Creek Hatchery, Bellingham
  - 2022: Deschutes River fish ladder, Olympia
- Continued testing planned at Deschutes River in 2023

Hood Canal Bridge Predation Mitigation

Bridge impedes fish passage; bird and mammal predators exploit structure to consume juvenile salmonids

Structural modifications to improve passage:

- Many partners: NOAA, Port Gamble S'Klallam Tribe, WDFW, Ecology, WSDOT, etc., coordinated by Long Live the Kings

Non-lethal pinniped deterrence RFQQ

Gov Inslee SRKW Task Force

Established by Executive Order in Mar. 2018

Address primary threats:

- Prey availability
- Vessel disturbance and noise
- Contaminants

2018 Report: 36 recommendations

2019 Report: 13 additional recommendations

Gov Inslee SRKW Task Force (2018): Pinniped-related Recommendations

Recommendation #12: Direct the appropriate agencies to work with tribes and NOAA to determine if pinniped predation is a limiting factor for Chinook in Puget Sound and outer coast and evaluate management actions.

Recommendation #13: Support authorization and other actions to more effectively manage pinniped predation of salmon in the Columbia River.

Rec. #12 (Puget Sound/Outer Coast) Details

Remove artificial haul outs

Independent science panel by Academy of Sciences to evaluate extent of pinniped predation on Chinook.

- Co-manager engagement

Engage NOAA to determine OSP for harbor seals

If pinniped removal identified as a management option, secure authorization through the MMPA

Provide funding for science, research, and if deemed necessary, removal

WA State Academy of Sciences Proviso

Identified in Gov Inslee SRKW Task Force Recommendation #12

Funding appropriated in 2021-23 to WDFW to contract with WA State Academy of Sciences (WSAS; $80K in SFY22; $60K in SFY23)

WDFW coordinated with 20 western WA treaty tribes to develop management-driven science questions to WSAS

WSAS convened panel; held meetings with regional scientists and public

WSAS submitted report to WDFW and Legislature in November 2022

WSAS Pinniped Predation Report

Compilation of information of pinniped abundance and distribution

Trophic relationships

Pinniped predation on salmonids (diet, rate, behaviors, compensatory/additive)

Impacts of predation on salmon recovery

Adaptive management and science

WSAS Findings (continued)

"The **preponderance of evidence** supports the hypothesis that current populations of **pinnipeds are likely impeding the recovery of salmon populations** in Washington waters. As such, **strategic lethal removal of pinnipeds is an approach that may be required** for understanding the magnitude of impacts of pinnipeds on salmonids, either at local scales or at the ecosystem scale."

"…the status quo [without intervention]…could further depress salmon populations.."

"…removals may be ineffective where pinniped populations are dense and there is the potential for other individuals to replace removed animals."

WSAS Findings (continued)

Complex trophic relationships and ecological interactions among pinnipeds, salmonids, and other predators and prey introduce uncertainty; **"However, potential unintended effects should not be a barrier to strategic removals."**

"…a management experiment of this scale and complexity would involve **substantial investment in scientific capacity and political will over long time periods.**"

Authors note the complexity of the MMPA and the limited administrative options available to intervene and the **"…constraints it creates effectively block[s] most pinniped removal…"**

Authors offer guidance on adaptive management and research programs.

Management Options in the MMPA

- Apply for Waiver and Request Direct Take
  - Request waiver of the Take Moratorium [Section 101(a)(3)]
  - Rule-Making [Section 103]
  - Take Permit [Section 104]

- Request Return of Management Authority to State: [Section 109]

- Pinniped Removal Authority: [Section 120 and 2018 Section 120(f)]
  - Intentional lethal taking of individually identifiable pinnipeds which are having a significant negative impact on the decline/recovery of salmonids

- Non-Lethal Management of Nuisance Animals: [Section 109(h)]

Next Steps

2023-25 Operating Budget Requests to Legislature

- $1.4M Columbia River pinniped management; ongoing
- $954K Puget Sound/Coast pinniped abundance, distribution, diet; ongoing

Puget Sound/Coast:

- Coordinate with Gov Office, F&W Commission, NMFS, treaty tribes, state and federal legislature on next steps
- Continue distribution/abundance/diet research
- Evaluate effectiveness of non-lethal deterrents

Questions

Thank you for participating