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Northwest Power and Conservation Council

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March 5, 2019

MEMORANDUM

TO: Council members

FROM: Lynn Palensky

SUBJECT: Briefing on Columbia River Basin salmon and steelhead returns for 2018 and run forecasts for 2019

BACKGROUND:

Presenters: Dan Rawding (WDFW), Art Martin (ODFW), Lance Hebdon (IDFG), and Brian Burke (NOAA NW Fisheries Science Center)

Summary: The Council will be briefed on the 2018 returns and 2019 run forecasts of adult salmon and steelhead

Dan Rawding (Columbia River Policy and Science Coordinator, Washington Department of Fish and Wildlife) and Art Martin (Columbia River Coordination Section Manager), will present the latest information on adult Chinook, coho, sockeye, and chum salmon and steelhead run forecasts for the Columbia and Snake rivers, and expectations for the 2019 fisheries. The presentation will also include a retrospective review of the 2018 adult salmon and steelhead returns and fisheries in the Columbia River excluding the Snake Basin.

Lance Hebdon (Anadromous Fishery Manager, Idaho Department of Fish and Game) will summarize the recent and historical returns of salmon and steelhead to the Snake River Basin, focusing on the species/run groupings of spring, summer and fall Chinook salmon; summer steelhead; and sockeye salmon. Numbers of fish passing Lower Granite Dam comprise the aggregate count of adult salmon and steelhead destined for eastern Oregon's Grande Ronde and Imnaha river drainages and Idaho's Clearwater and Salmon River drainages.

Brian Burke (Research Fishery Biologist at NOAA's NW Fisheries Science Center), will present the outlook for Chinook and coho returns to the Columbia River based on local and regional ocean conditions.

Relevance: This information is relevant to our high-level indicators. It gives the region a preview for what is expected for adult returns in the current year.

Workplan: This task is captured in the Division's work plan under Adaptive Management - Annual Reports.

More Info: Links:
Columbia River Forecasts: http://wdfw.wa.gov/fishing/reports_plants.html
[2018 Forecast Report](#) to Council
Joint State Staff Reports <http://wdfw.wa.gov/fishing/crc/>
Columbia River DART: <http://www.cbr.washington.edu/dart>

COLUMBIA RIVER SALMON AND STEELHEAD RETURNS



NPCC – March 2019

Presented by: Washington Department of Fish and Wildlife

U.S. v Oregon

Technical Advisory Committee

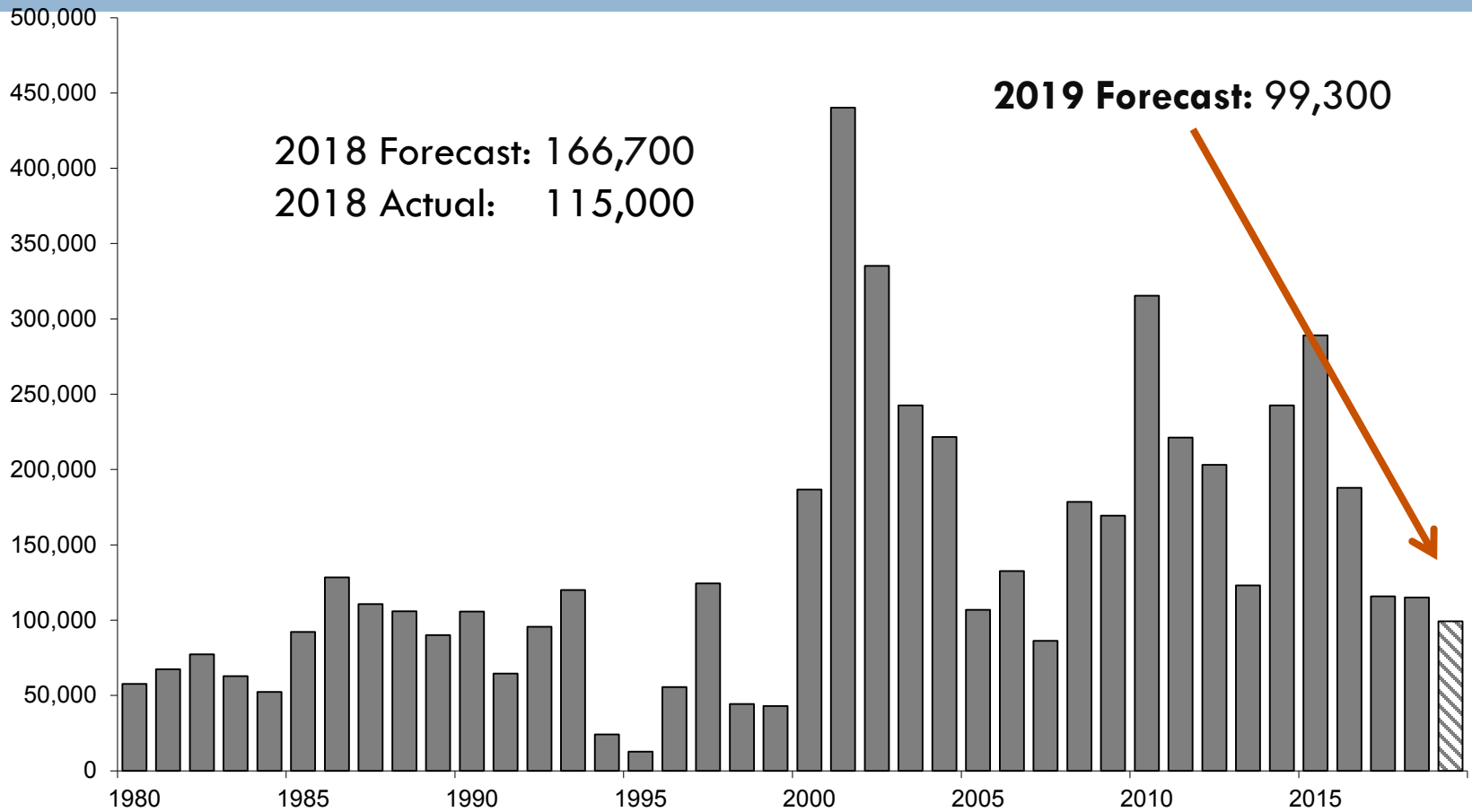
2

- Consists of staff from federal, tribal and state entities.
- TAC 'reconstructs' Columbia River salmon and steelhead returns post season and develops preseason forecasts.
- TAC reviews salmon and steelhead stock status as the runs progress and provides inseason run size updates.
- In 2018, TAC met 28 times between April and October to provide inseason run size updates on upriver salmon and steelhead.
- These inseason updates allow fishery managers to adjust fisheries as necessary in order to remain within ESA limits and management guidelines.

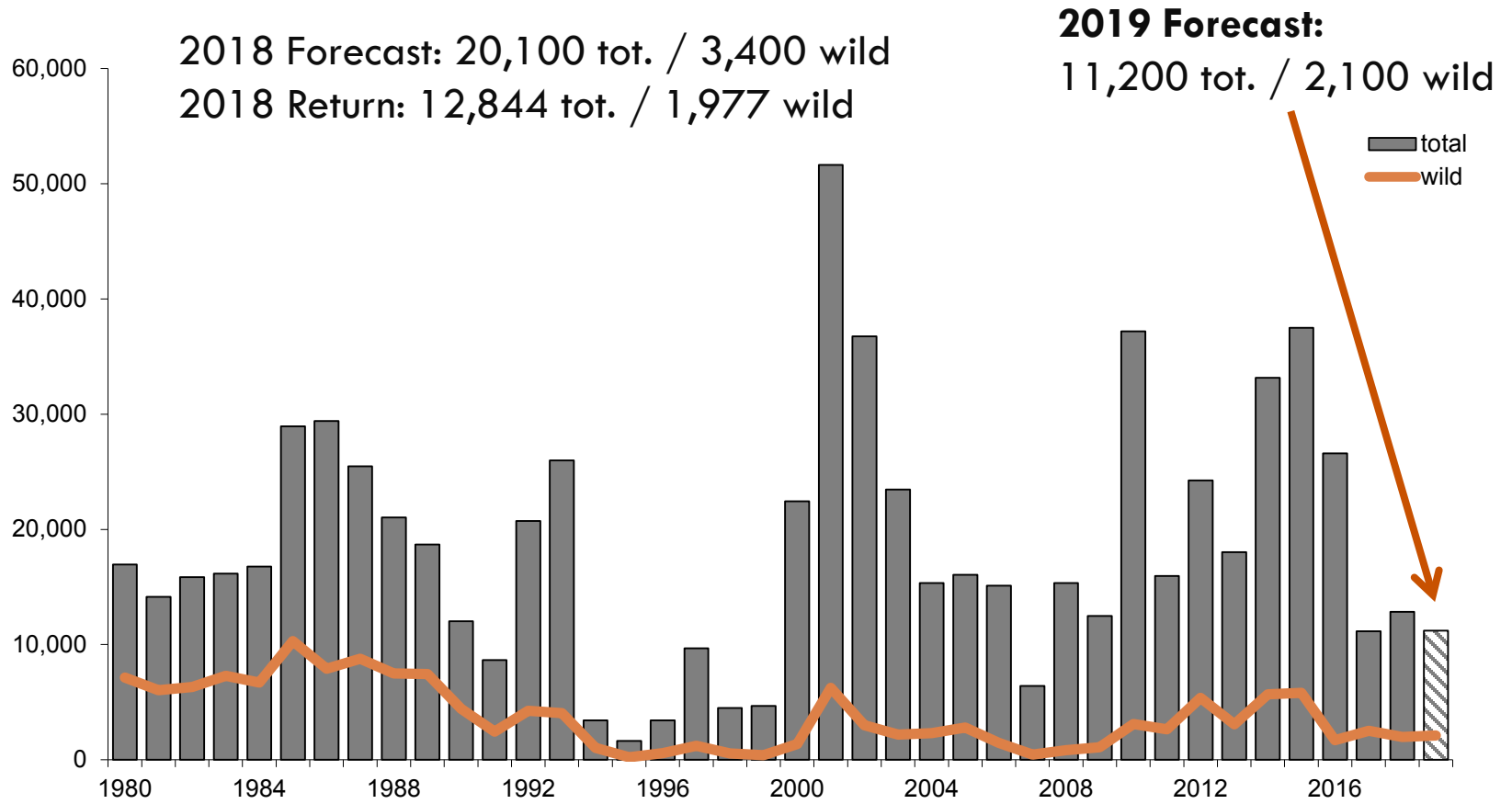
Upriver Spring Chinook



3
Total # of fish returning to the mouth of the Columbia River



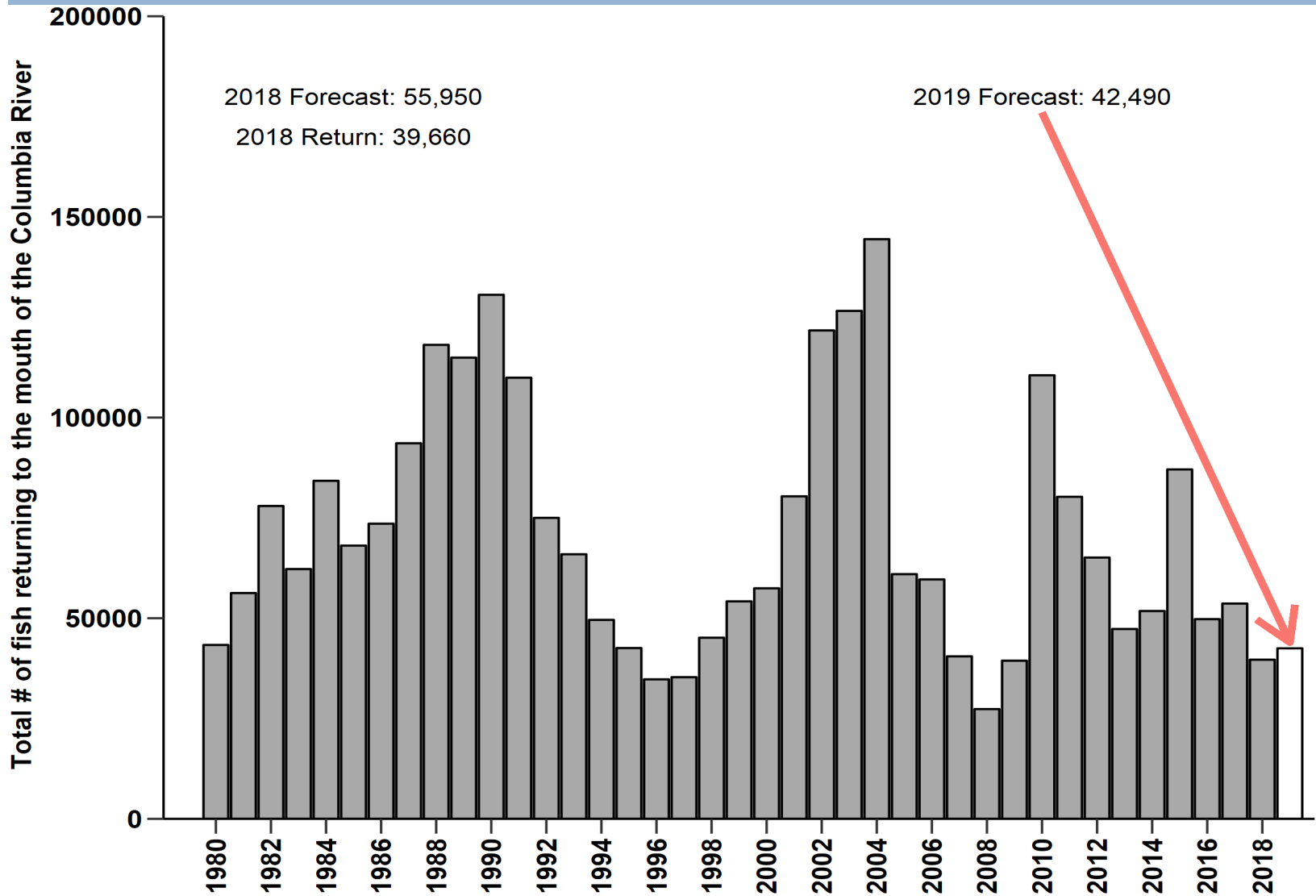
Upper Columbia Spring Chinook



Willamette Spring Chinook



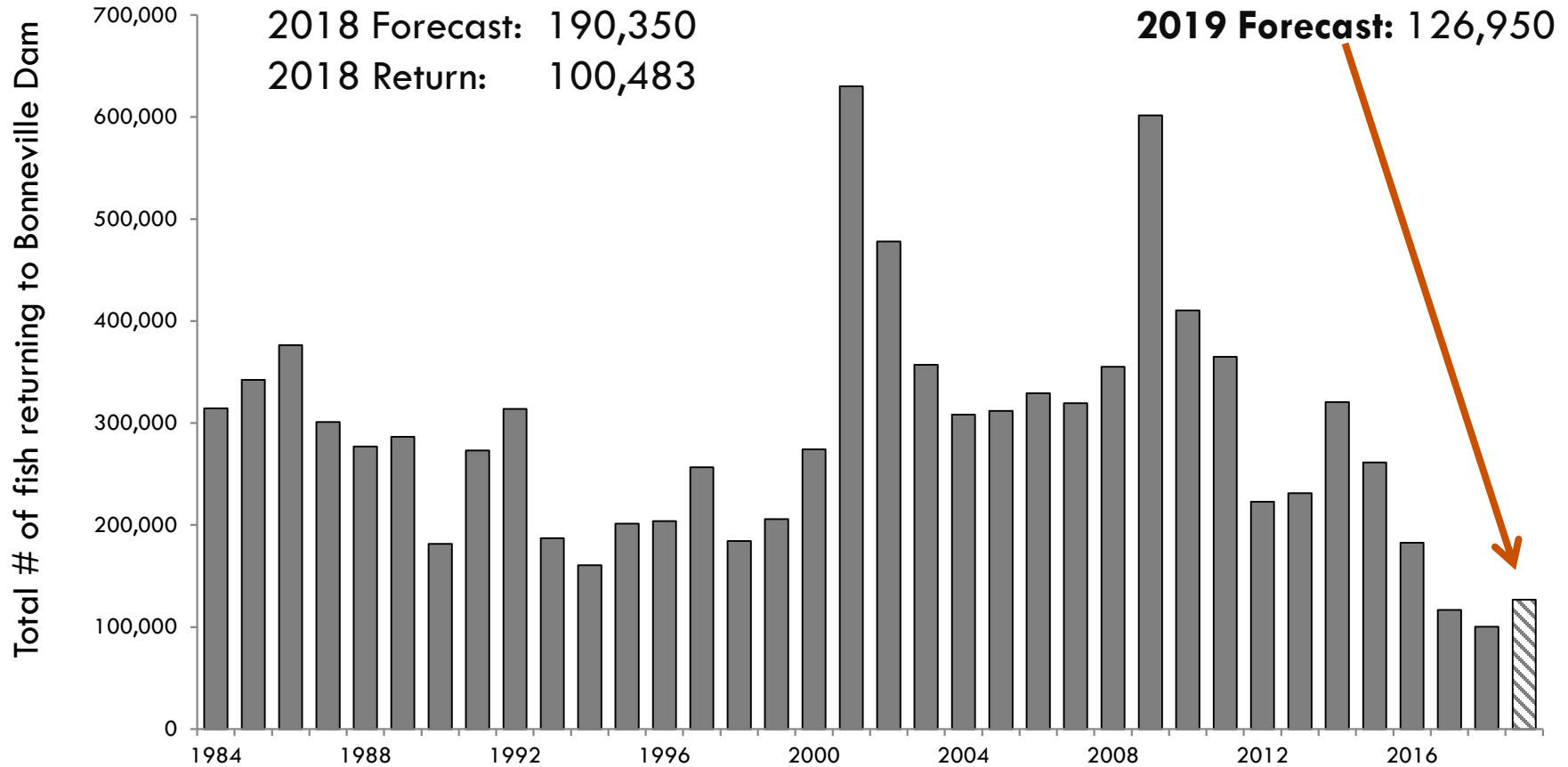
5



Upriver Summer Steelhead



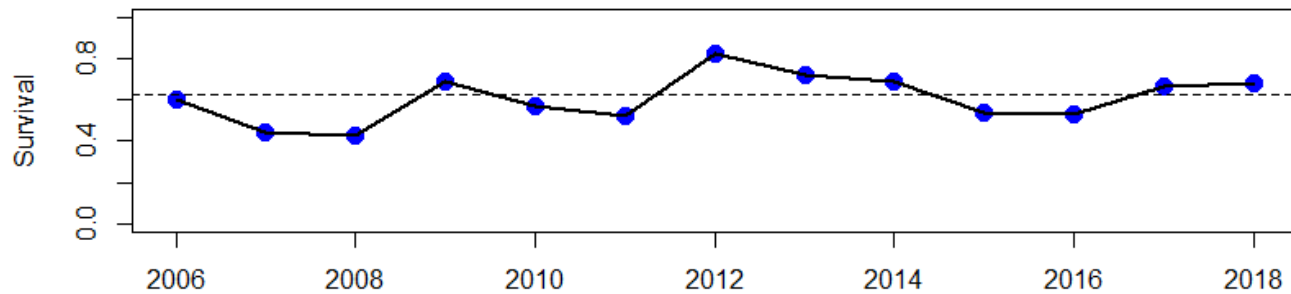
6



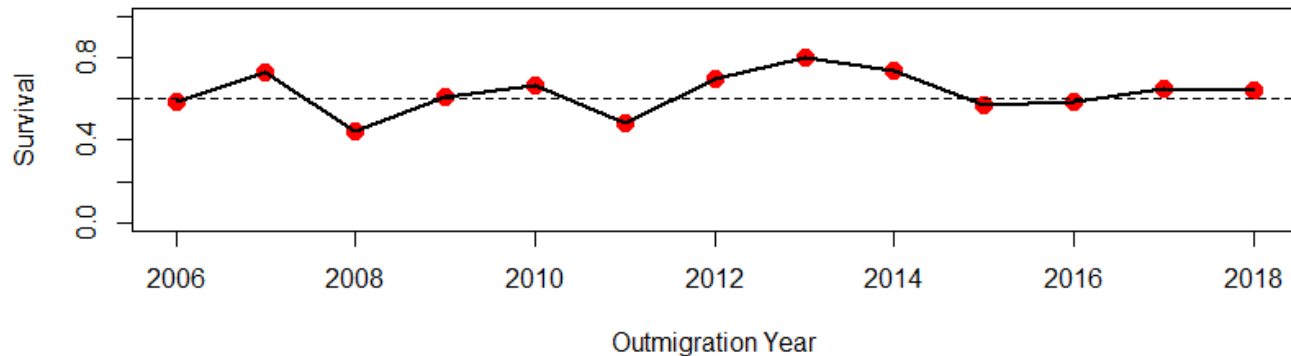
Smolt Survival from LWG to BON

7

Steelhead Smolt Survival



Sp Chinook Smolt Survival



Wild Winter Steelhead

8

Total # of fish returning to the mouth of the Columbia River

2018 Forecast: 11,700

2018 Return: 11,323

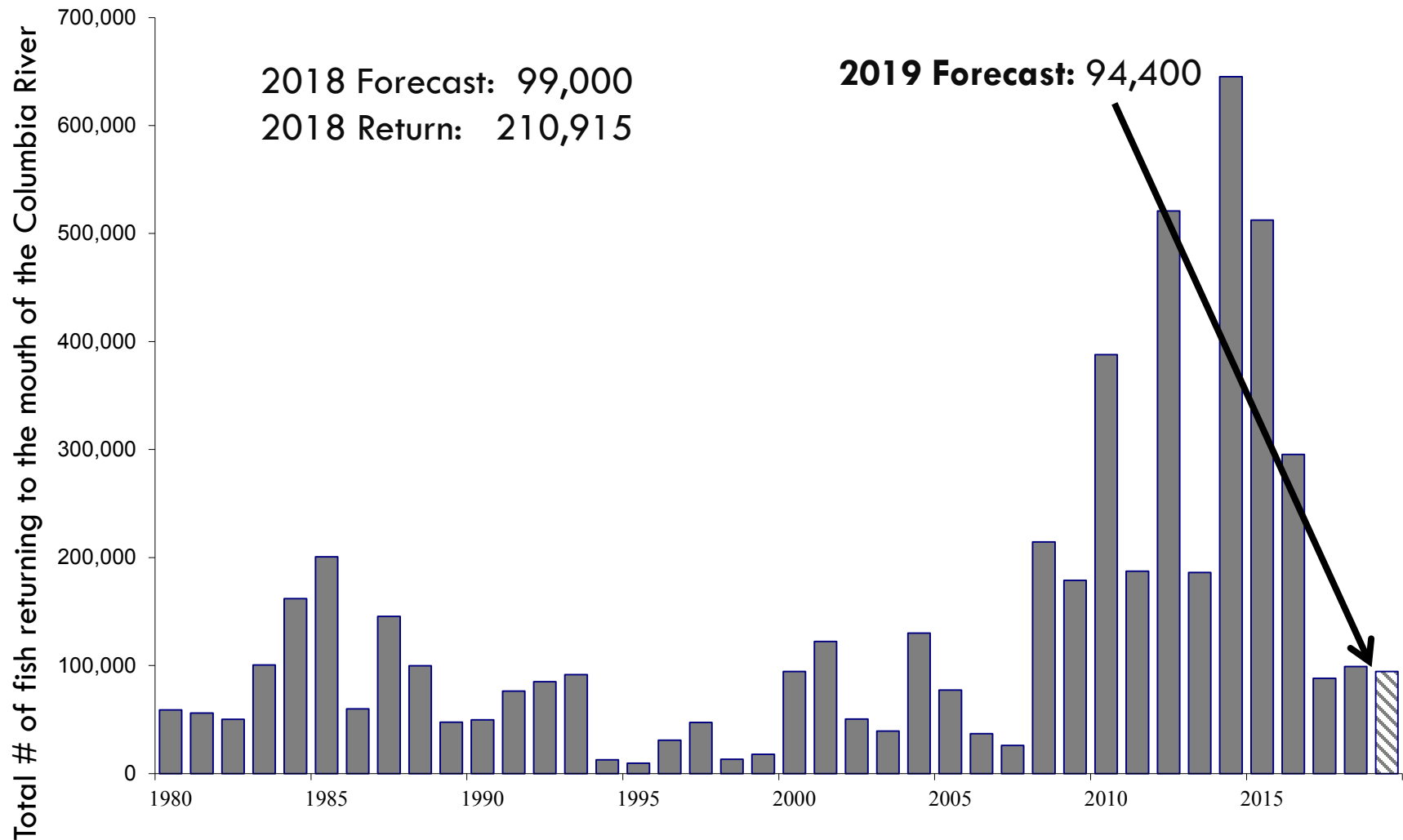
2019 Forecast: 14,400



Columbia River Sockeye

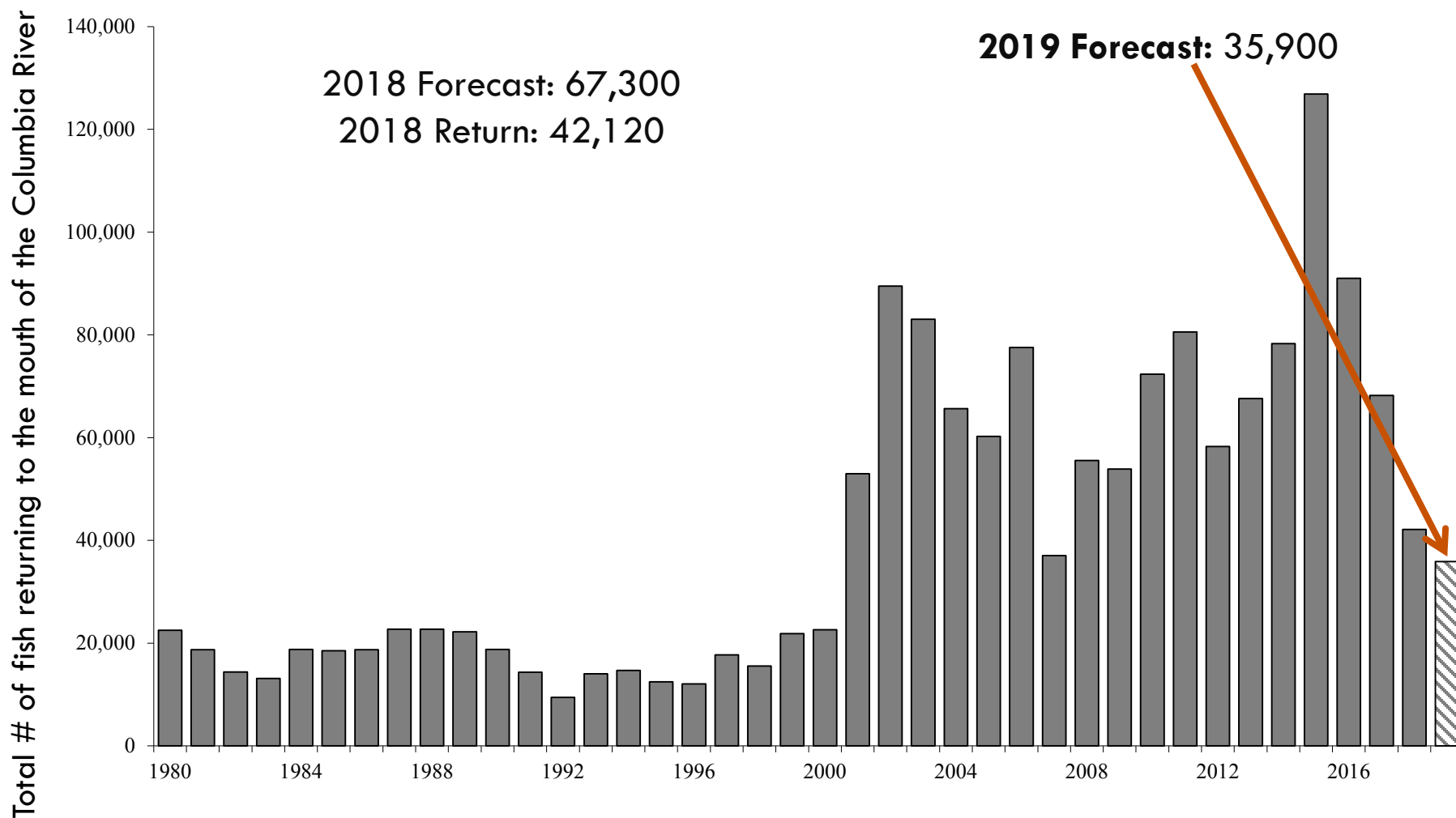


9



Upper Columbia Summer Chinook

10

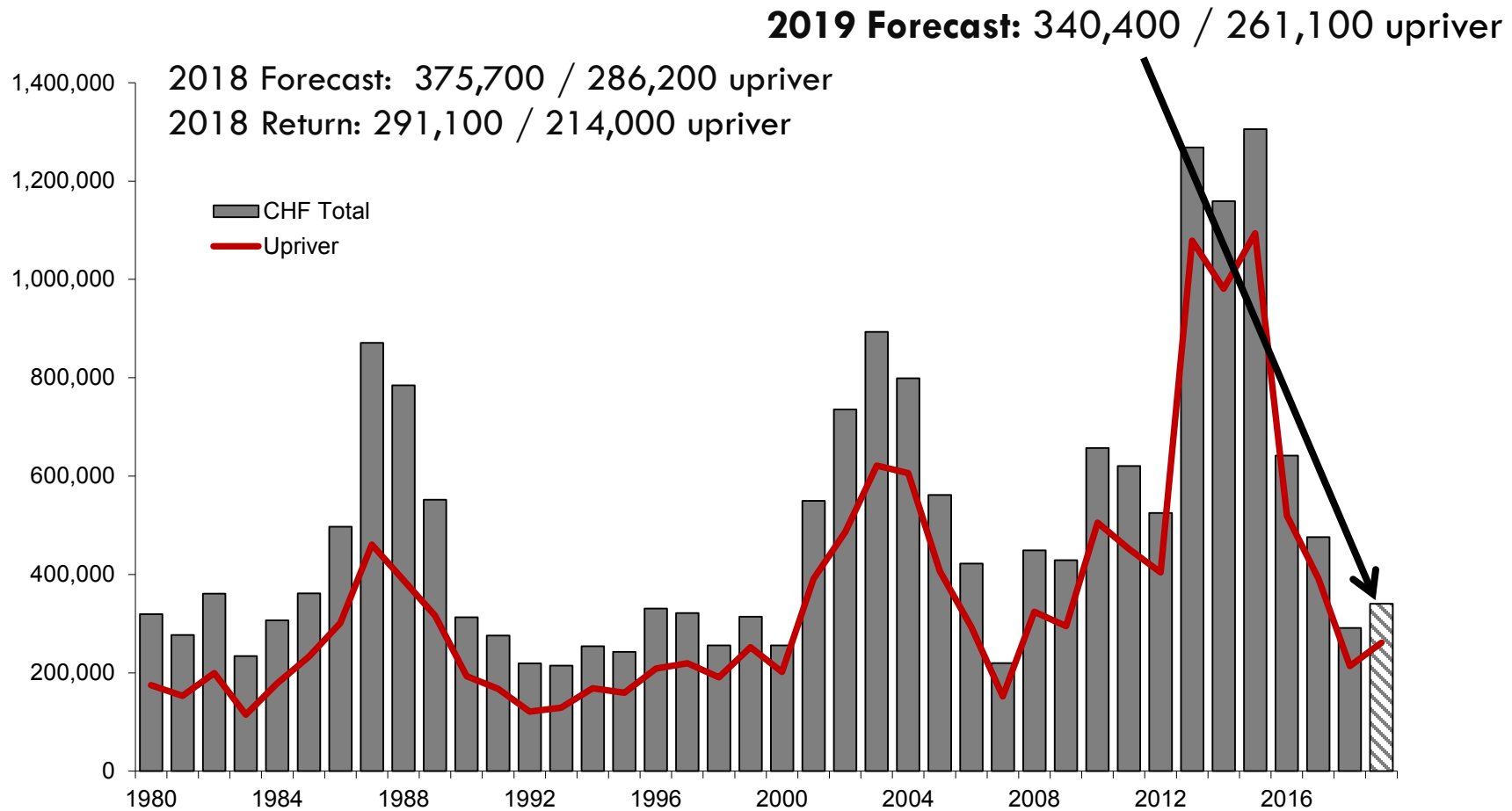


Total Fall Chinook



11

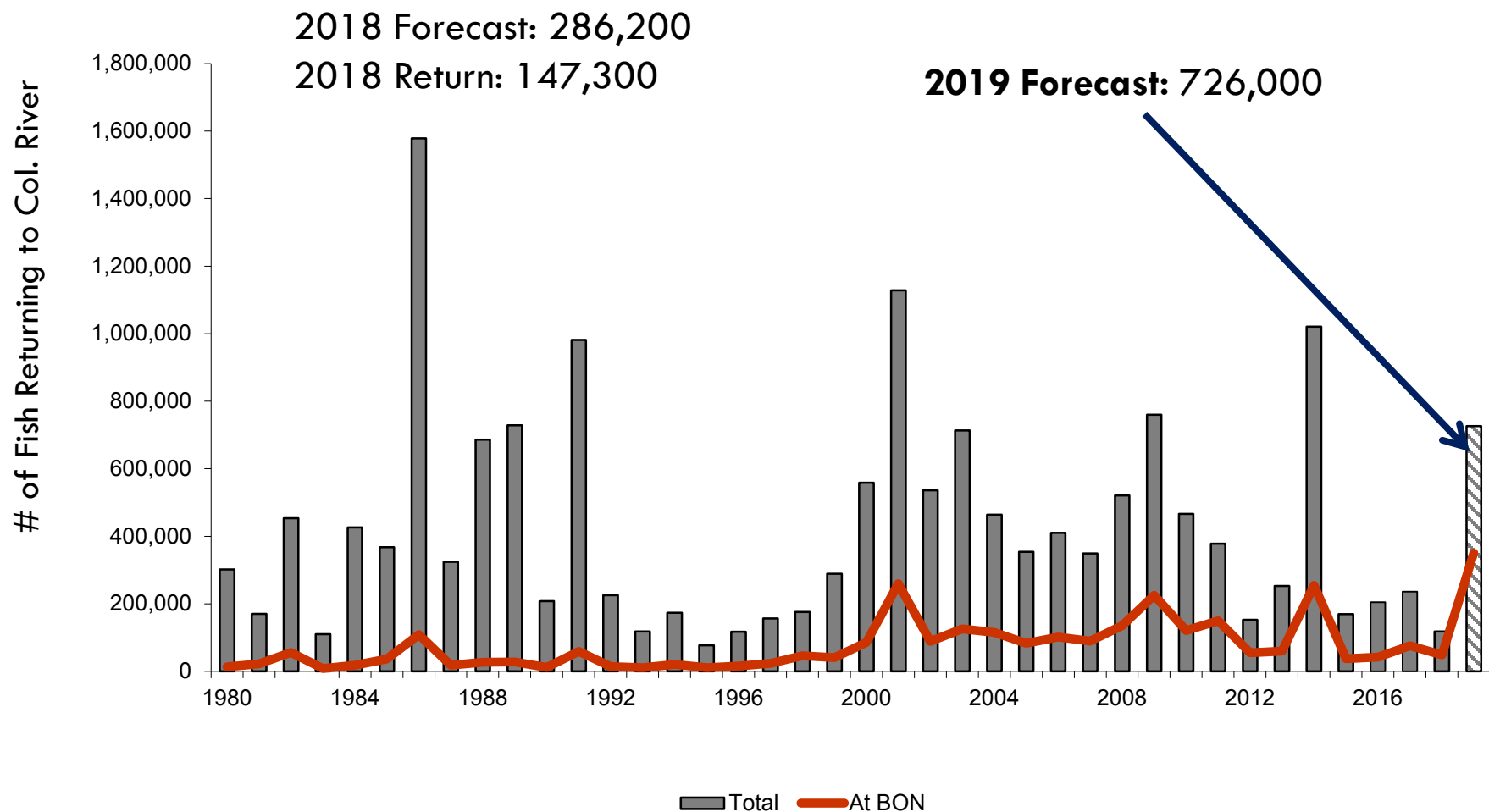
Total # of fish returning to the mouth of the Columbia River



Columbia River Coho



12

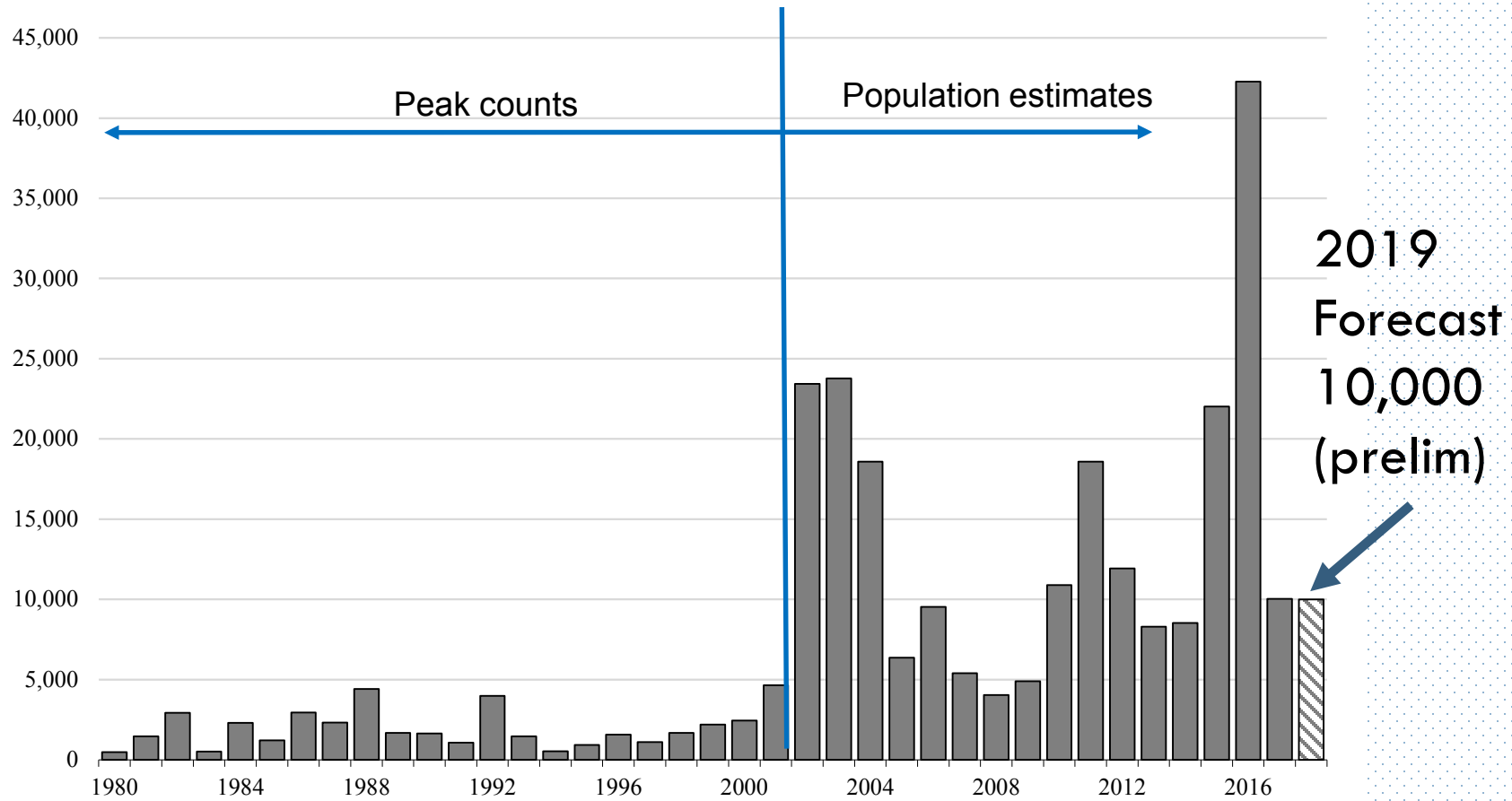


Columbia River Chum



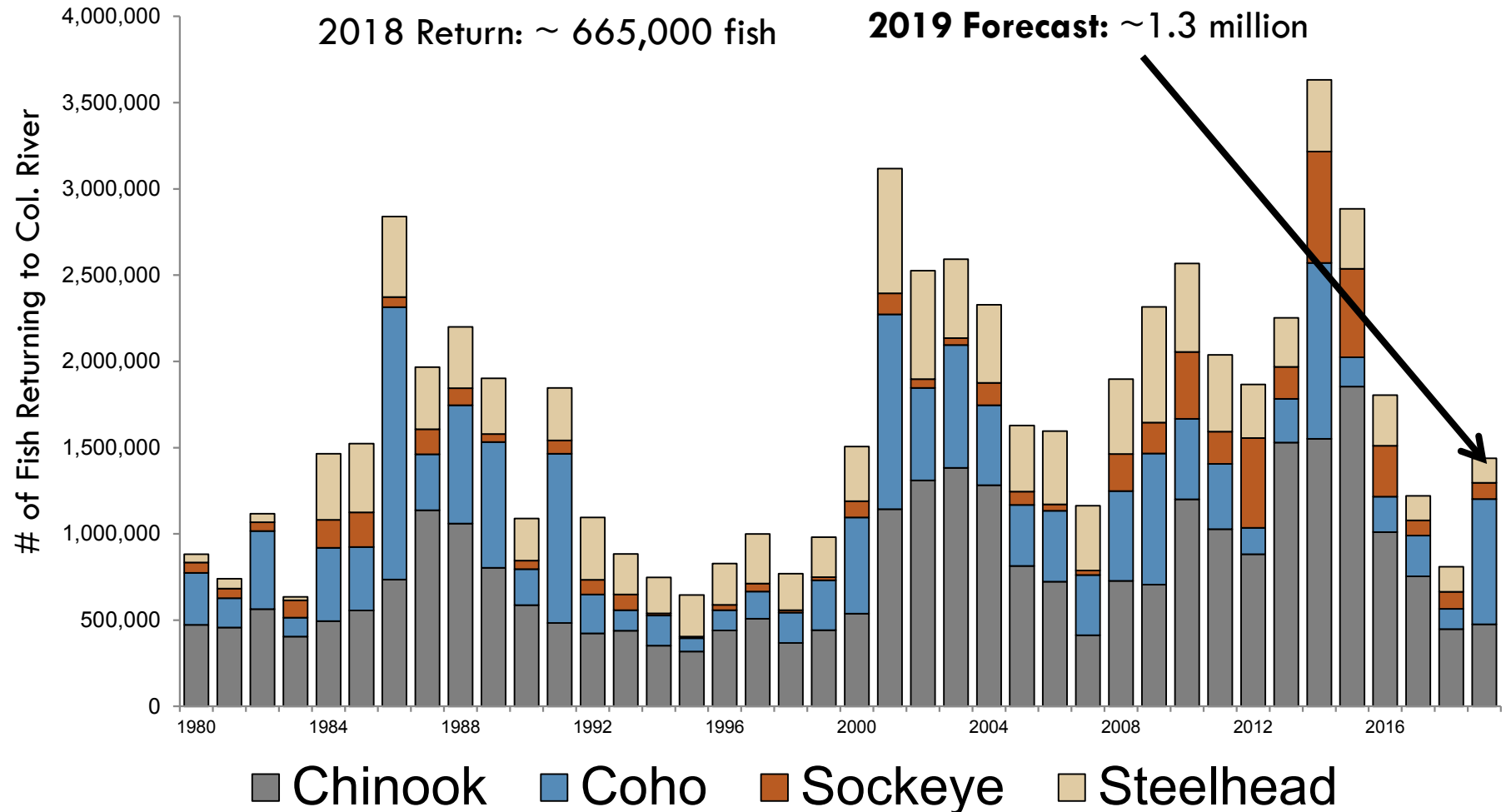
13

of Fish Returning to Col. River



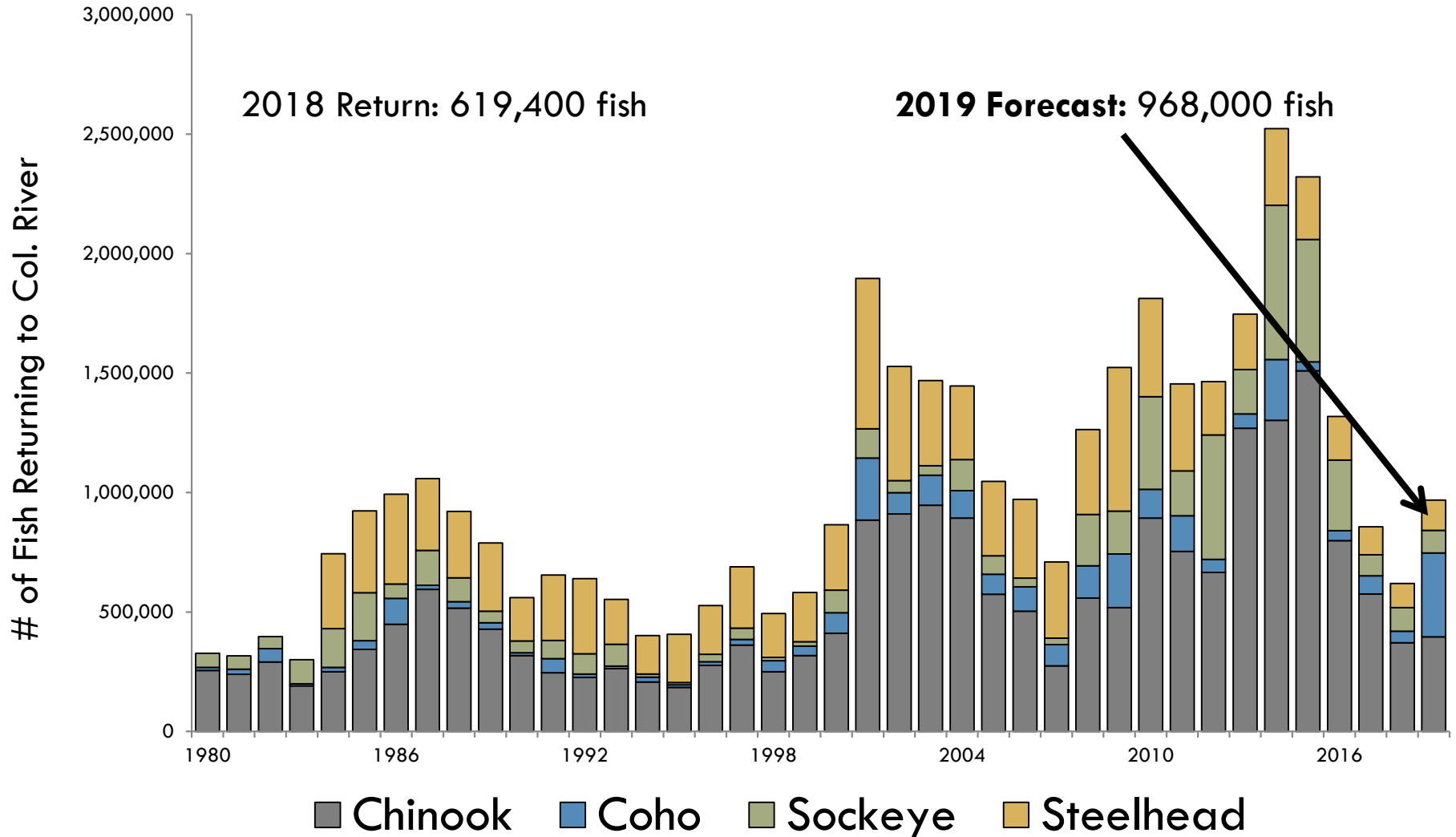
TOTAL Return of Salmonids to the Columbia River

14



UPRIVER Salmonids Returning to the Columbia River

15



2018 Fisheries Conservation

16

- ▣ Summer Steelhead return was lowest since 1979 (2017 was 2nd lowest)
 - Decline driven by A-index
- ▣ Co-managers worked together to reduce recreational impact to steelhead
- ▣ Columbia (OR & WA) and Snake (WA)
 - Summer – rolling closures due to Chinook run-size downgrade
 - Fall – rolling closures due to Chinook and steelhead run-size downgrades

2018 Non-Indian Sport Fisheries

17

▣ Spring Chinook

- Below Bonneville:
 - 90,000 angler trips
 - 7500 hatchery fish kept
- Bonneville to WA/OR border:
 - 600 hatchery fish kept
- Snake River (WA waters):
 - 740 hatchery fish kept

▣ Summer Season

- Below Bonneville:
 - 27,500 angler trips
 - 1000 hatchery Chinook
 - 2,400 hatchery steelhead (May-June)
 - 400 sockeye
- Bonneville - Priest Rapids:
 - 430 hatchery Chinook
 - 100 sockeye
- Priest Rapids – Chief Joseph:
 - 3,000 hatchery Chinook
 - 16,100 sockeye

▣ Fall Season

- Buoy 10:
 - 67,300 angler trips
 - 11,600 Chinook kept
 - 6,800 hatchery coho kept
- Below Bonneville:
 - 69,600 angler trips
 - 9,800 Chinook kept
 - 650 hatchery coho kept
 - 1,100 hatchery steelhead kept
- Hanford Reach:
 - 20,100 angler trips
 - 6,700 Chinook kept

2018 Non-Indian Commercial Fisheries

18



MAINSTEM FISHERIES

- ▣ Spring Season – Closed
- ▣ Summer Season – Closed
- ▣ Fall Season –
 - 8,300 Chinook
 - 380 Coho

SELECT AREA FISHERIES (SAFE)

- ▣ Spring Season
 - 8,700 Chinook
- ▣ Summer Season
 - 2,200 Chinook
- ▣ Fall Season
 - 15,000 Fall Chinook
 - 12,500 Coho

2018 Treaty Indian Fisheries

19



- ▣ Spring Chinook –
 - 10,900 fish
- ▣ Summer Chinook –
 - 9,300 fish
- ▣ Sockeye –
 - 5,400 fish
- ▣ Summer Steelhead –
 - 1,200 in spring/summer
 - 5,000 in fall
 - 6,200 TOTAL
- ▣ Fall Chinook –
 - 49,800
- ▣ Coho –
 - 3,600

Landed fish include those kept for ceremonial & subsistence (C&S) purposes, or sold commercially.

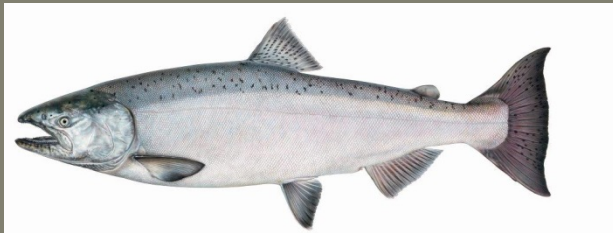
Questions?

20



SNAKE RIVER SALMON AND STEELHEAD RETURNS

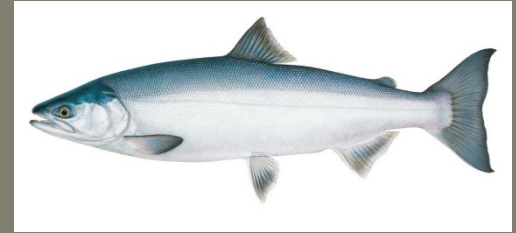
Natural-origin and Hatchery-origin



Spring/Summer Chinook
Fall Chinook



Summer Steelhead



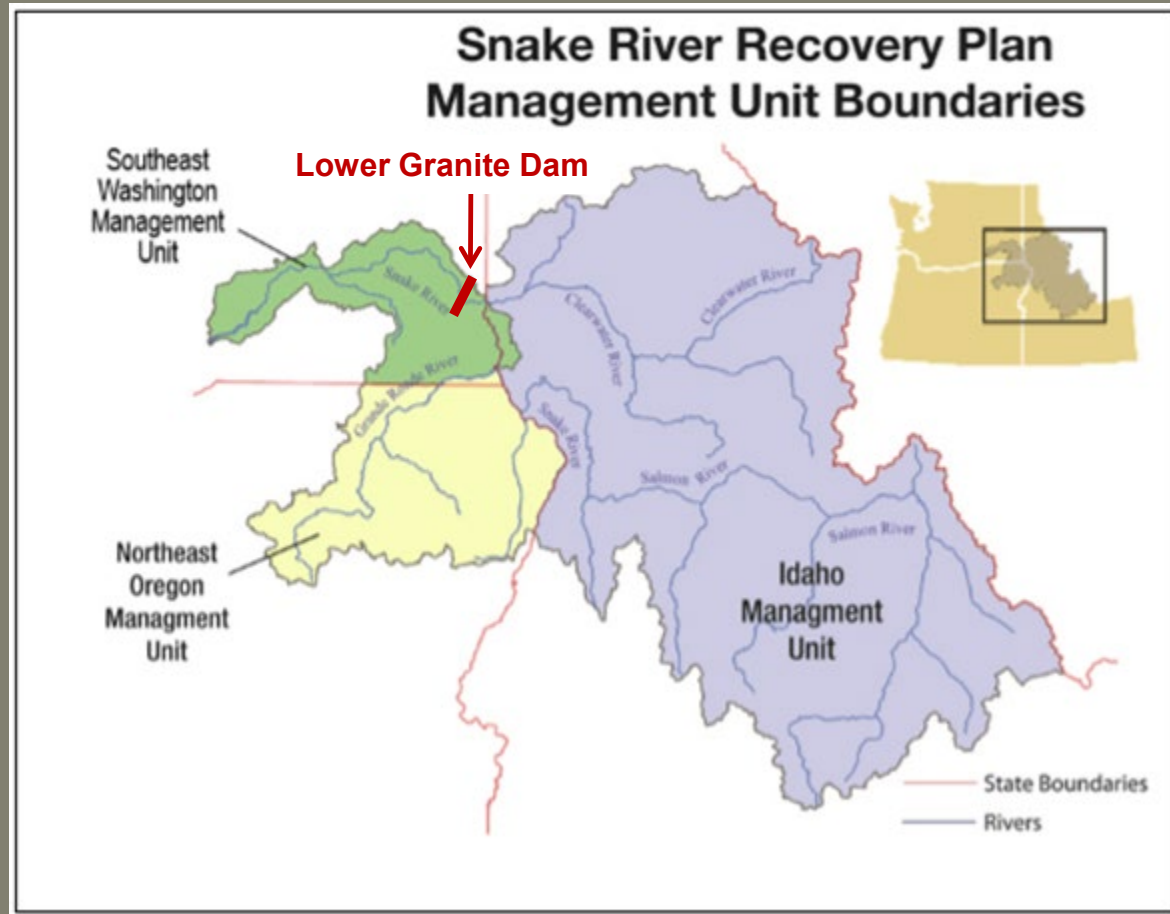
Sockeye

NPCC – March 2019

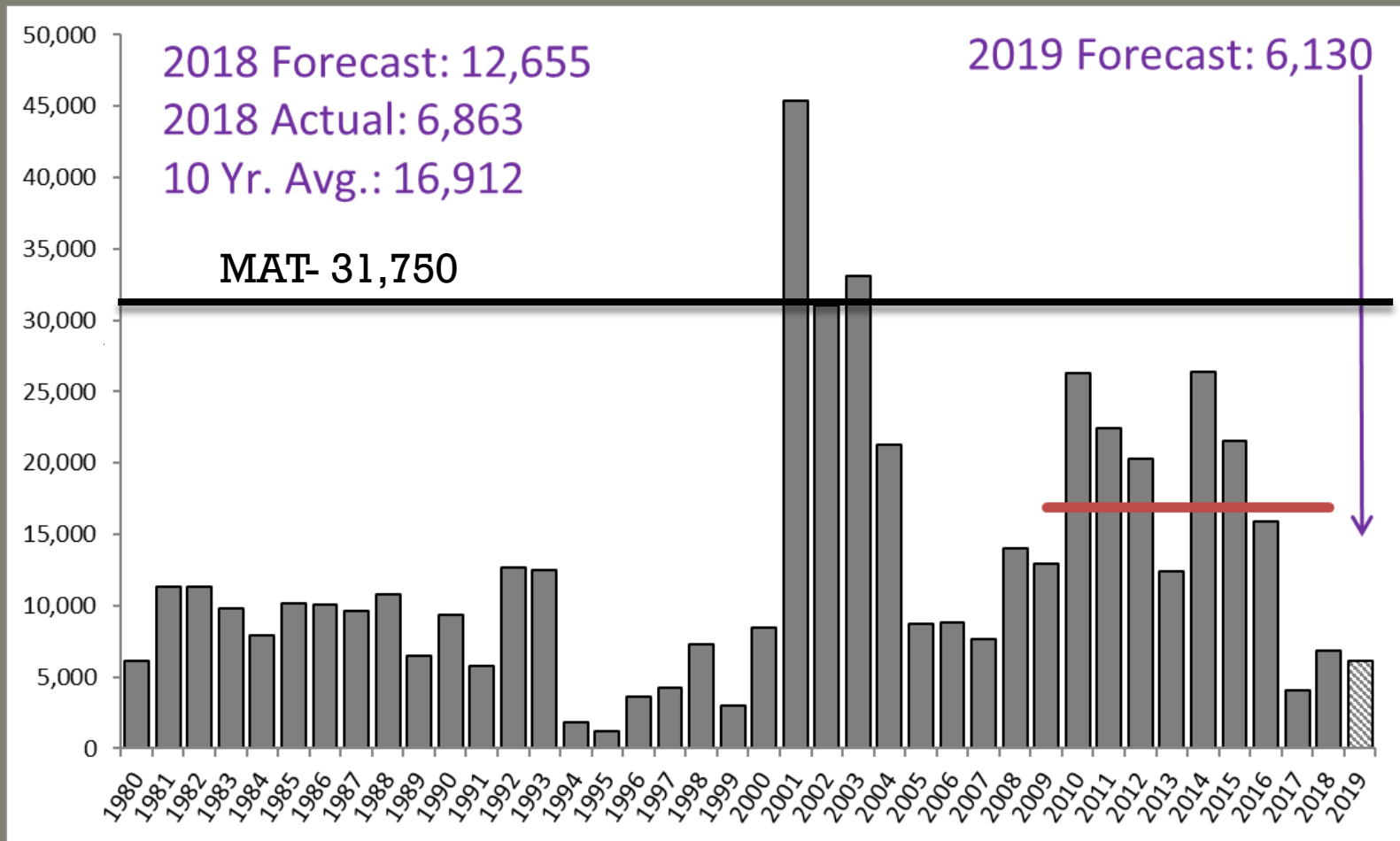
Presented by: Idaho Department of Fish and Game



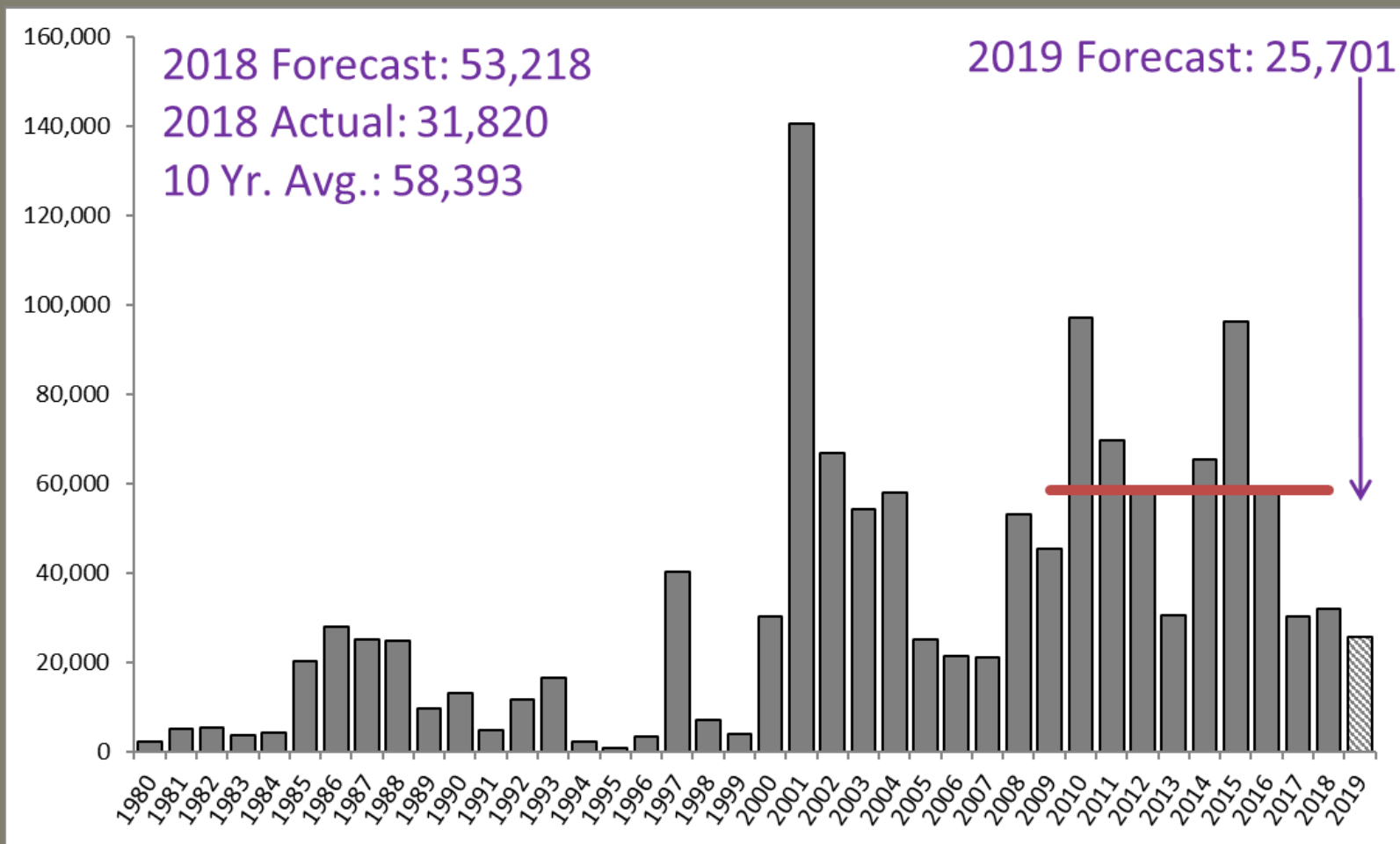
SNAKE RIVER SALMON AND STEELHEAD RETURNS



NATURAL-ORIGIN SPRING/SUMMER CHINOOK

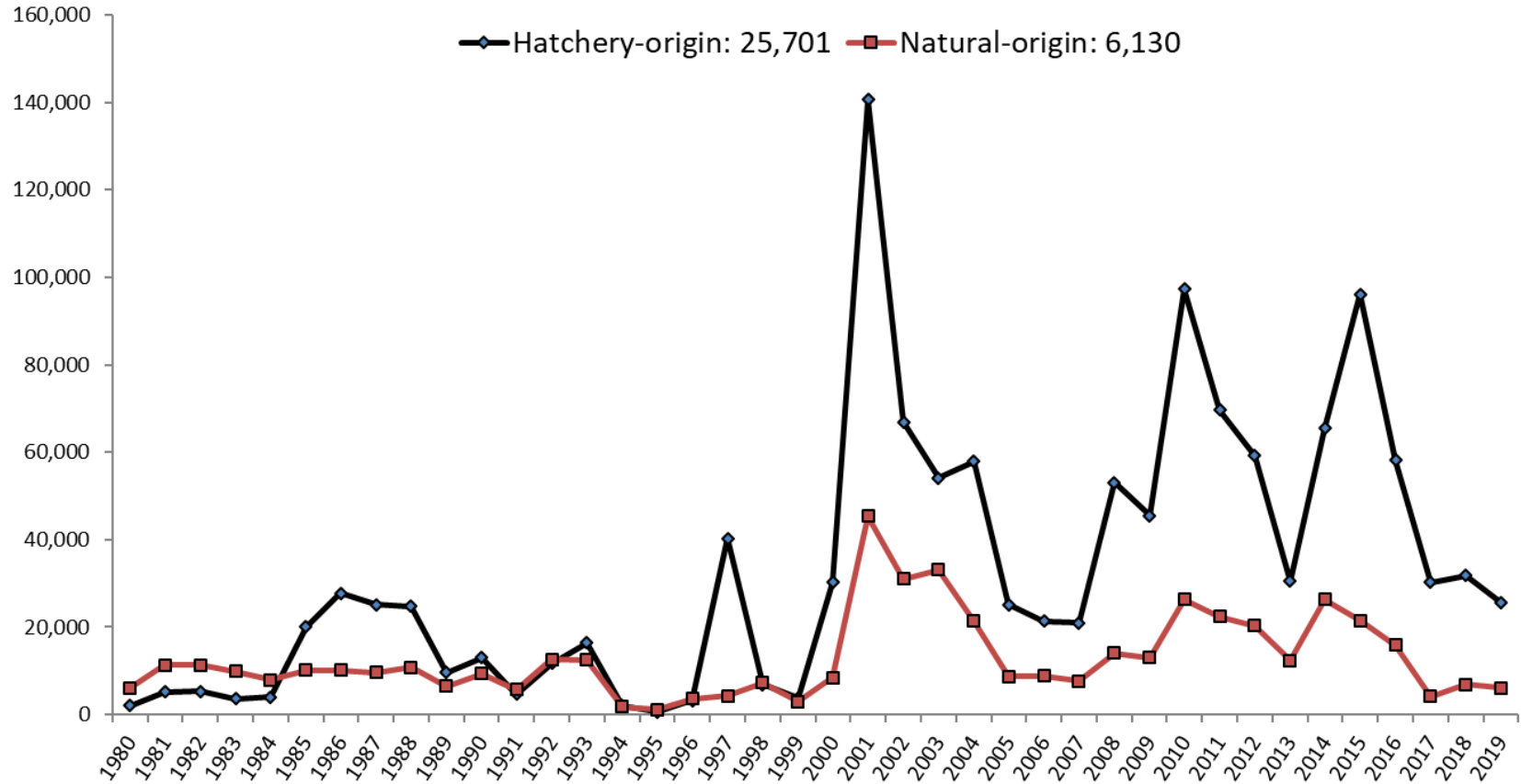


HATCHERY-ORIGIN SPRING/SUMMER CHINOOK

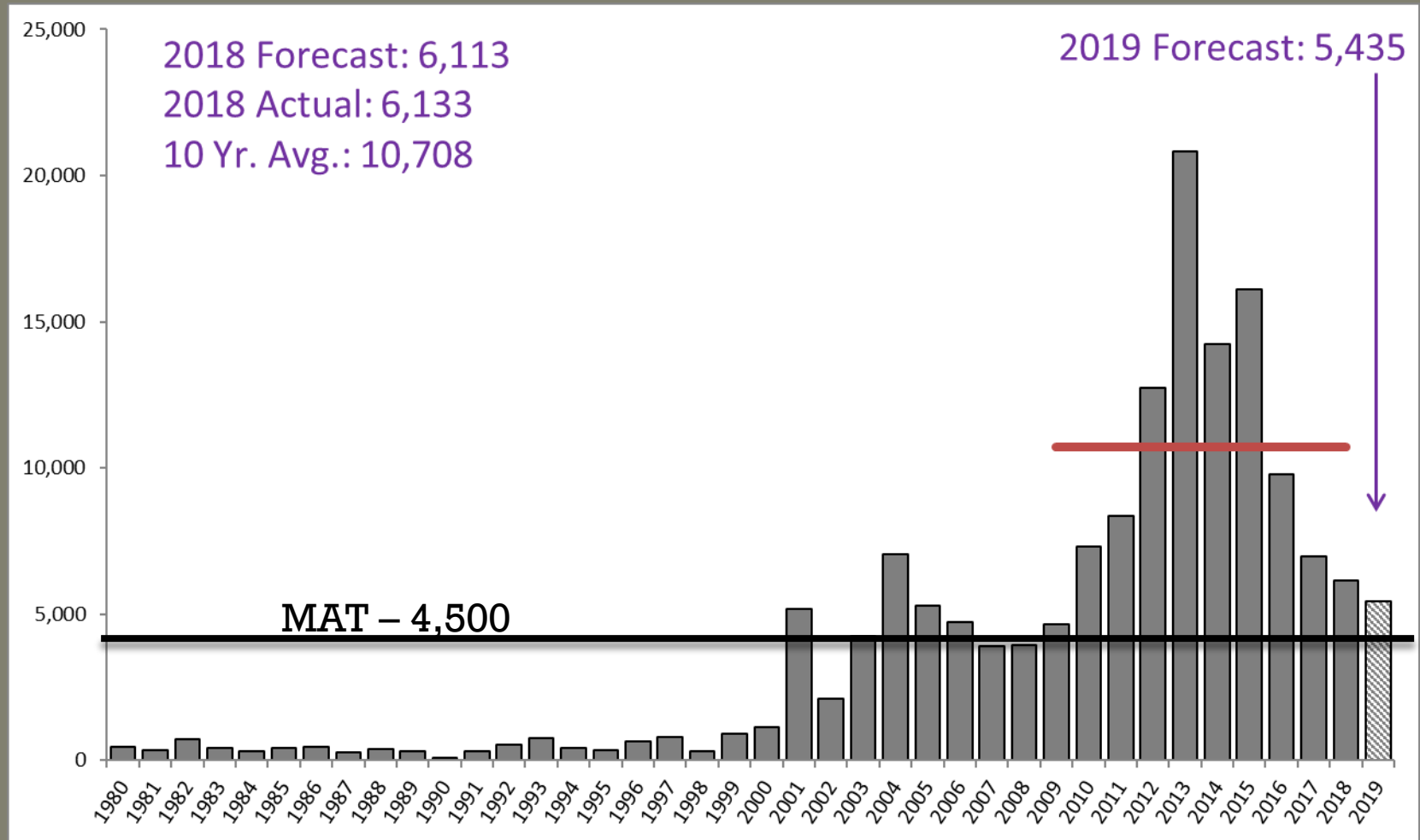


COMBINED NATURAL- AND HATCHERY-ORIGIN SPRING/SUMMER CHINOOK

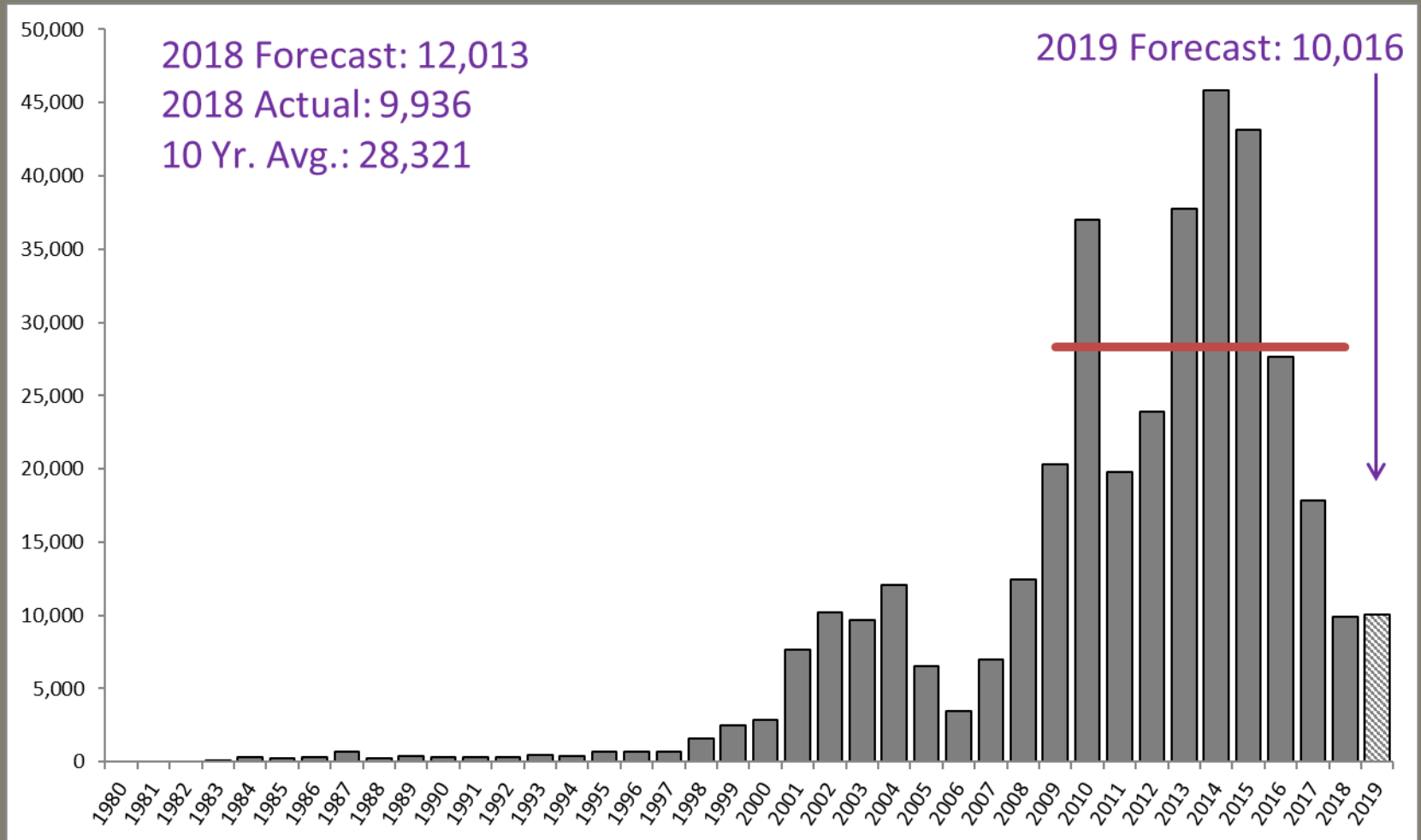
Snake River 2019 Spring/Summer Chinook Forecast



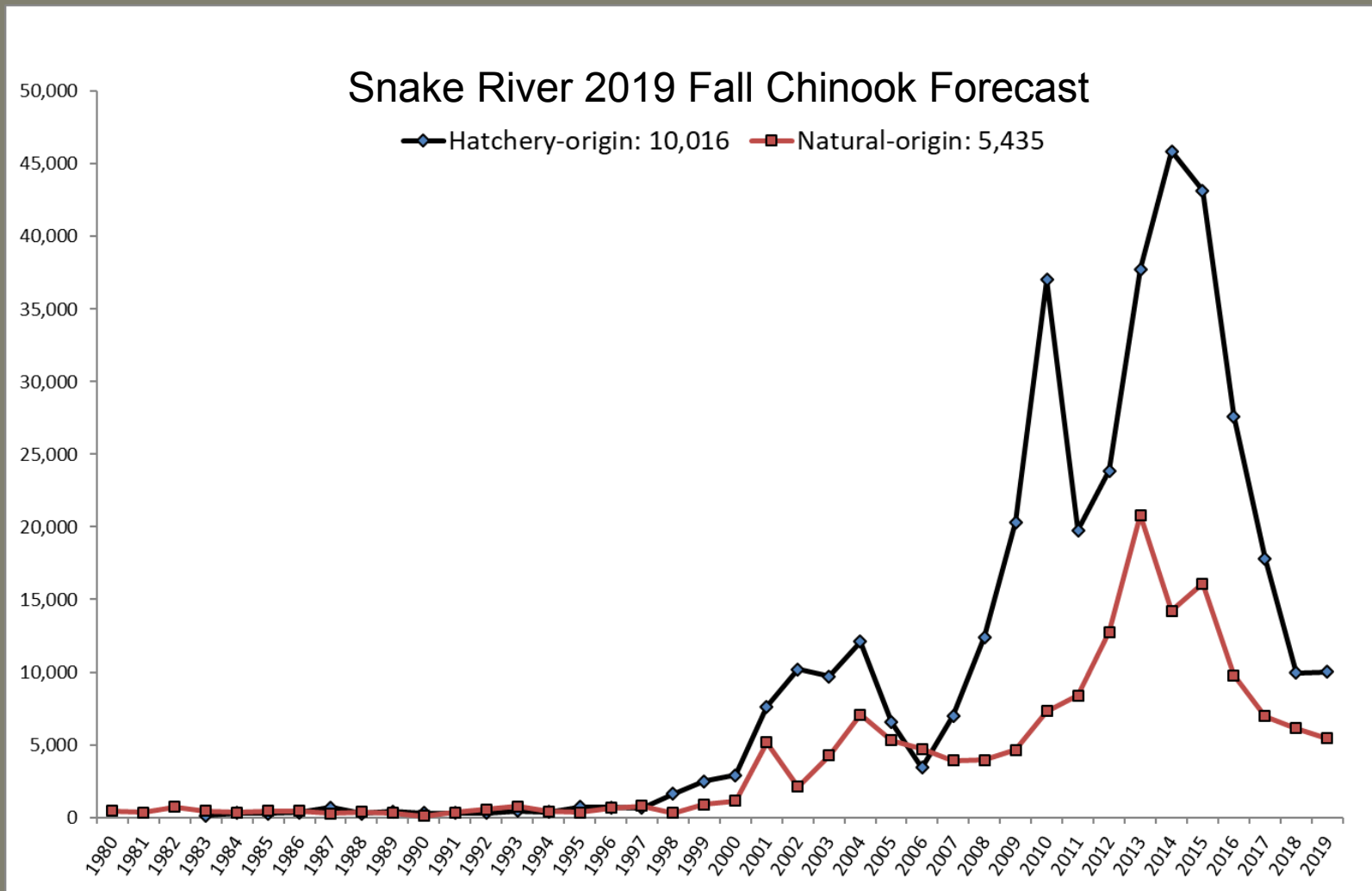
NATURAL-ORIGIN FALL CHINOOK



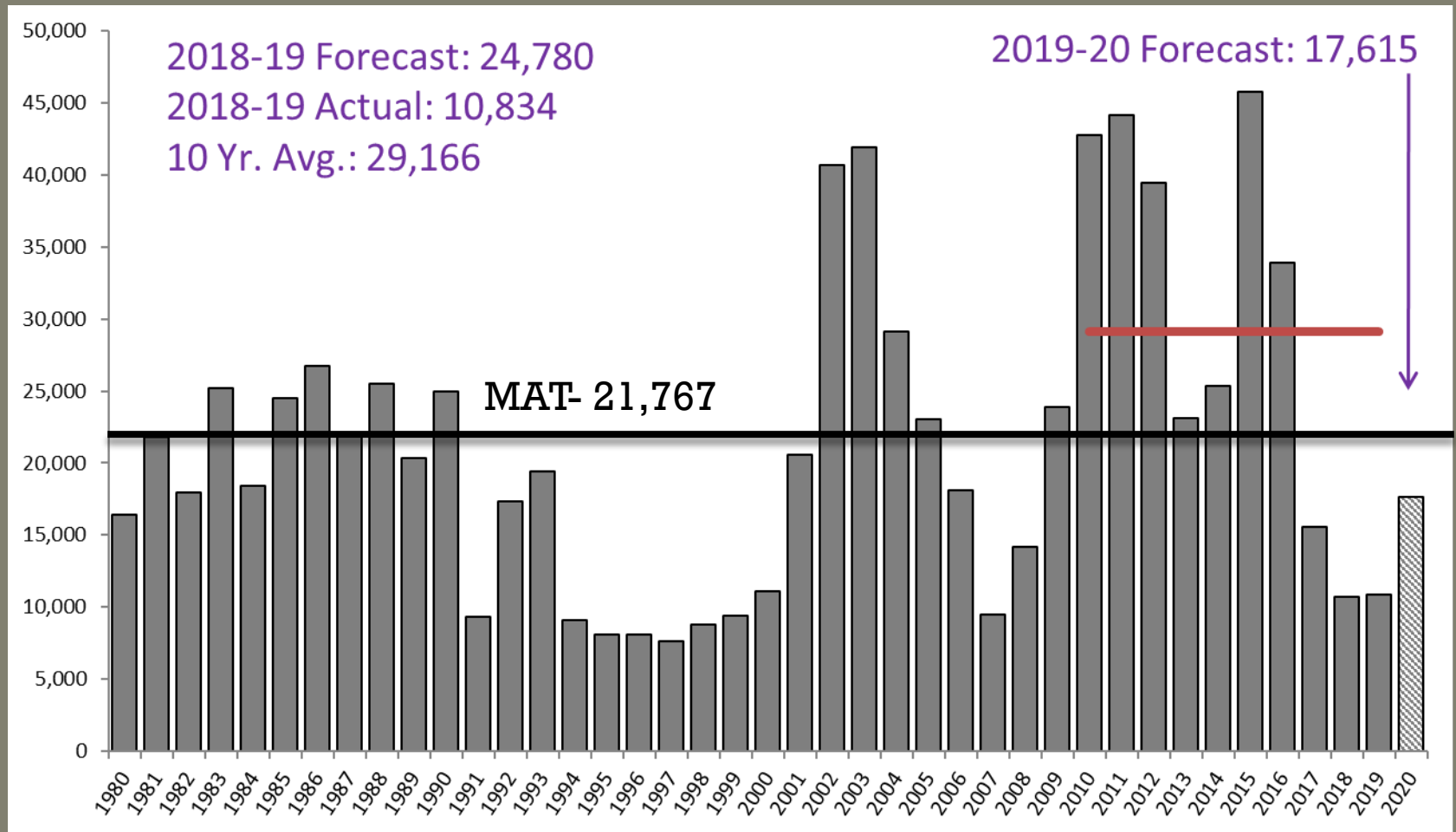
HATCHERY-ORIGIN FALL CHINOOK



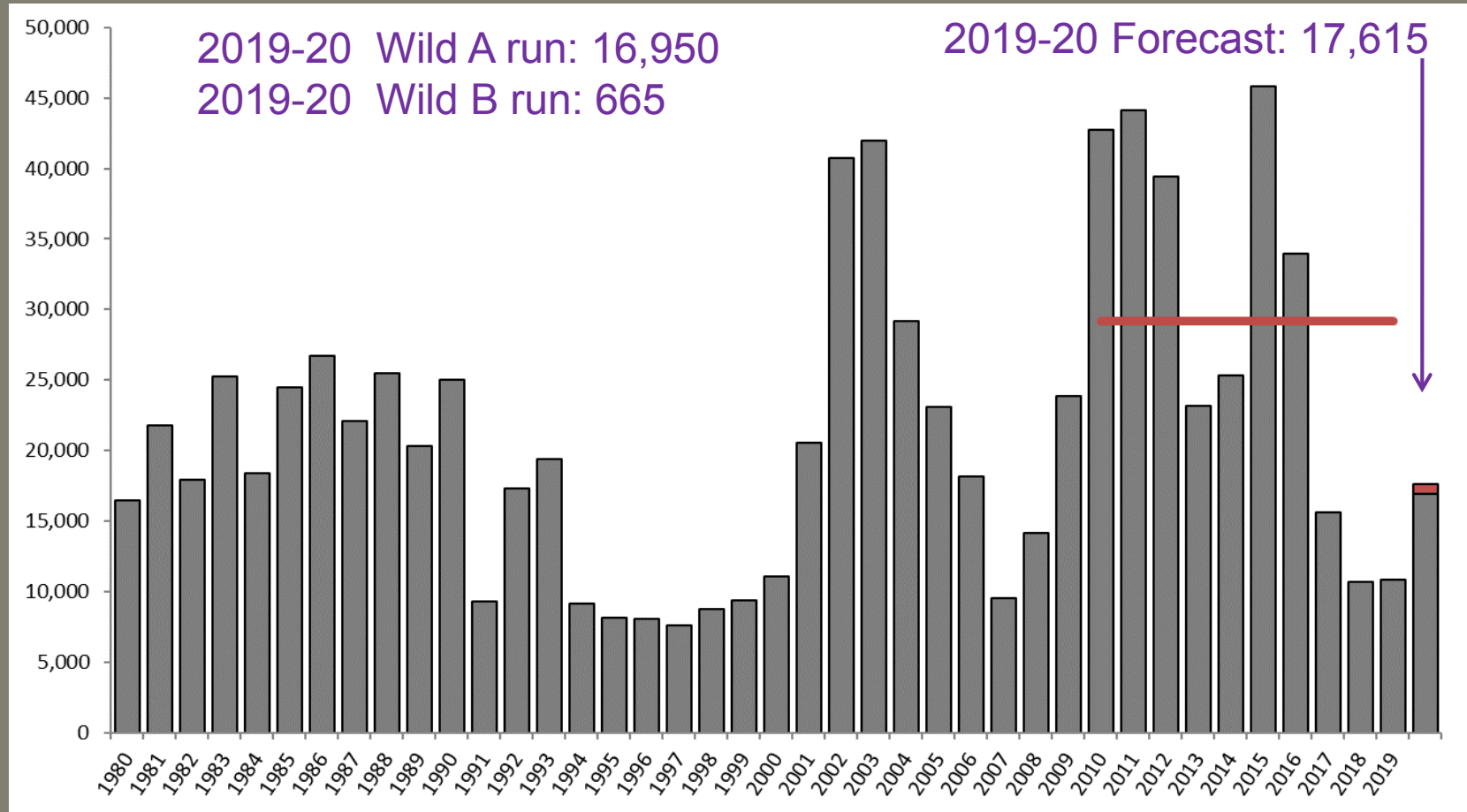
COMBINED NATURAL- AND HATCHERY-ORIGIN FALL CHINOOK



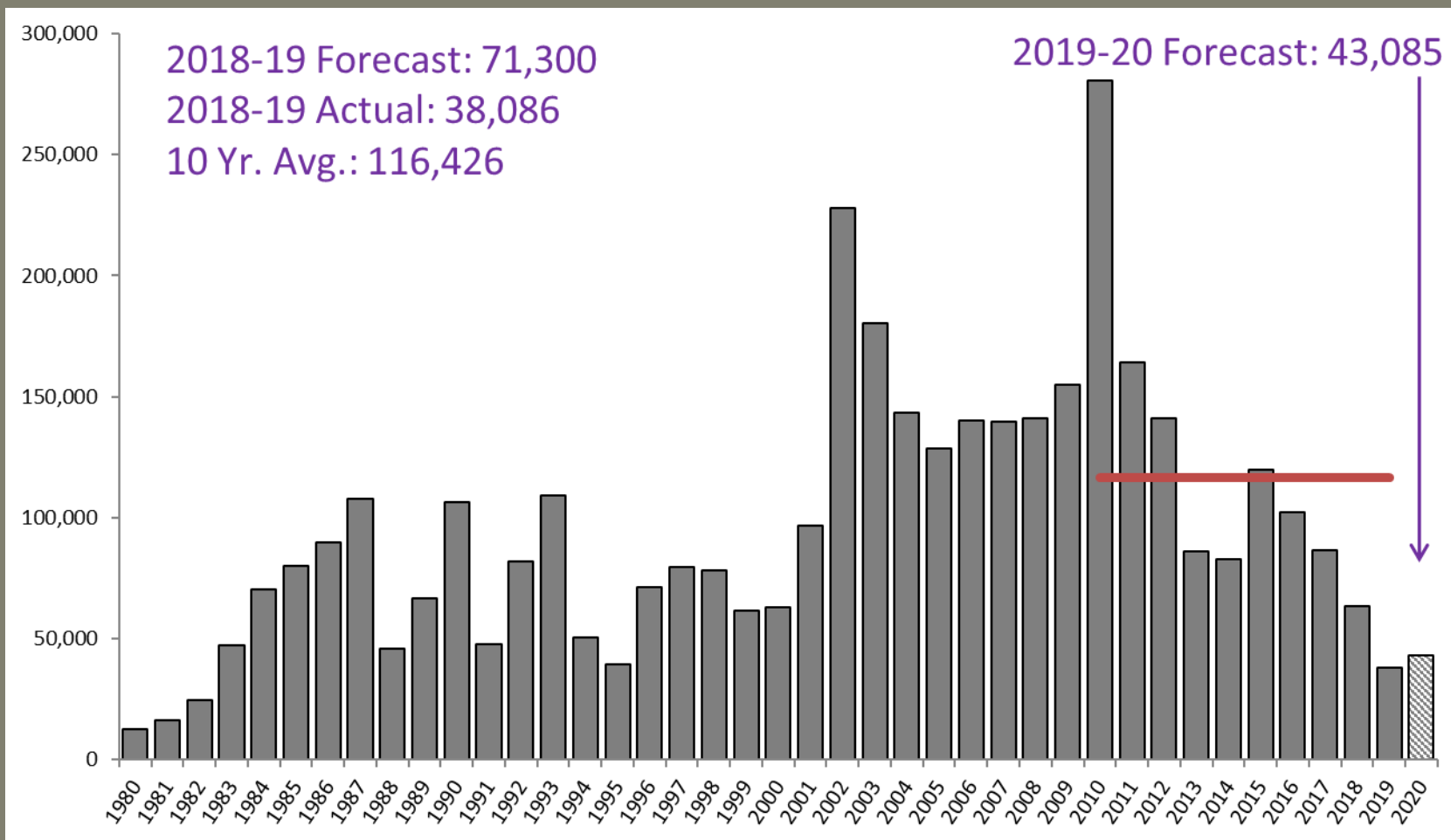
NATURAL-ORIGIN SUMMER STEELHEAD



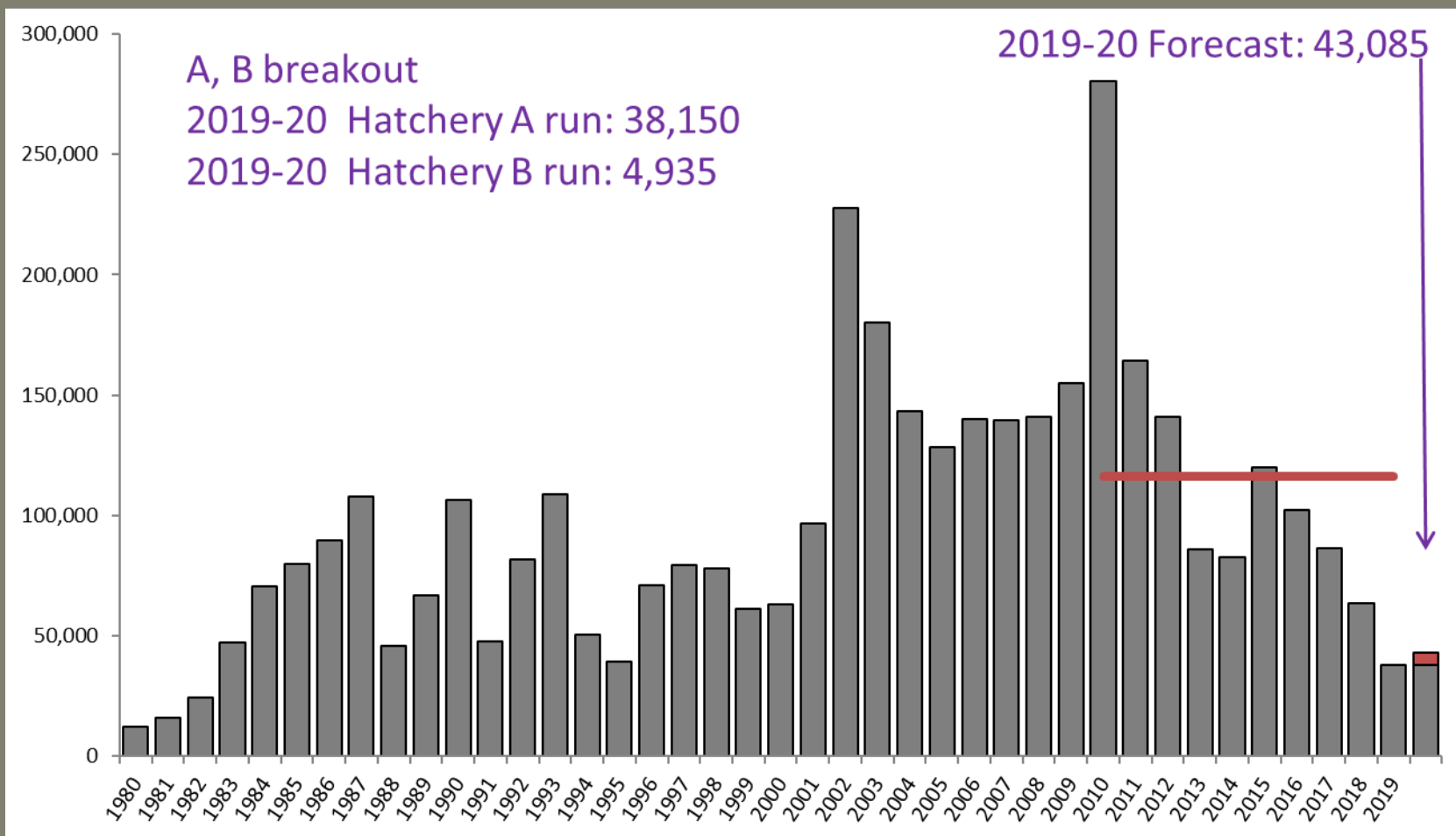
NATURAL-ORIGIN SUMMER STEELHEAD



HATCHERY-ORIGIN SUMMER STEELHEAD

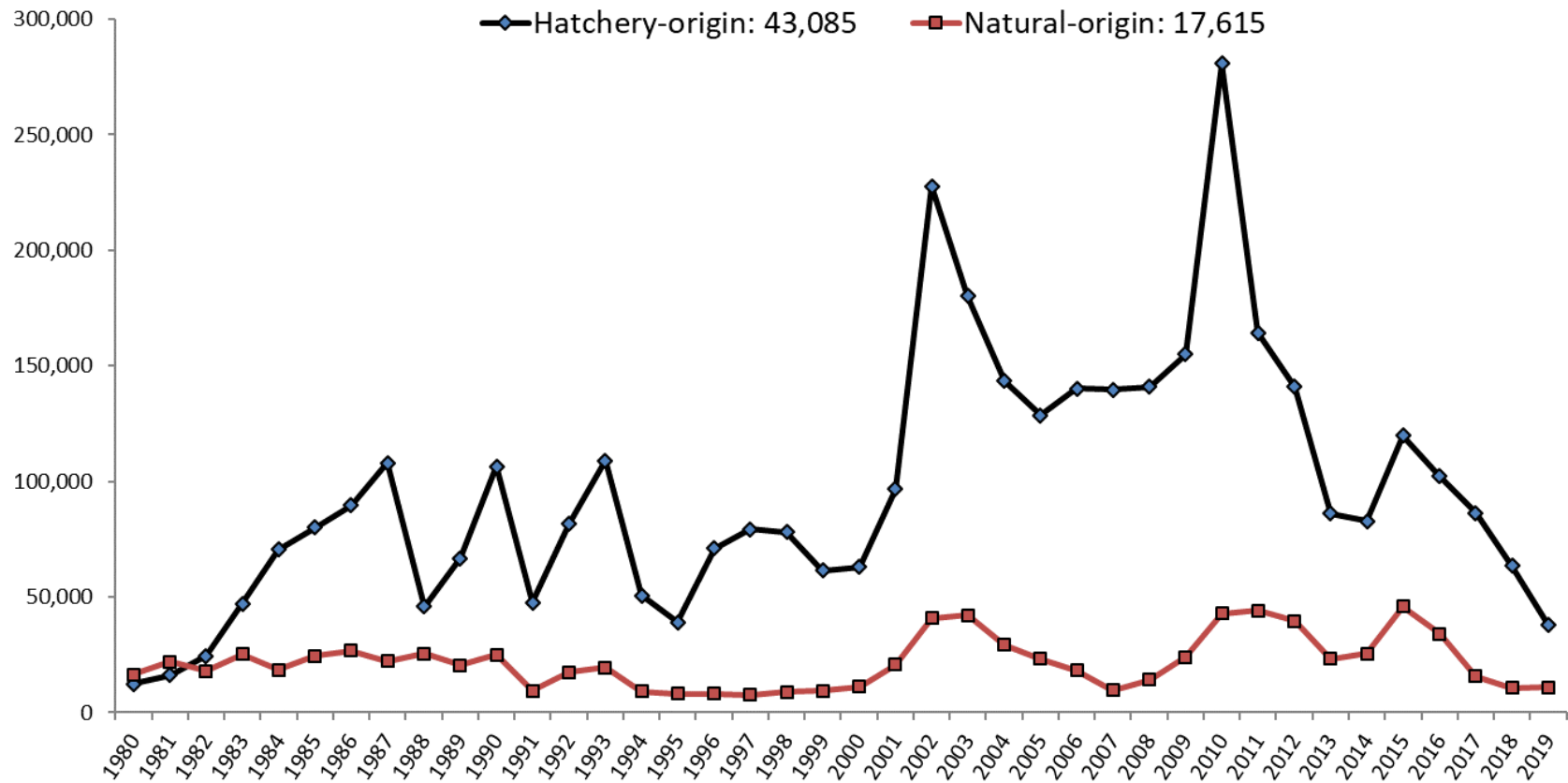


HATCHERY-ORIGIN SUMMER STEELHEAD

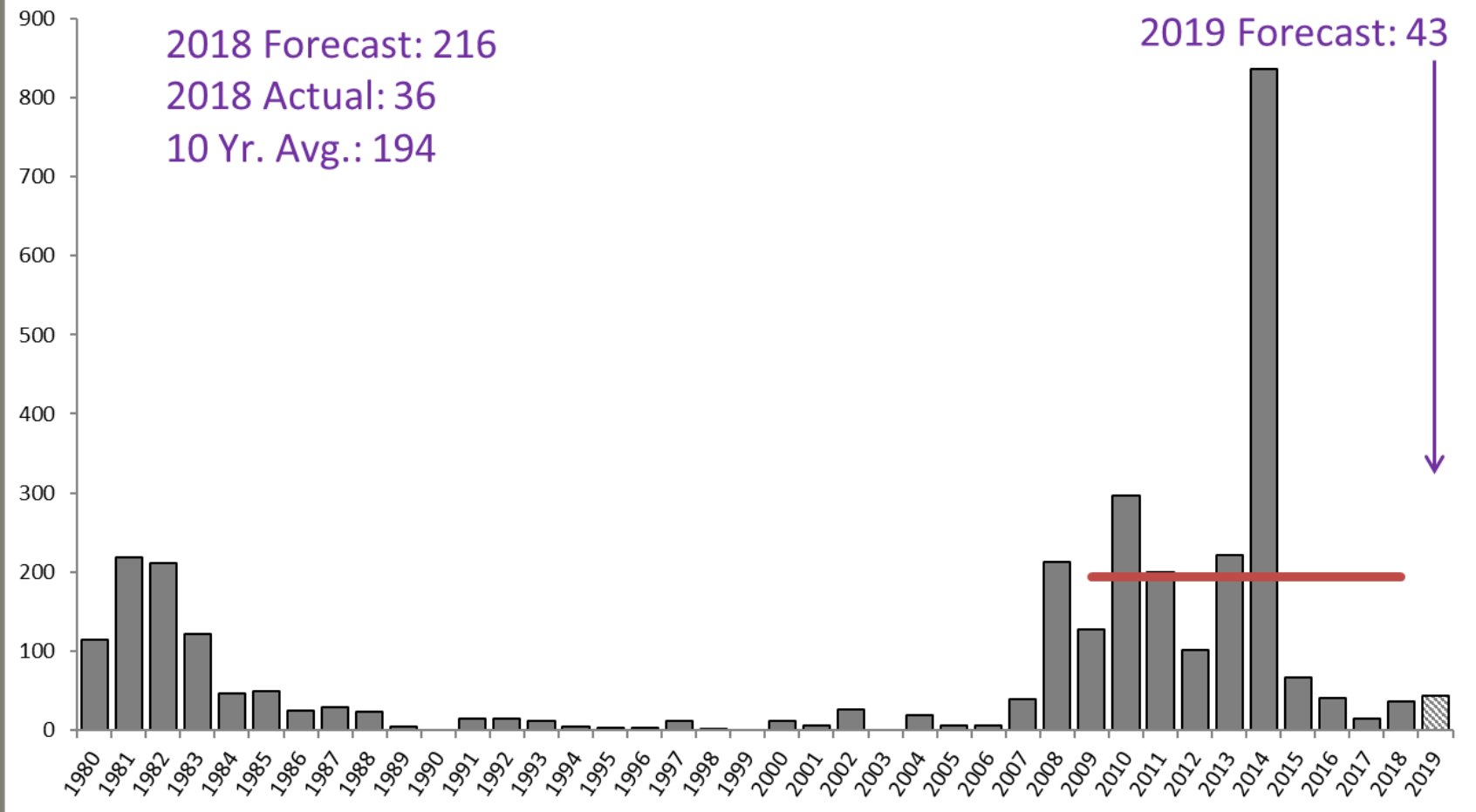


COMBINED NATURAL- AND HATCHERY-ORIGIN SUMMER STEELHEAD

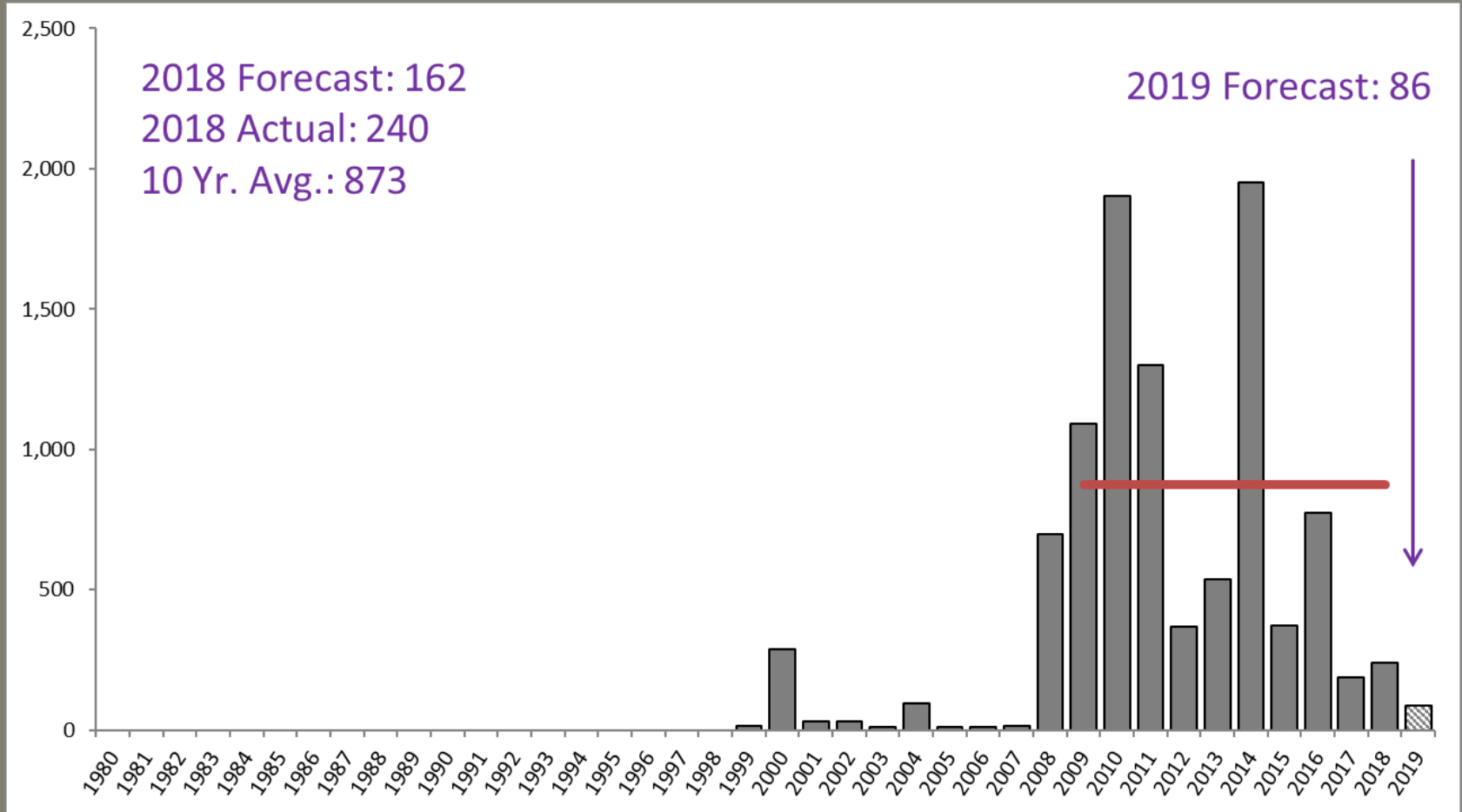
Snake River 2019-2020 Summer Steelhead Forecast



NATURAL-ORIGIN SOCKEYE



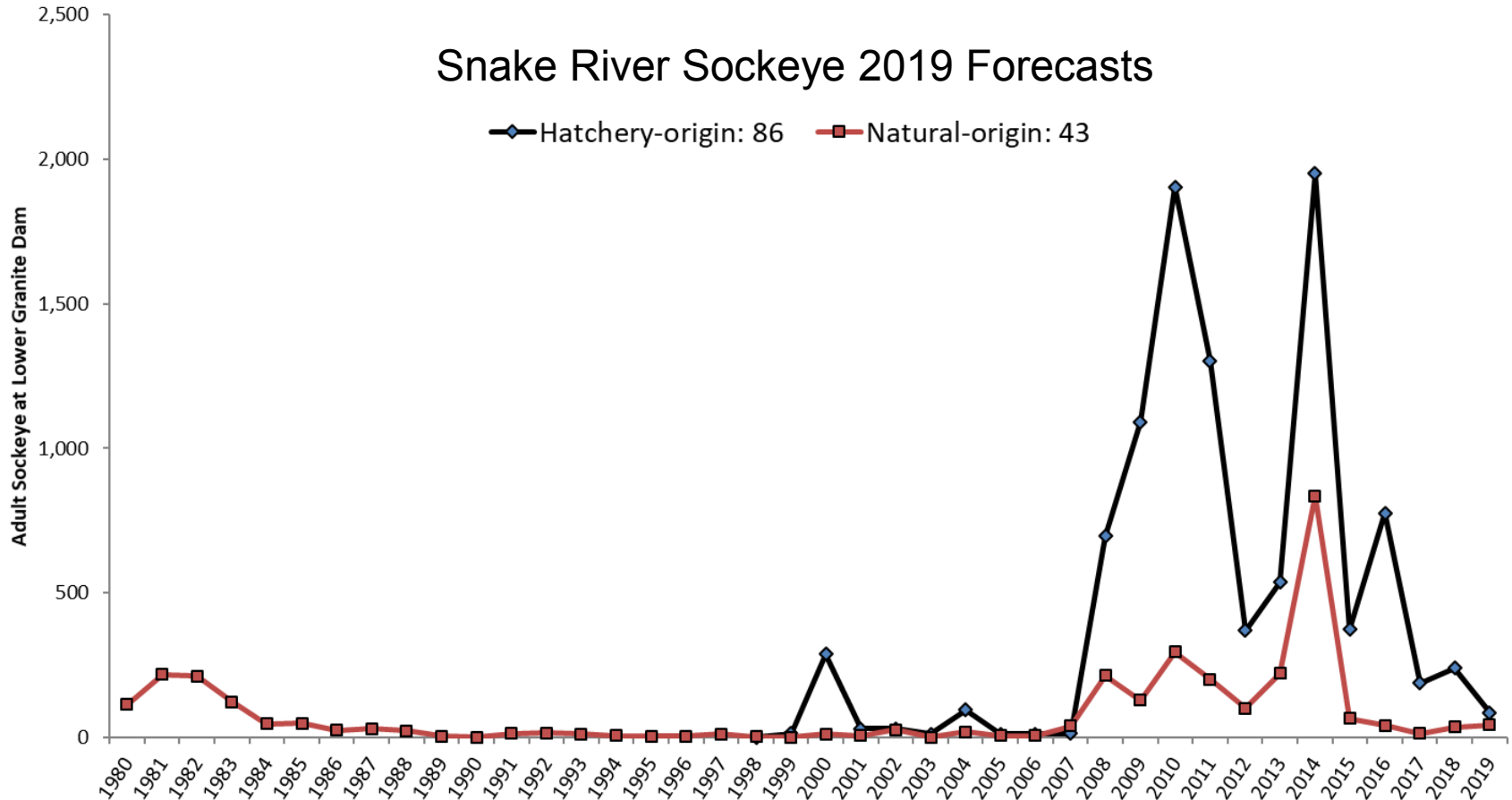
HATCHERY-ORIGIN SOCKEYE



COMBINED NATURAL- AND HATCHERY-ORIGIN SOCKEYE

Snake River Sockeye 2019 Forecasts

◆ Hatchery-origin: 86 ■ Natural-origin: 43



Recent Ocean Observations and Outlooks for Salmon Returns

*Northwest Power and Conservation Council
March 12th, 2019*



Presenter: Brian Burke
NOAA Fisheries, NWFSC

Supported by:



1. Newport Hydrographic Line

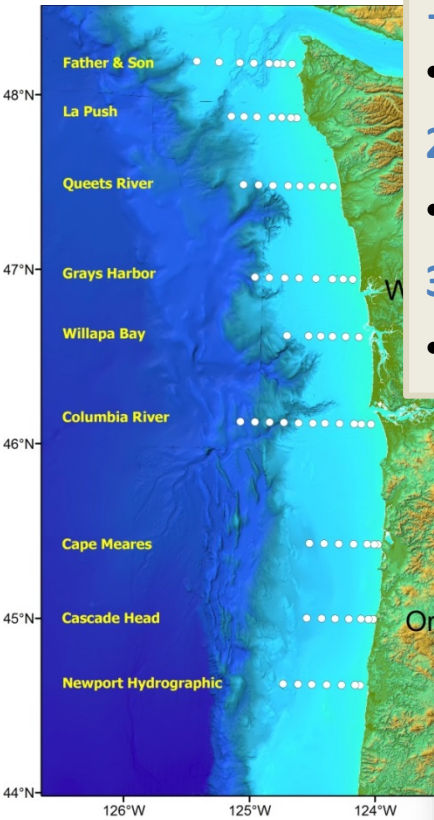
- Sampled biweekly for >20 years (1996 – present)

2. Juvenile Salmon and Ocean Ecosystem Survey (JSOES)

- May and June surveys, starting in 1998

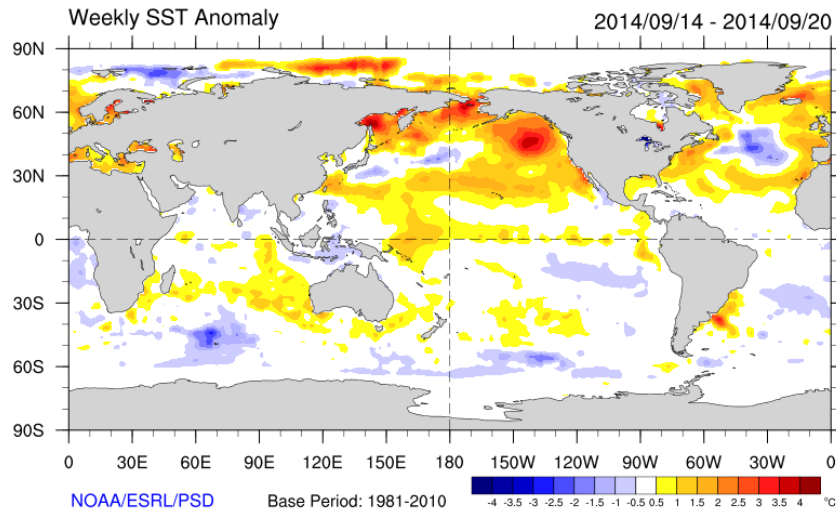
3. Pre-recruit survey

- Night trawls at 30 m depth, 2011, 2013-2018

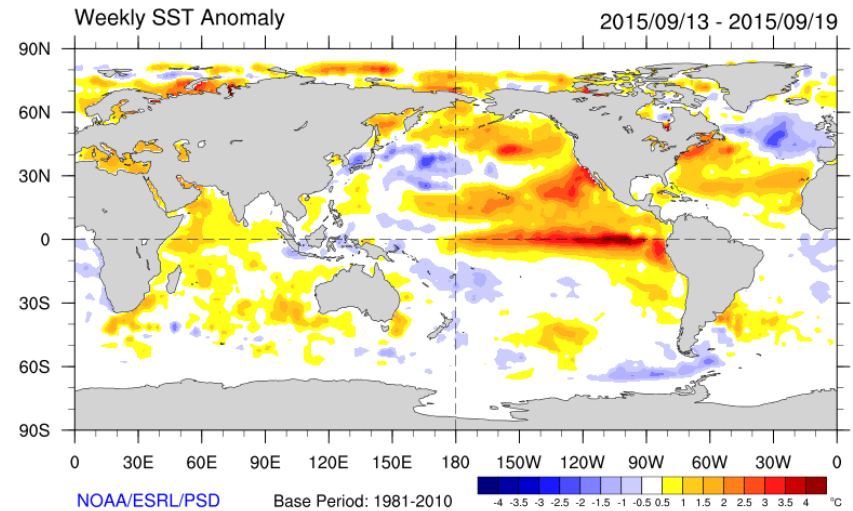


Pacific Basin-Scale Dynamics

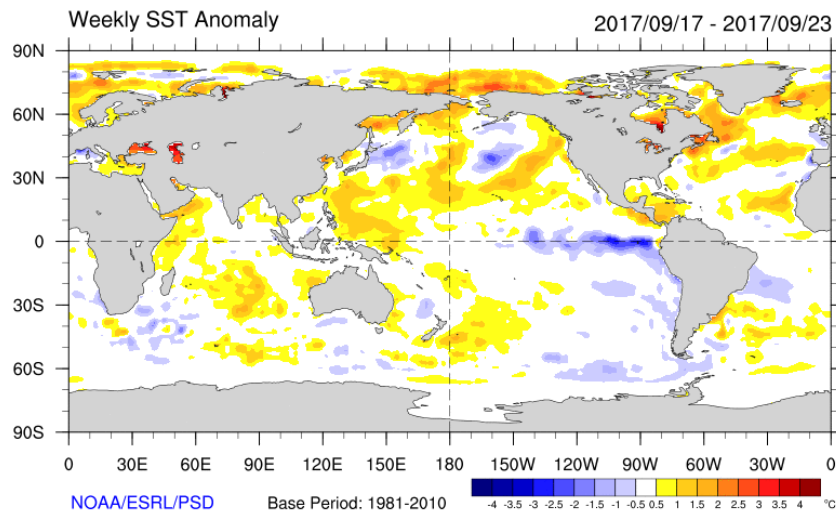
September 2014



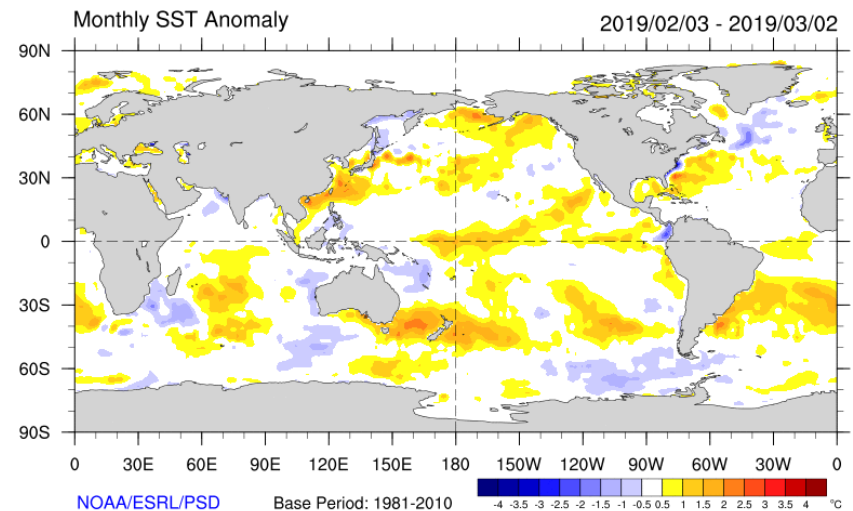
September 2015



September 2017



February 2019



Systemic Biological Response to the Blob

2015

Tropicals
In Oregon



Species
range
extensions
from CA to
AK



Dramatic changes
to food webs

Domoic acid closes
crab and clam
fisheries AK-CA



Young
Chinook &
coho in ocean
very skinny



2016

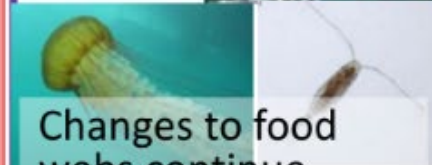


Red pelagic
crabs in
Oregon!

Anchovies
invade the
Salish Sea



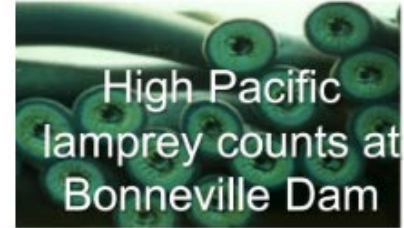
Changes to food
webs continue



Crab and clam
fishery closures

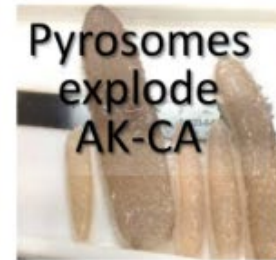


2017



High Pacific
lamprey counts at
Bonneville Dam

Pyrosomes
explode
AK-CA



Swordfish off
Vancouver

Extremely low
Pacific cod
abundance in
Gulf of Alaska

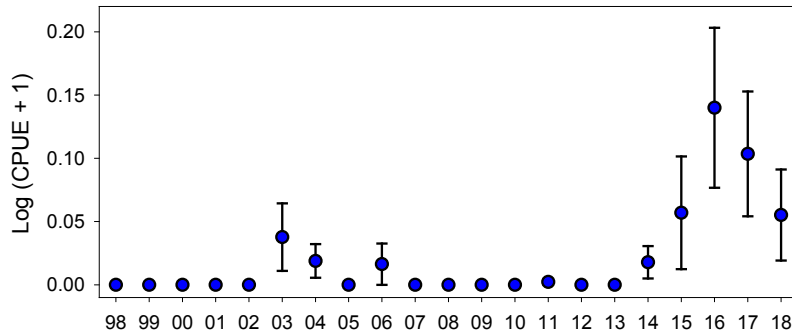


Crab and clam
fishery closures

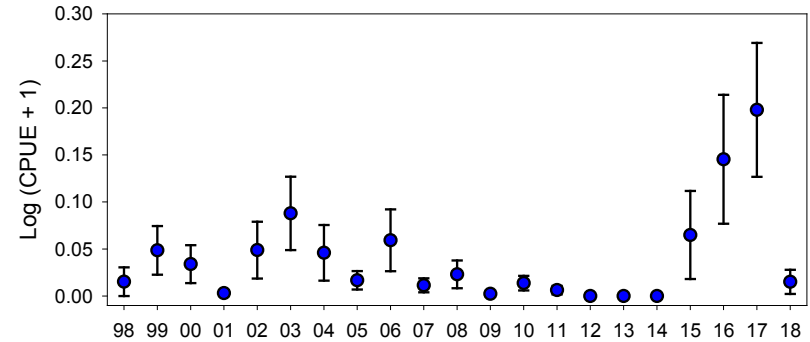


Systemic Biological Response to the Blob

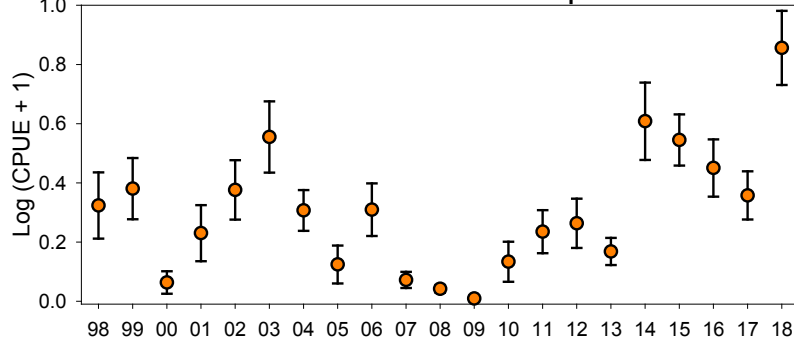
Pacific Pompano



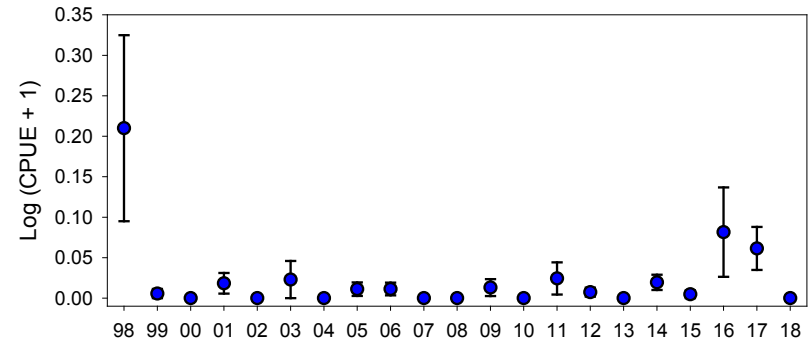
Jack Mackerel



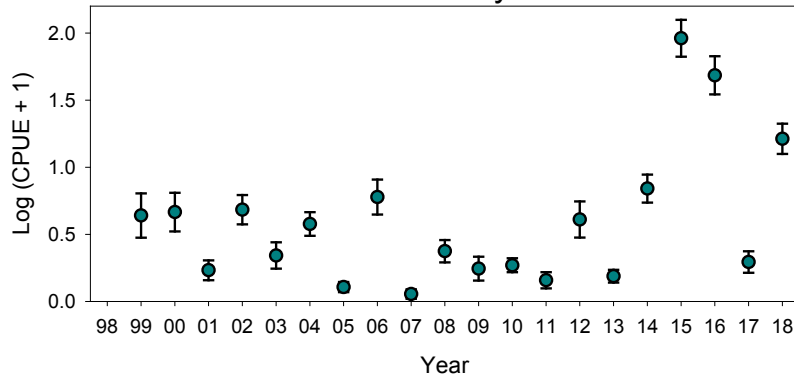
California Market Squid



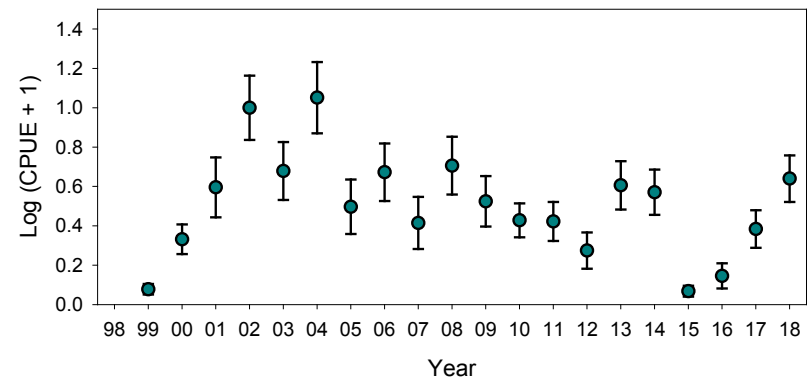
Pacific Chub Mackerel



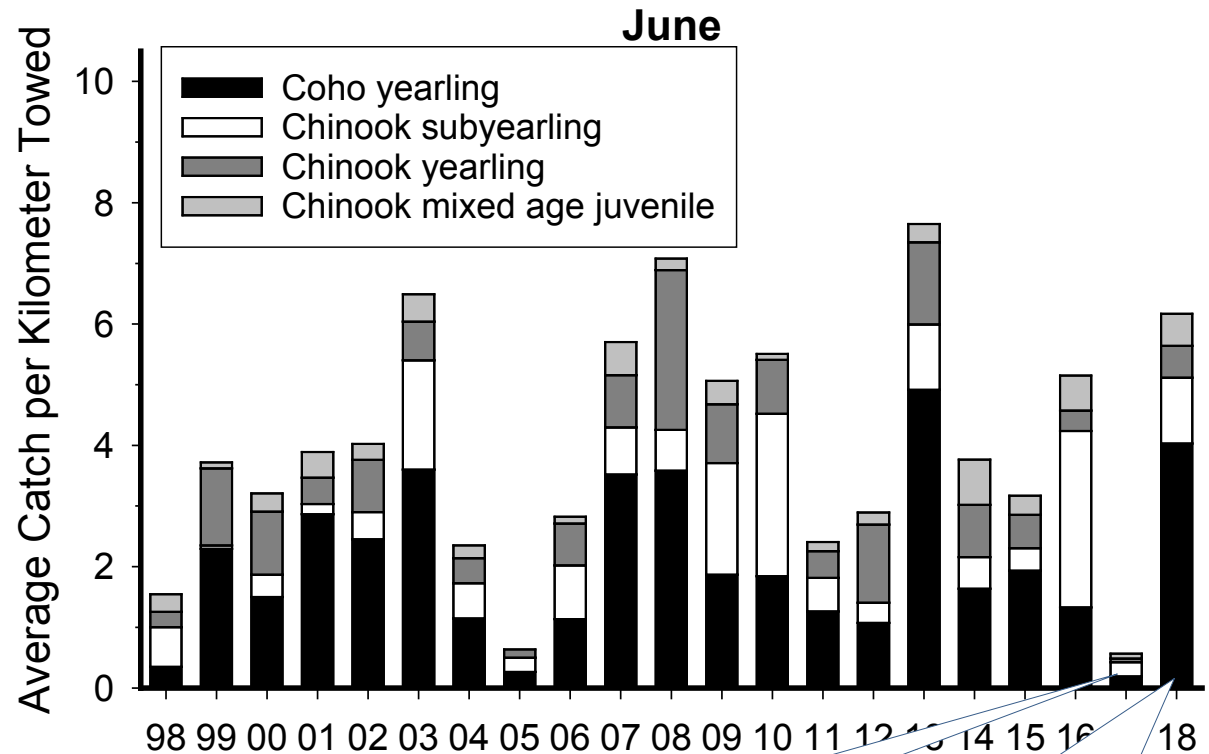
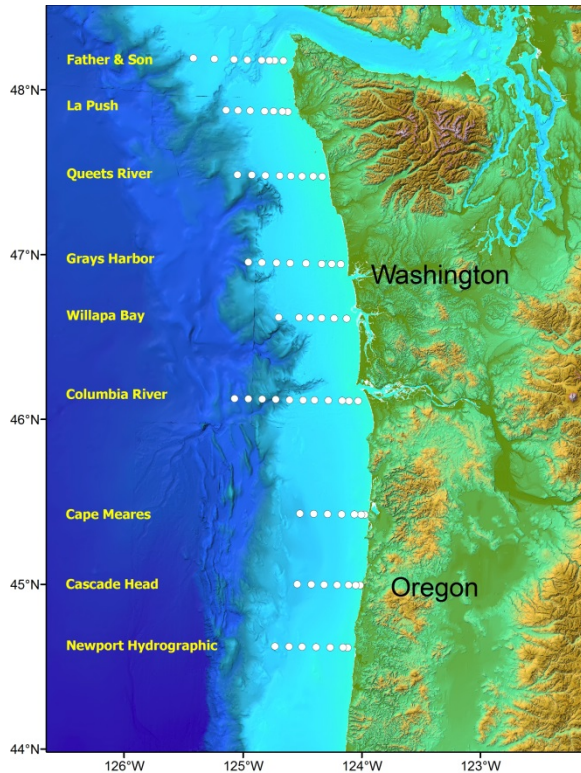
Water Jelly



Sea Nettle



Improved Salmon Catch in 2018



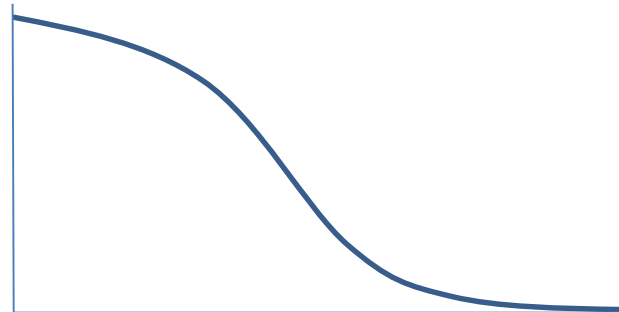
Suggests **low** returns of:

- Coho in 2018 ✓
- Chinook in 2019 ?

Suggests **high** returns of coho in 2019 ?
And **average** returns of Chinook in 2020 ?

Early Warning: Stoplight Chart

Survival
(Bonn to Bonn)



Ocean Conditions

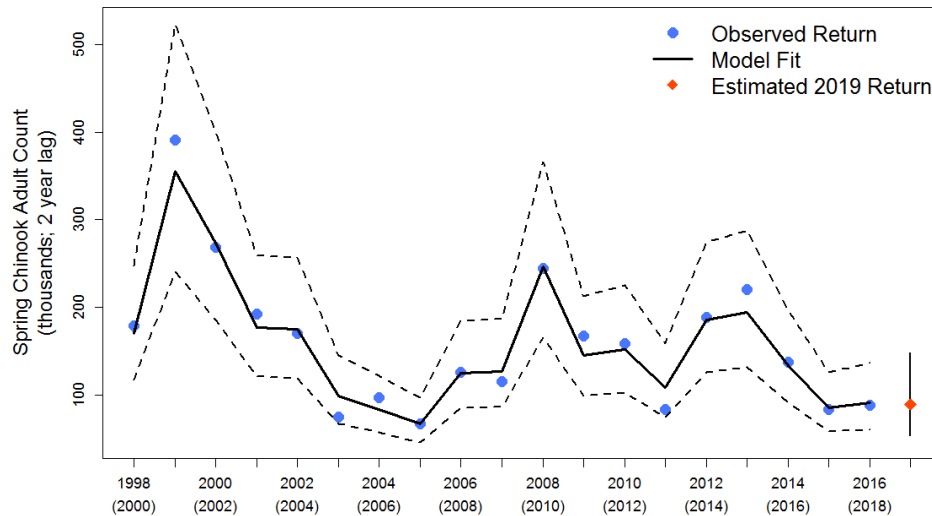
	Year																				
Ecosystem Indicators	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PDO (Sum Dec-March)	18	6	3	13	7	20	12	16	14	9	5	1	15	4	2	8	10	21	19	17	11
PDO (Sum May-Sept)	10	4	6	5	11	17	16	18	12	14	2	9	7	3	1	8	19	21	20	15	13
ONI (Average Jan-June)	20	1	1	7	14	16	15	17	9	12	3	11	18	4	6	8	10	19	21	13	5
46050 SST (°C, May-Sept)	16	9	3	4	1	8	21	15	5	17	2	10	7	11	12	13	14	20	18	6	19
Upper 20 m T (°C, Nov-Mar)	20	11	8	10	6	15	16	12	13	5	1	9	17	4	3	7	2	21	19	18	14
Upper 20 m T (°C, May-Sept)	17	12	14	4	1	3	21	19	7	8	2	5	13	10	6	18	20	9	15	11	16
Deep temperature (°C, May-Sept)	21	6	8	4	1	10	12	16	11	5	2	7	14	9	3	15	20	18	13	17	19
Deep salinity (May-Sept)	19	3	9	4	5	16	17	10	6	1	2	14	18	13	12	11	20	15	8	7	6
Copepod richness anom. (no. species; May-Sept)	19	2	1	7	6	14	13	18	15	10	8	9	17	4	5	3	11	20	21	16	12
N. copepod biomass anom. (mg C m ⁻³ ; May-Sept)	19	14	10	11	3	16	13	20	15	12	6	9	8	1	2	4	5	17	21	18	7
S. copepod biomass anom. (mg C m ⁻³ ; May-Sept)	21	2	5	4	3	14	15	20	13	10	1	7	16	9	8	6	11	18	19	17	12
Biological transition (day of year)	18	8	5	7	9	14	13	19	12	2	1	3	16	6	10	4	11	21	21	17	15
Ichthyoplankton biomass (mg C 1,000 m ⁻³ ; Jan-Mar)	21	12	3	8	10	19	18	15	17	16	2	13	5	14	11	9	20	6	7	1	4
Ichthyoplankton community index (PCO axis 1 scores; Jan-Mar)	10	13	2	7	5	11	20	18	3	12	1	14	15	8	4	6	9	19	21	17	16
Chinook salmon juvenile catches (no. km ⁻¹ ; June)	19	4	5	16	8	12	17	20	11	9	1	6	7	15	3	2	10	13	18	21	14
Coho salmon juvenile catches (no. km ⁻¹ ; June)	19	8	13	6	7	3	16	20	17	5	4	10	11	15	18	1	12	9	14	21	2
Mean of ranks	17.9	7.2	6.0	7.3	6.1	13.0	15.9	17.1	11.3	9.2	2.7	8.6	12.8	8.1	6.6	7.7	12.8	16.7	17.2	14.5	11.6
Rank of the mean rank	21	5	2	6	3	15	17	19	11	10	1	9	13	8	4	7	13	18	20	16	12
Ecosystem Indicators not included in the mean of ranks or statistical analyses																					
Physical Spring Trans. UI based (day of year)	3	7	20	17	4	13	15	21	13	1	6	2	8	11	18	9	19	10	5	16	11
Physical Spring Trans. Hydrographic (day of year)	20	3	13	8	5	12	14	21	6	9	1	9	18	3	11	2	16	7	17	19	14
Upwelling Anomaly (April-May)	10	3	17	6	9	14	13	21	10	4	7	8	15	17	15	12	19	1	2	20	5
Length of Upwelling Season UI based (days)	6	2	19	12	1	14	10	21	5	3	9	3	16	18	16	15	20	11	8	13	7
SST NH-5 (°C, May-Sept)	9	6	5	4	1	3	21	16	10	18	2	19	11	7	14	13	15	12	17	8	20
Copepod Community Index (MDS axis 1 scores)	20	3	4	8	1	13	15	18	16	10	2	6	12	9	7	5	11	19	21	17	14
Coho Juv Catches (no. fish km ⁻¹ ; Sept)	11	2	1	4	3	6	12	14	8	9	7	15	13	5	10	NA	NA	NA	NA	NA	NA

<https://www.nwfsc.noaa.gov/oceanconditions>

Chinook at Bonneville Dam

Dynamic Linear Models

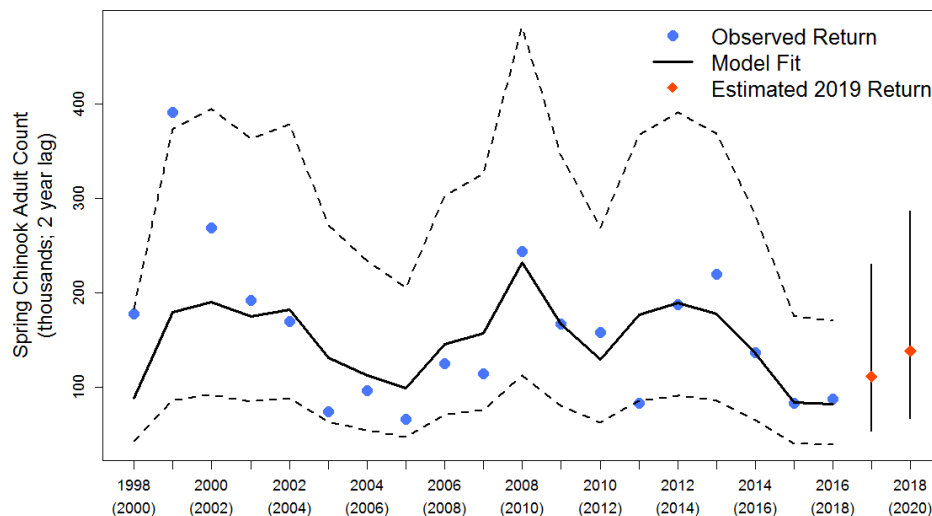
Sibling Regression and the first Principal Component of the stoplight chart



Spring Chinook

March 15 – May 31

Outlook for 2019: **88K (53 - 148)**



Outlook for 2020: **138K (67 – 287)**

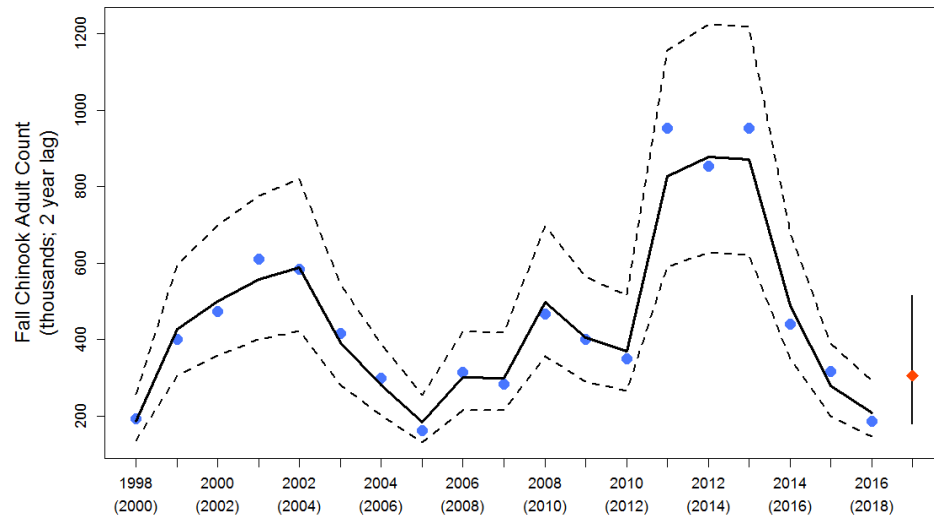
(no jack information)

Return data from Columbia Basin Research, DART

Chinook at Bonneville Dam

Dynamic Linear Models

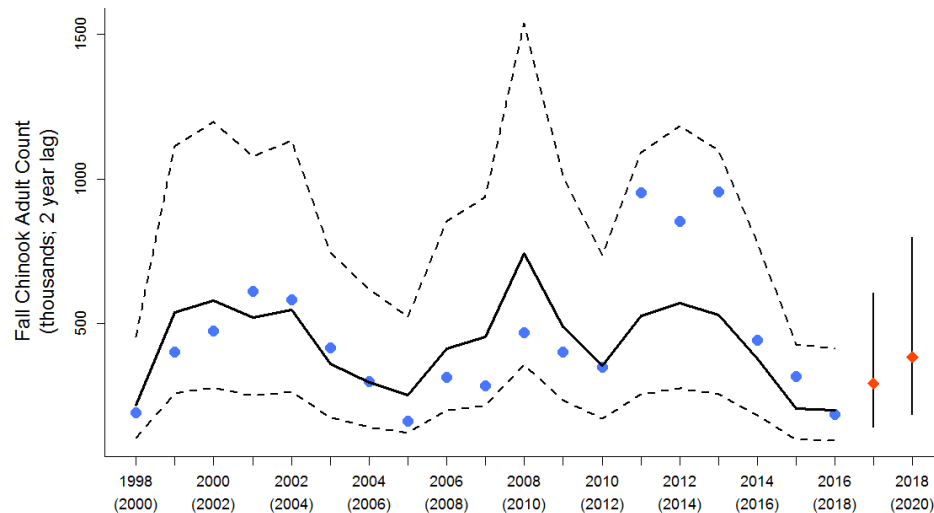
Sibling Regression and the first Principal Component of the stoplight chart



Fall Chinook

Aug 1 – Nov 15

Outlook for 2019: **305K (181 - 516)**



Outlook for 2020: **385K (186 – 798)**

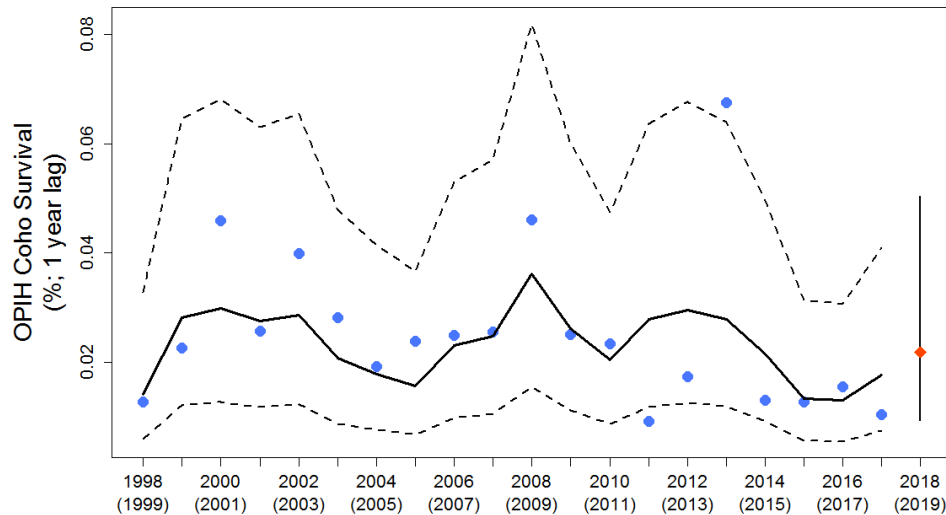
(no jack information)

Return data from Columbia Basin Research, DART

Coho at Bonneville Dam

Dynamic Linear Models

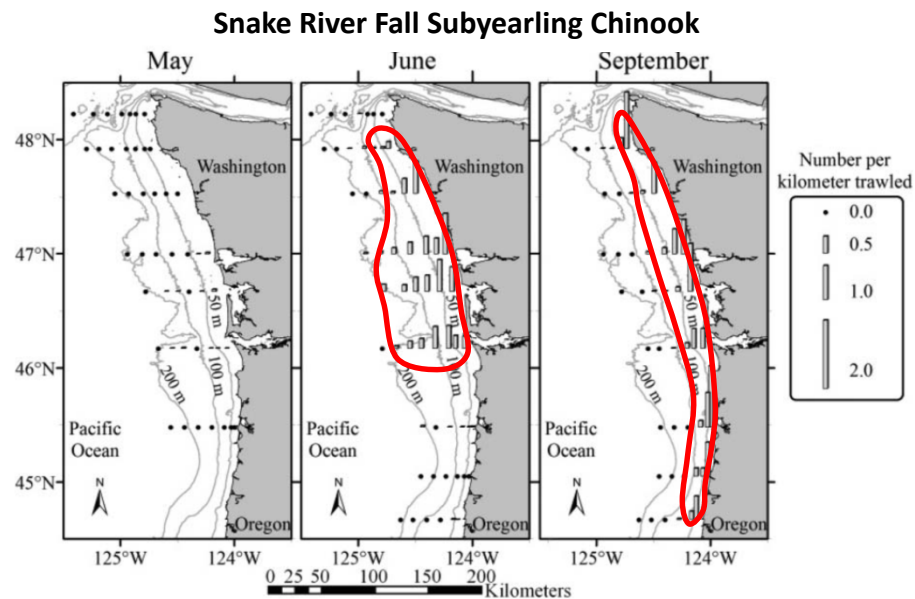
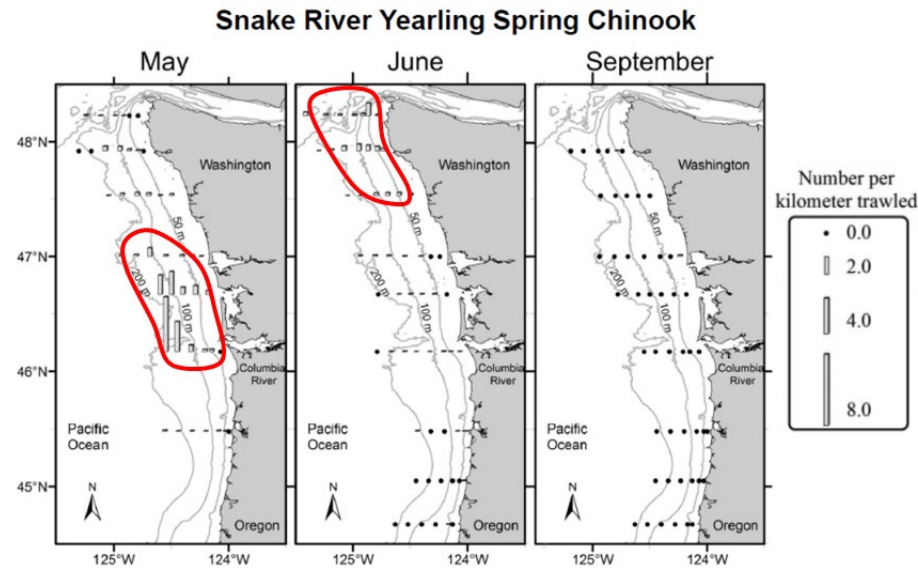
First Principal Component of the stoplight chart



Coho
OPIH

Outlook for 2018: **2.2% (0.9 – 5.0)**

Caveat: spatial distribution is stock-specific



Conclusions

- Physical environment is somewhat neutral
- Some aspects of the ocean ecosystem appear to be back to 'normal', others are still changing ('still changing' might be the new normal)
- Expected returns in 2019:
 - Spring Chinook: Similar to last two years
 - Fall Chinook: Slightly higher than last year
 - Coho: Better than last several years

