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March 6, 2018

MEMORANDUM

TO: Council members

FROM: Lynn Palensky

SUBJECT: Briefing on Columbia River Basin salmon and steelhead returns for 2017 and run forecasts for 2018

BACKGROUND:

Presenters: Dan Rawding (WDFW), Paul Kline (IDFG), and Brian Burke (NOAA NW Fisheries Science Center)

Summary: The Council will be briefed on the 2017 returns and 2018 run forecasts of adult salmon and steelhead

Dan Rawding (Columbia River Policy and Science Coordinator, Washington Department of Fish and Wildlife) will present the latest information on the 2017 adult Chinook, coho, sockeye, and chum salmon and steelhead run forecasts for the Columbia and Snake rivers, with a brief summary of expectations for the 2018 fisheries. His presentation will also include a retrospective review of the 2017 adult salmon and steelhead returns and fisheries in the Columbia River excluding the Snake Basin.

Paul Kline (Asst. Chief of Fisheries for the Idaho Department of Fish and Game) will then 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. For each species/run grouping, counts of fish crossing Lower Granite Dam will be presented. 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.

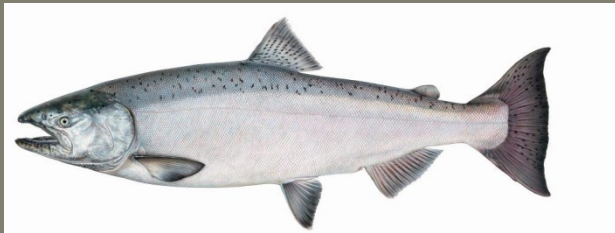
Relevance: This information is relevant to our high-level indicators. It gives the region a preview for what is expected for adult returns in the current year.

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

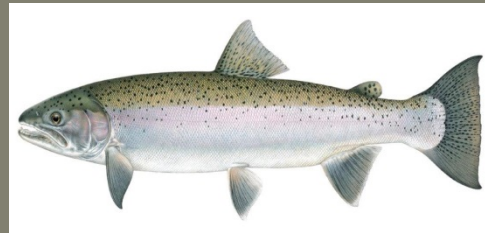
More Info: Links:
Columbia River Forecasts: http://wdfw.wa.gov/fishing/reports_plants.html
Joint State Staff Reports <http://wdfw.wa.gov/fishing/crc/>
Columbia River DART: <http://www.cbr.washington.edu/dart>

SNAKE RIVER SALMON AND STEELHEAD RETURNS

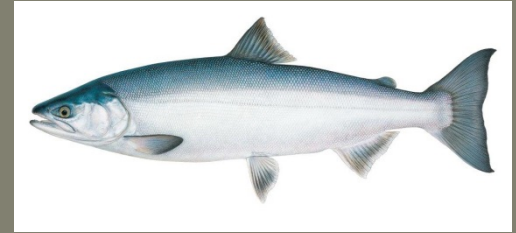
Natural-origin and Hatchery-origin



Spring/Summer Chinook
Fall Chinook



Summer Steelhead



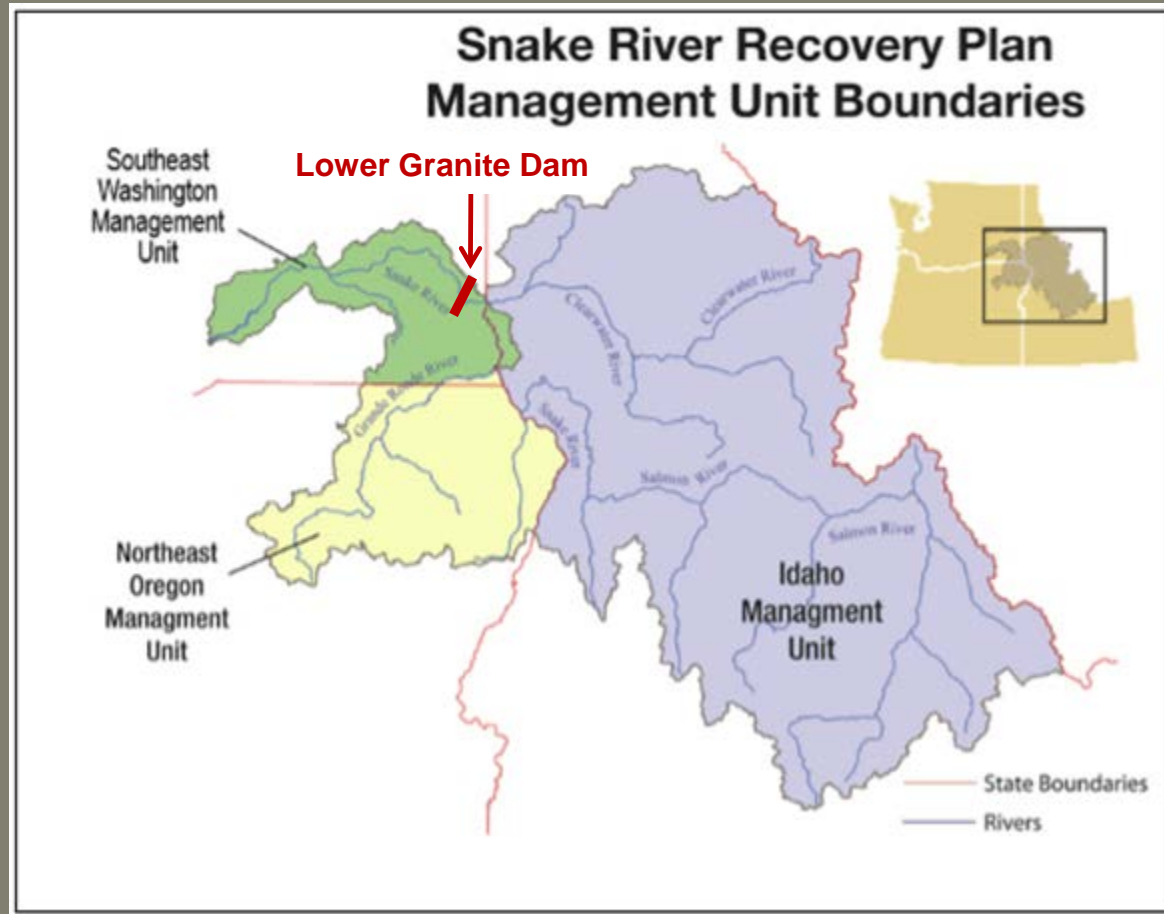
Sockeye

NPCC – March 2018

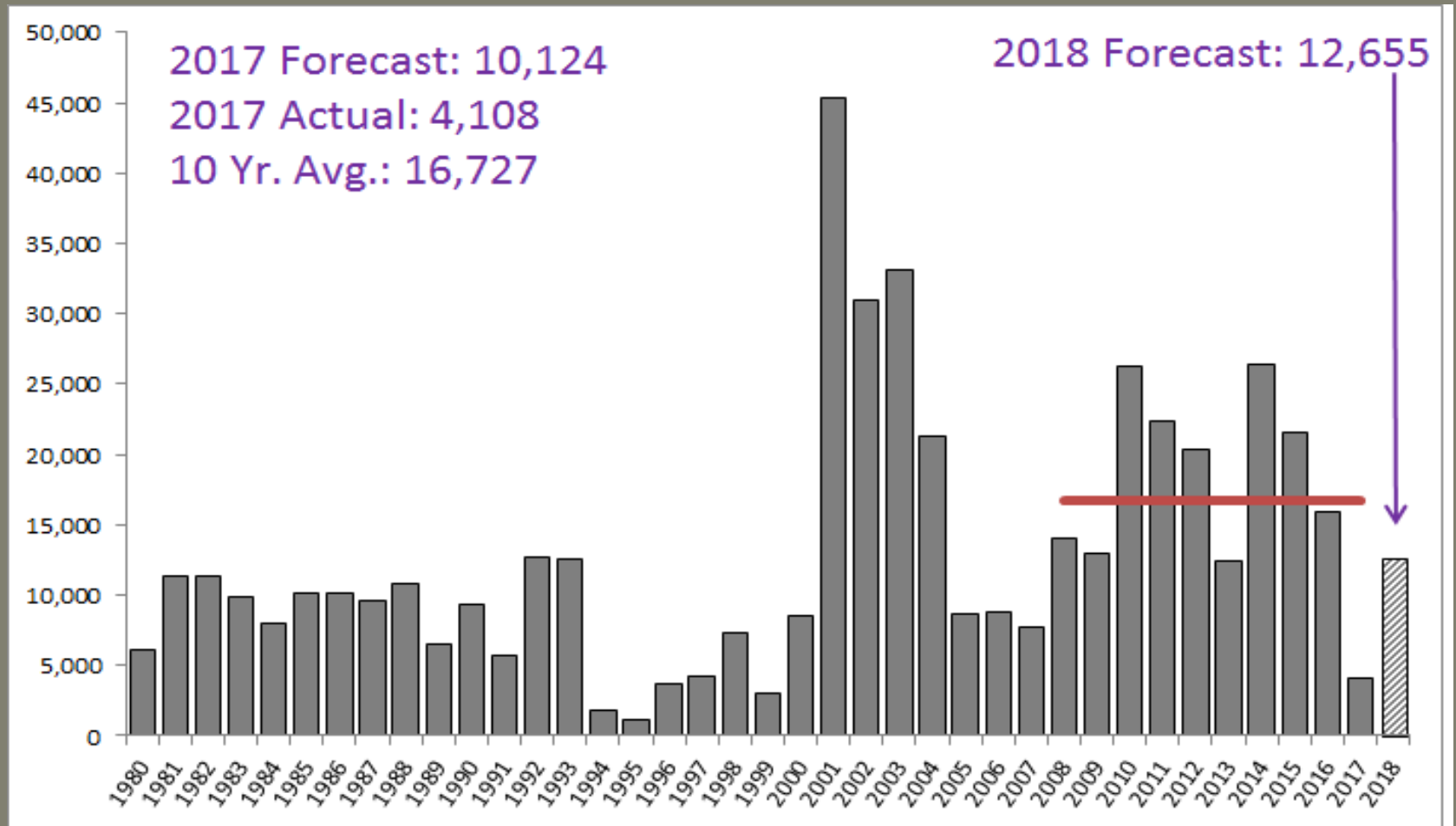
Presented by: Idaho Department of Fish and
Game



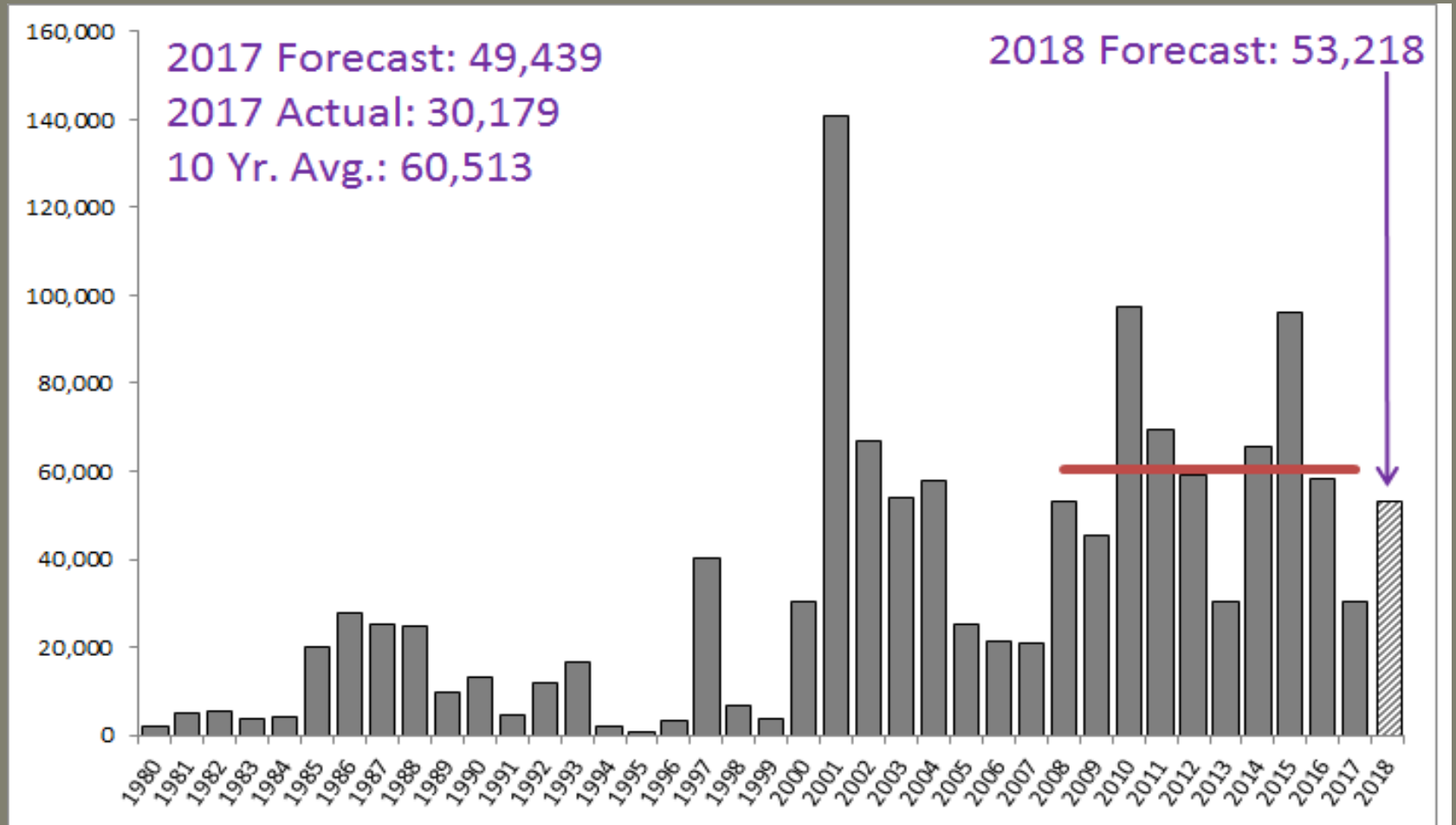
SNAKE RIVER SALMON AND STEELHEAD RETURNS



NATURAL-ORIGIN SPRING/SUMMER CHINOOK



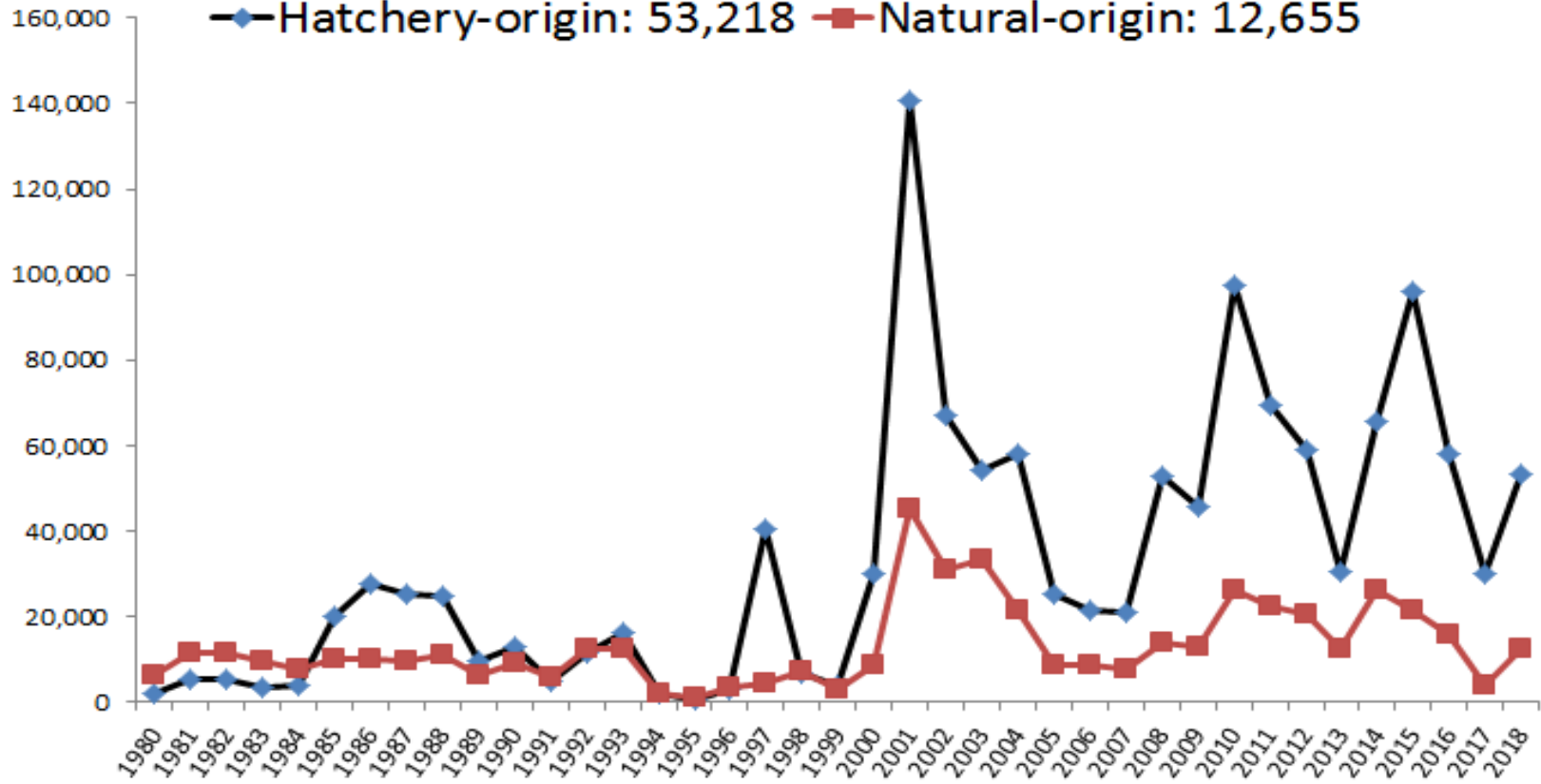
HATCHERY-ORIGIN SPRING/SUMMER CHINOOK



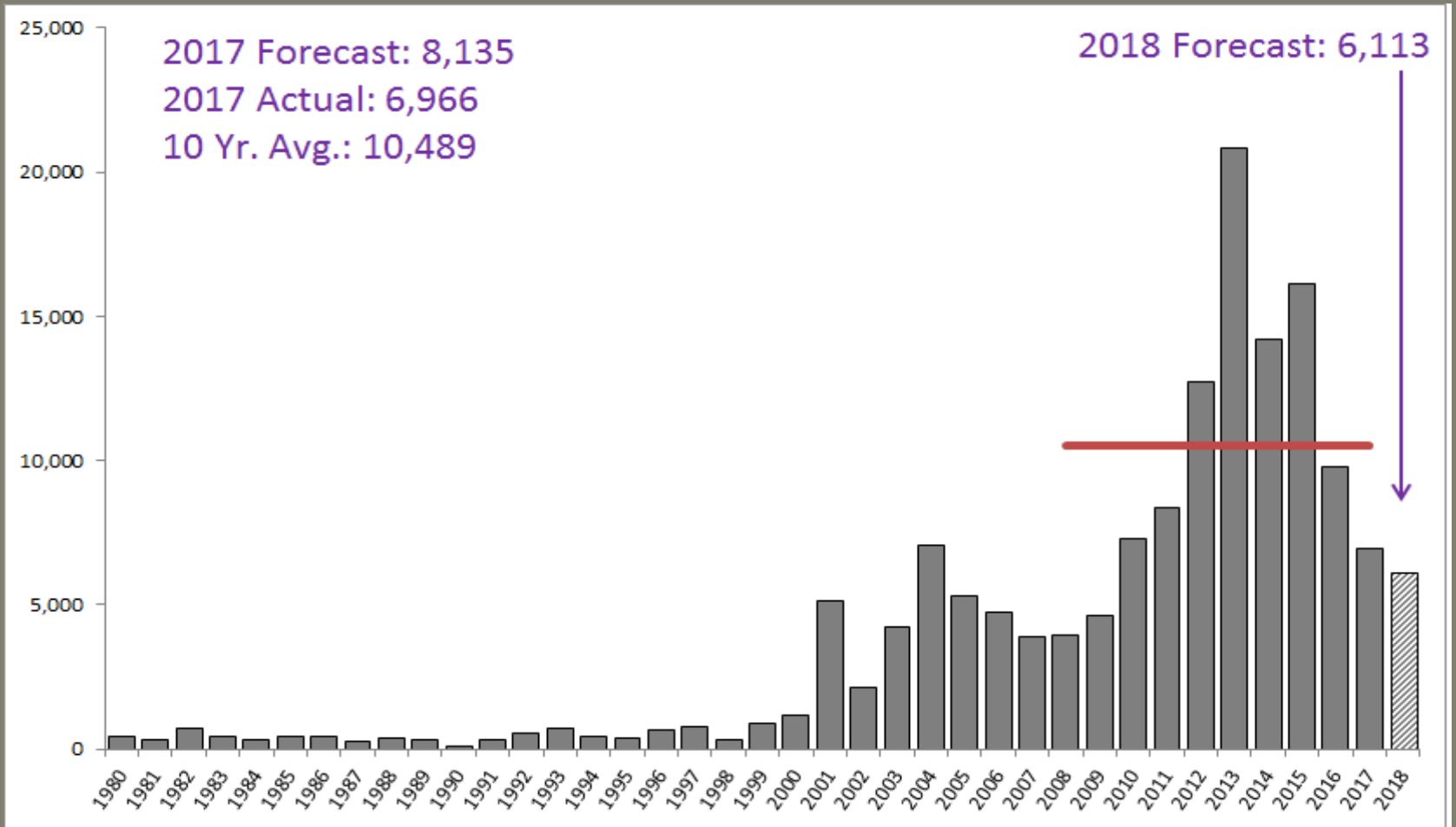
COMBINED NATURAL- AND HATCHERY-ORIGIN SPRING/SUMMER CHINOOK

Snake River Spring/Summer Chinook 2018 Forecast

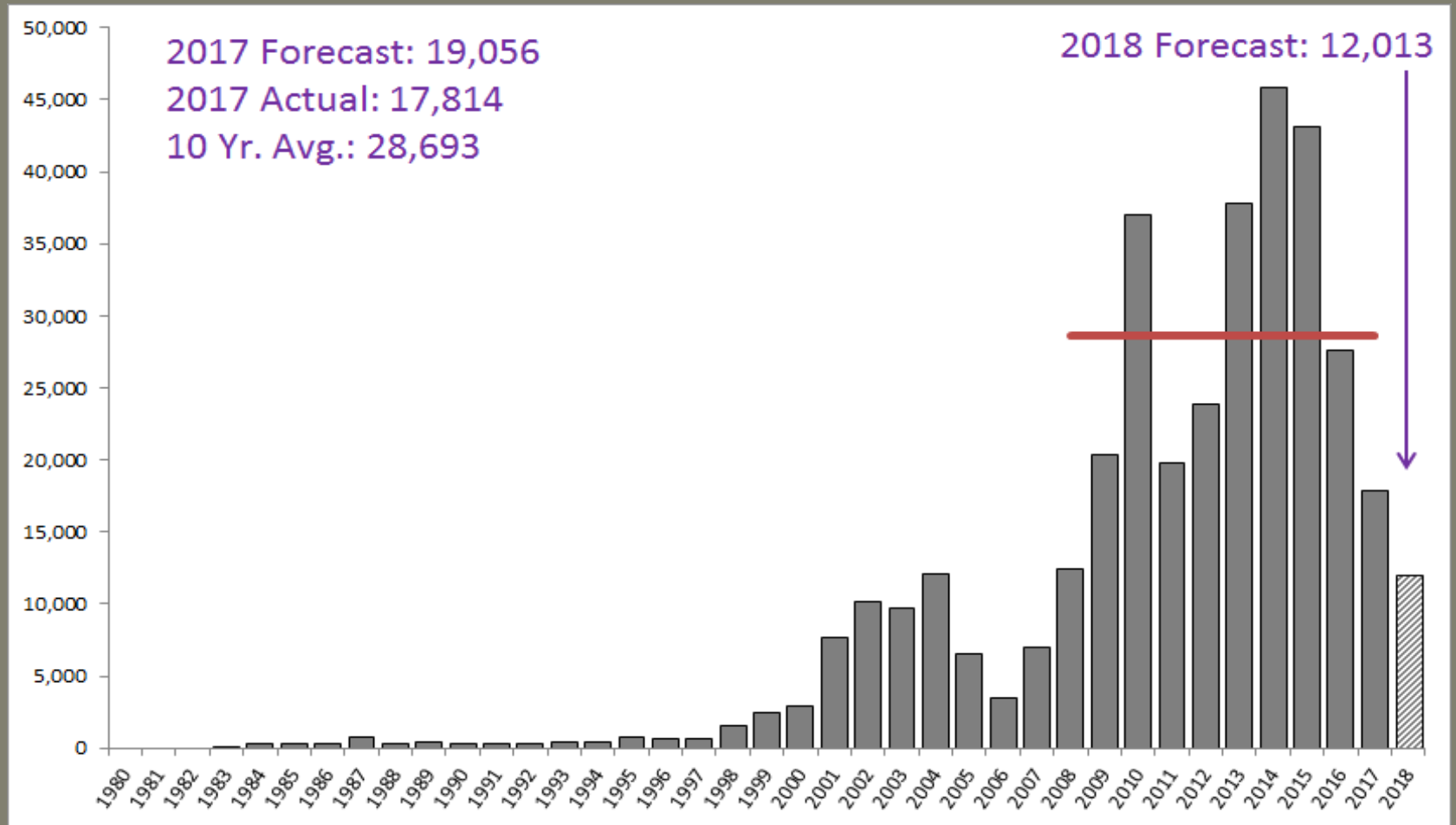
◆ Hatchery-origin: 53,218 ■ Natural-origin: 12,655



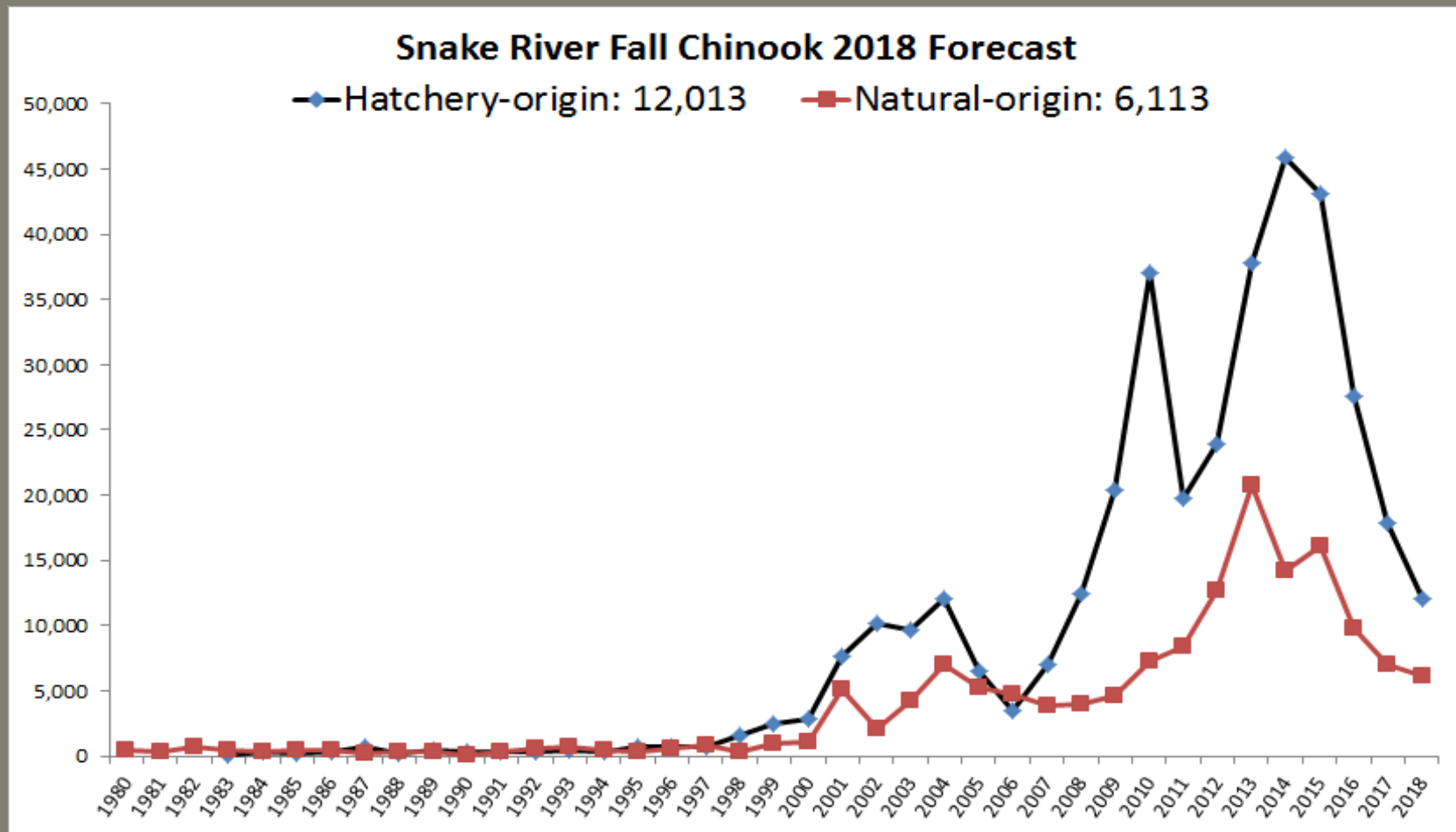
NATURAL-ORIGIN FALL CHINOOK



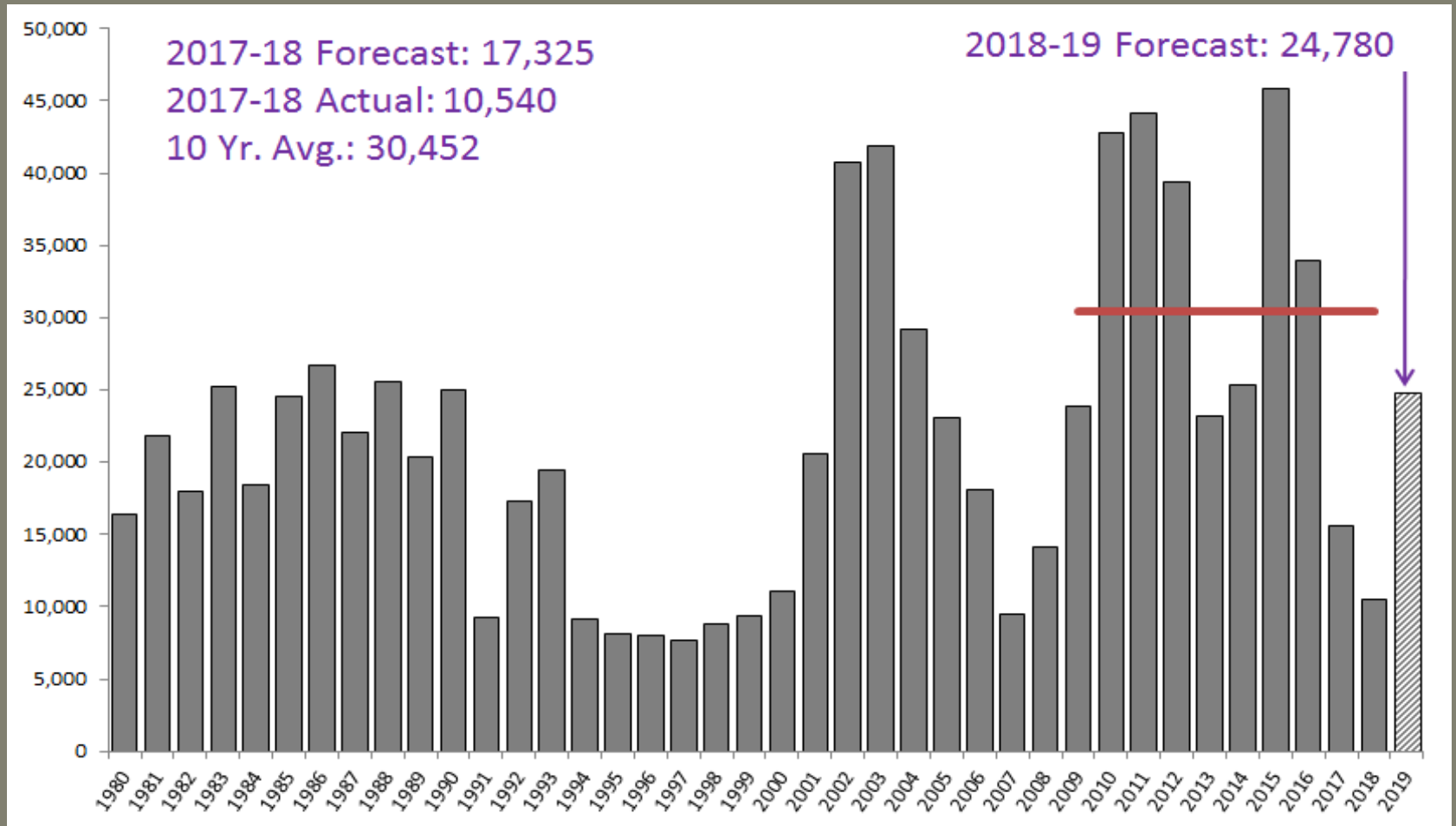
HATCHERY-ORIGIN FALL CHINOOK



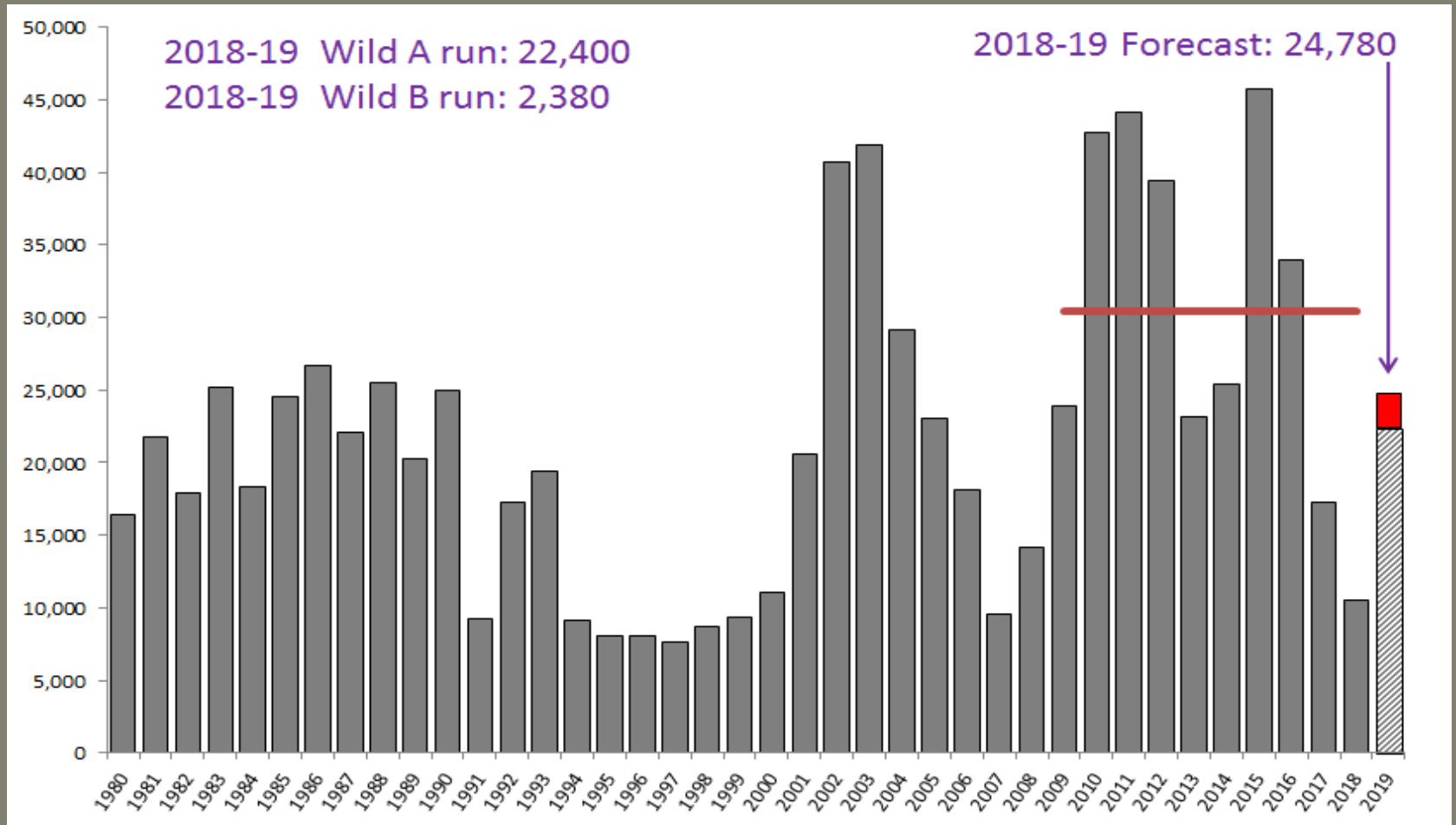
COMBINED NATURAL- AND HATCHERY-ORIGIN FALL CHINOOK



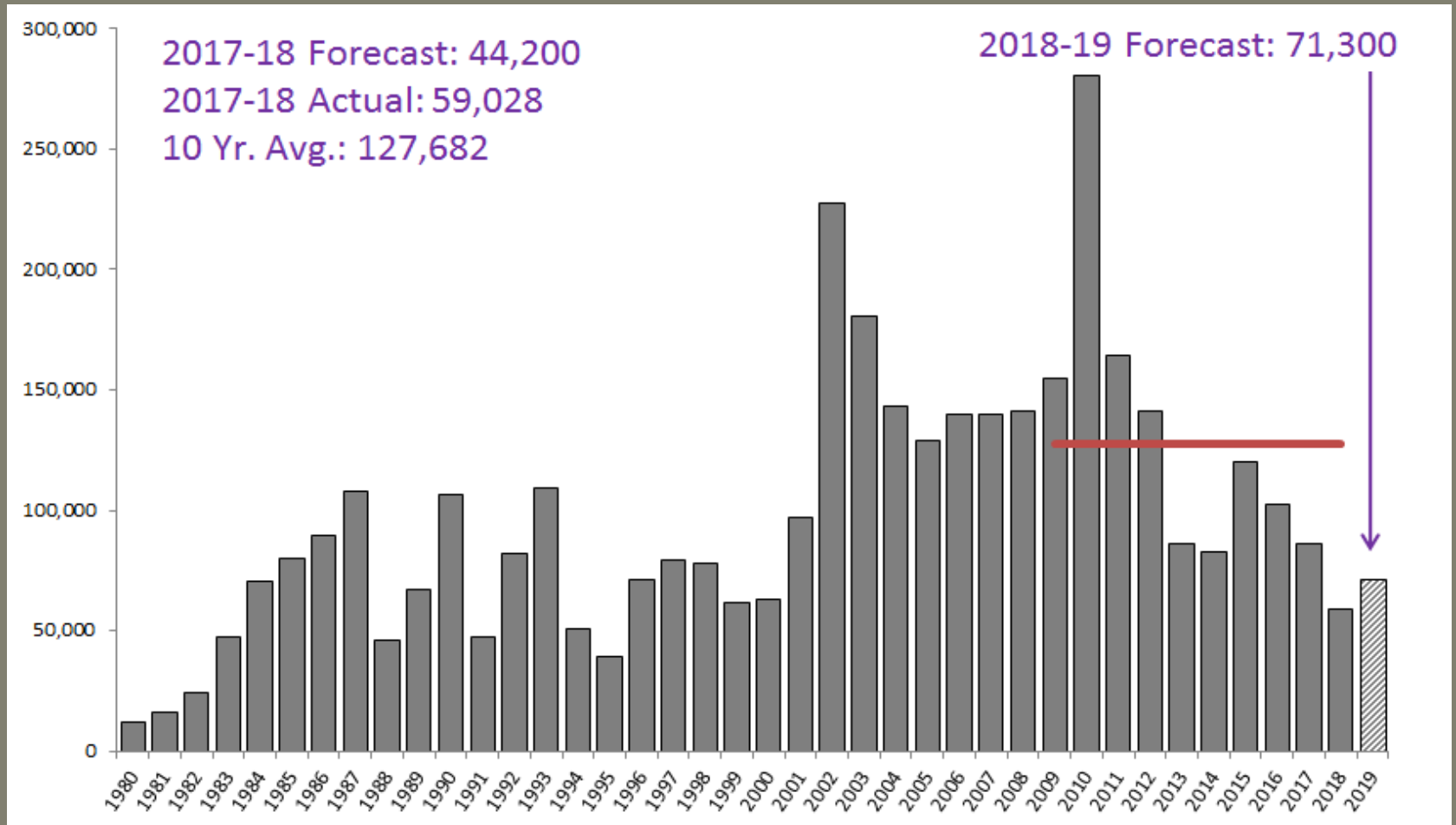
NATURAL-ORIGIN SUMMER STEELHEAD



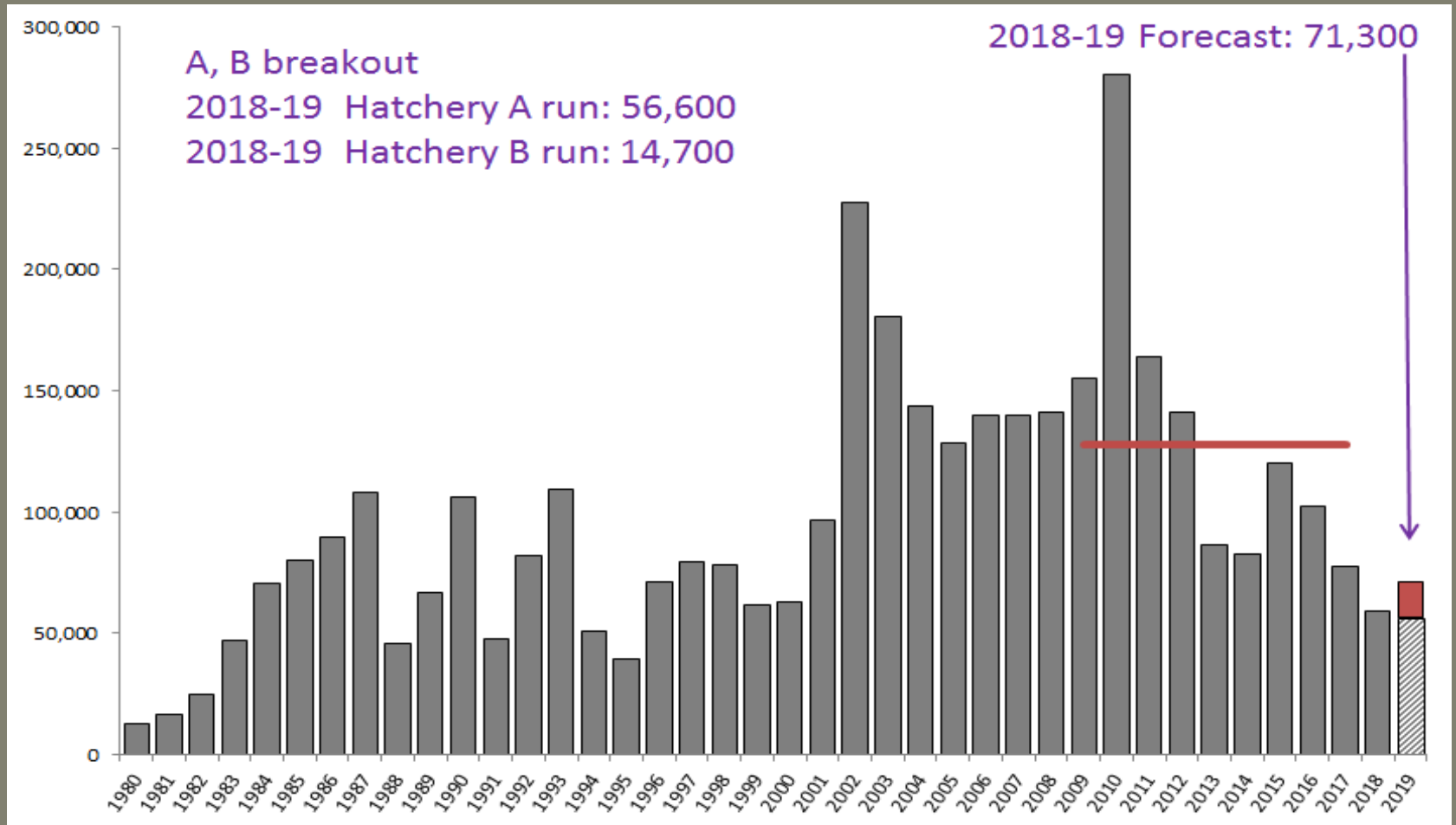
NATURAL-ORIGIN SUMMER STEELHEAD



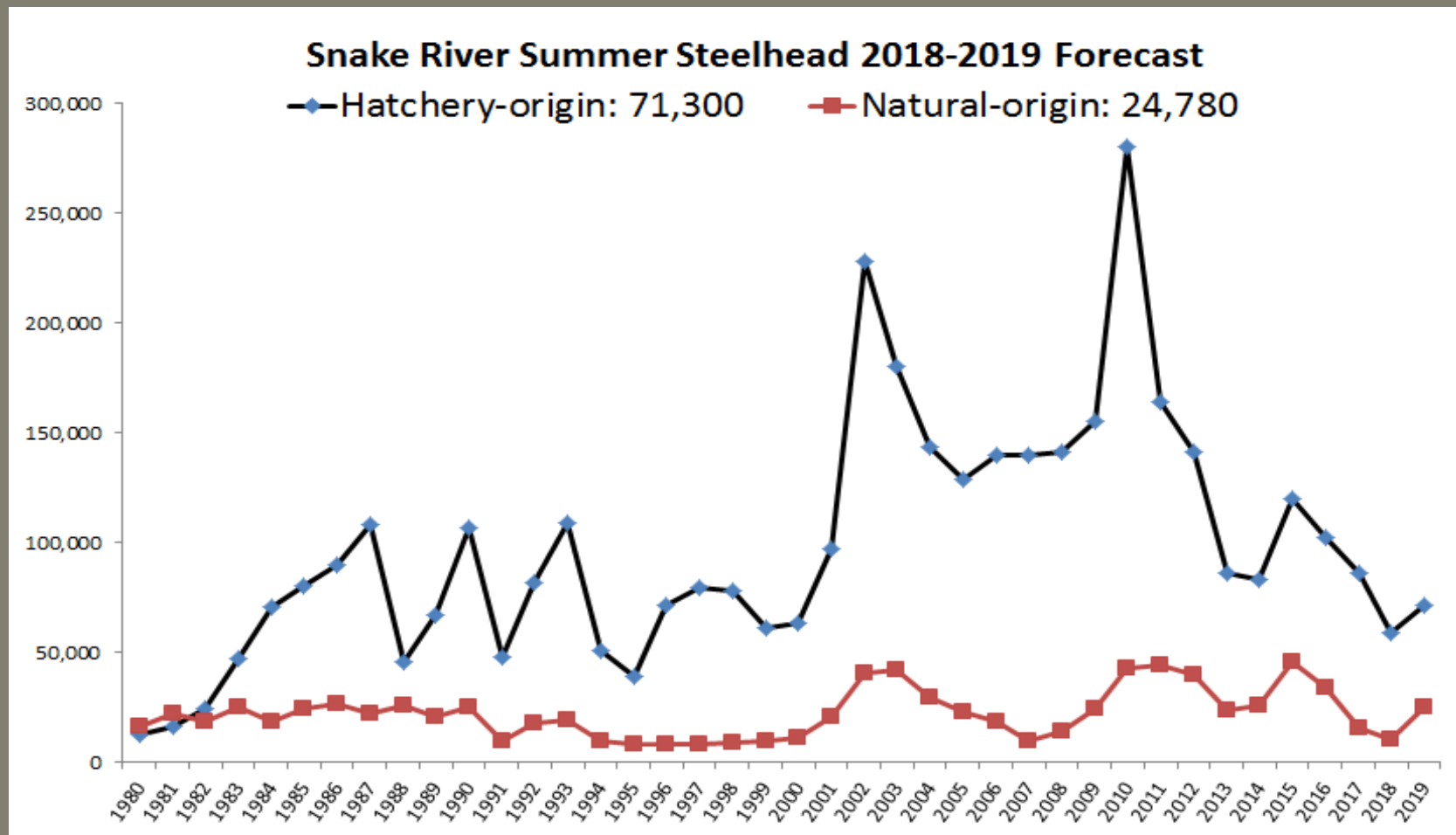
HATCHERY-ORIGIN SUMMER STEELHEAD



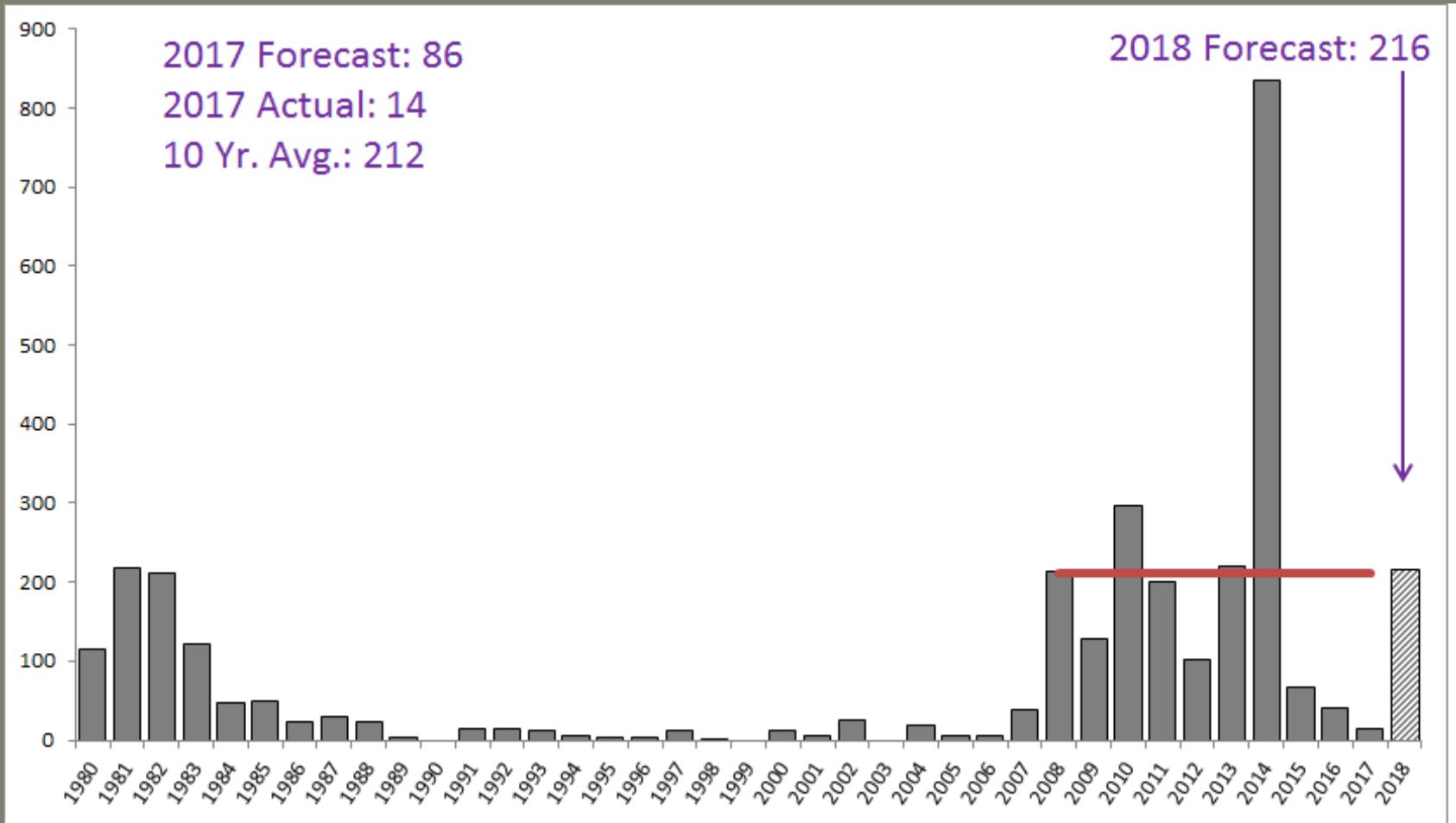
HATCHERY-ORIGIN SUMMER STEELHEAD



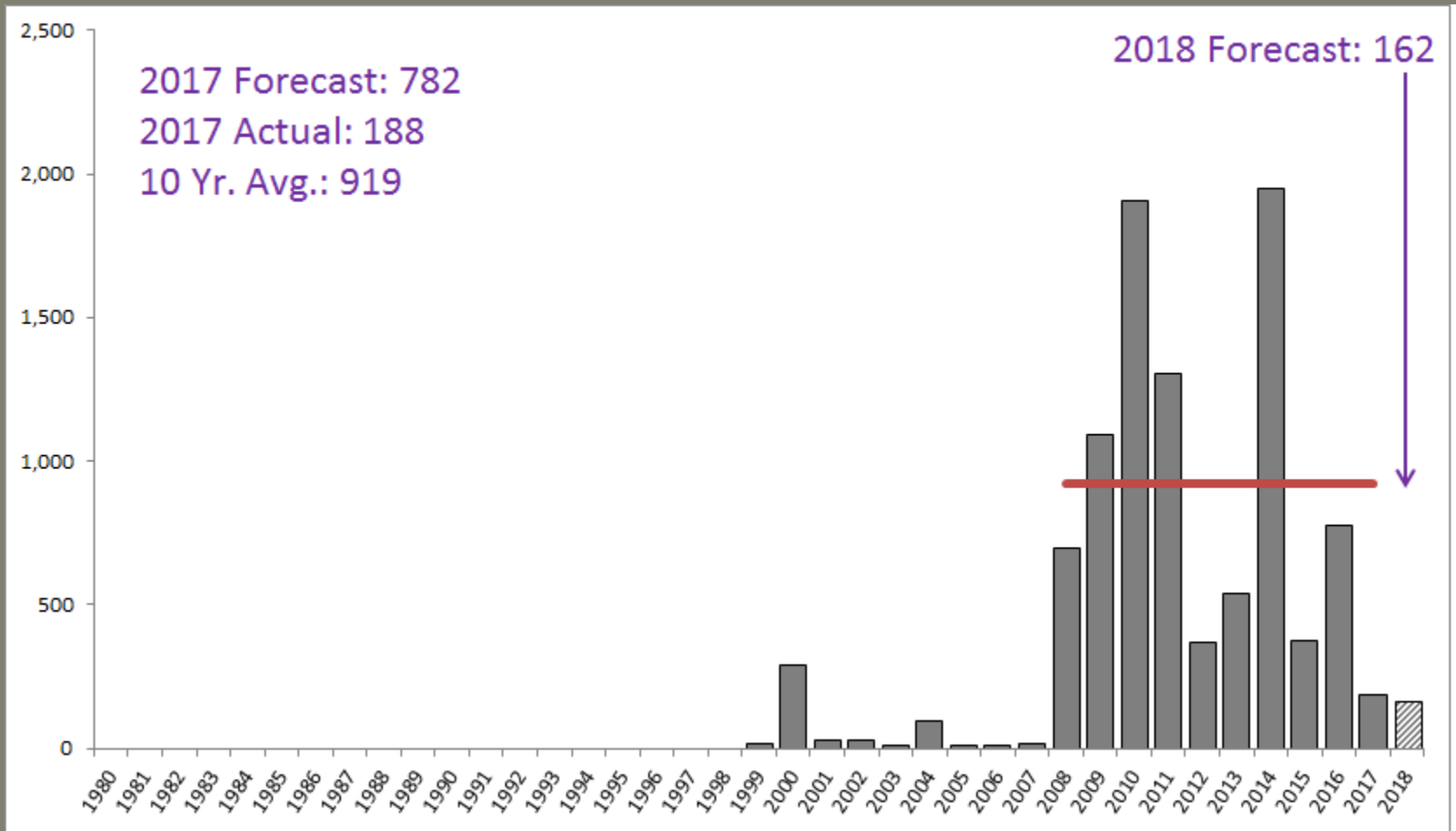
COMBINED NATURAL- AND HATCHERY-ORIGIN SUMMER STEELHEAD



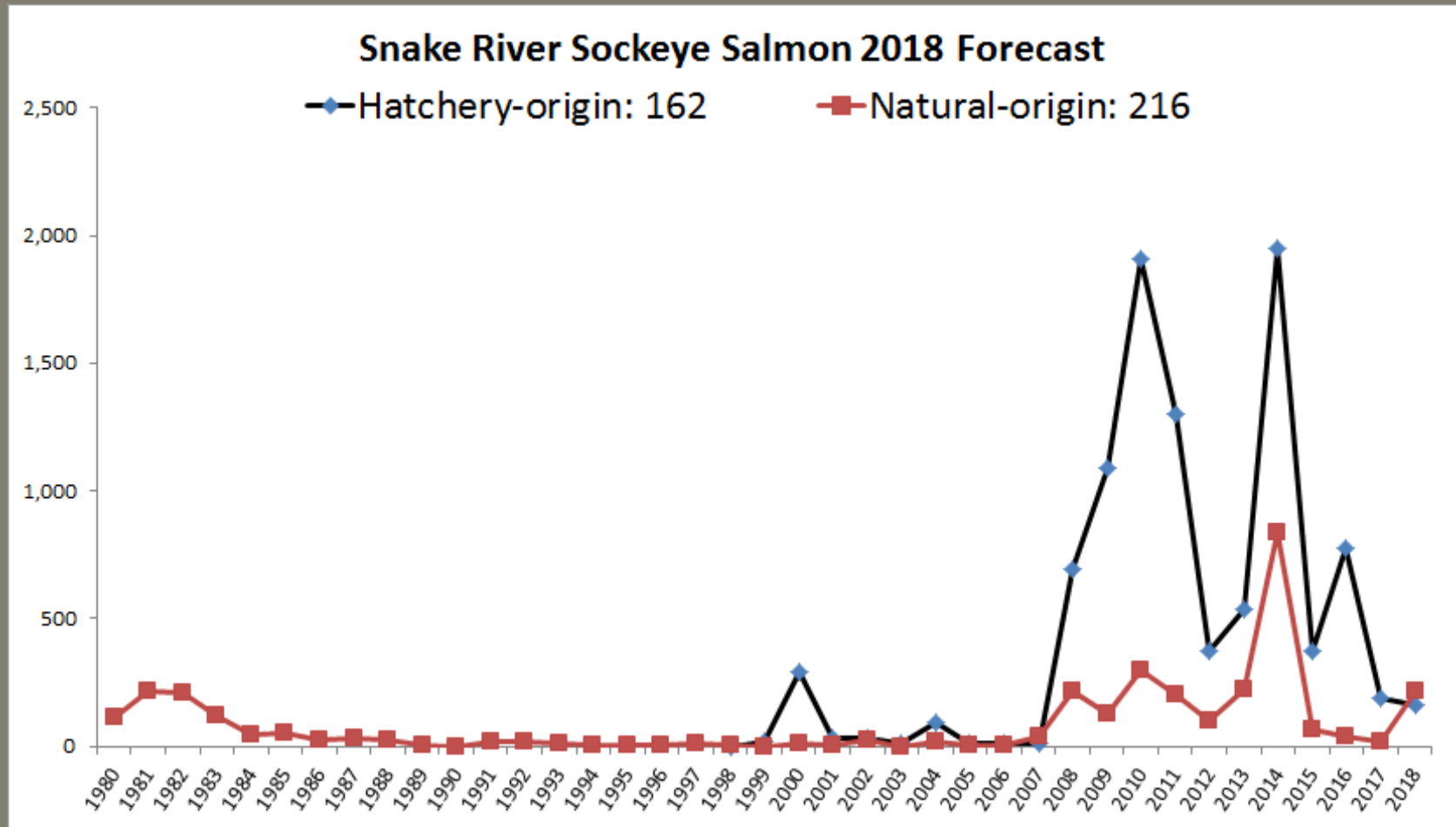
NATURAL-ORIGIN SOCKEYE



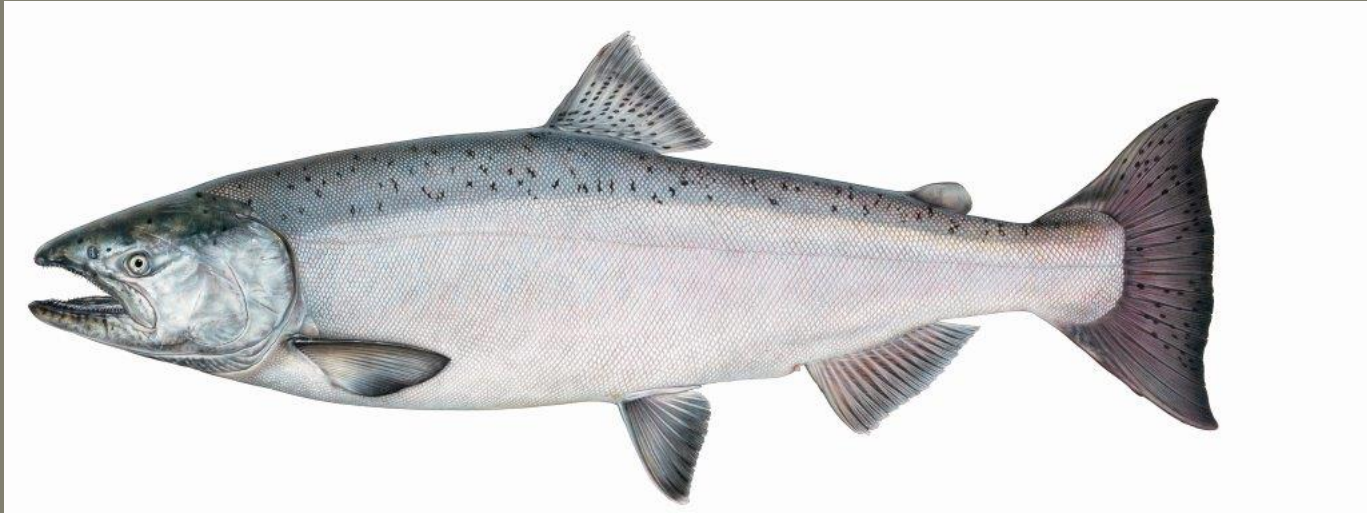
HATCHERY-ORIGIN SOCKEYE



COMBINED NATURAL- AND HATCHERY-ORIGIN SOCKEYE



SPRING/SUMMER CHINOOK SUMMARY



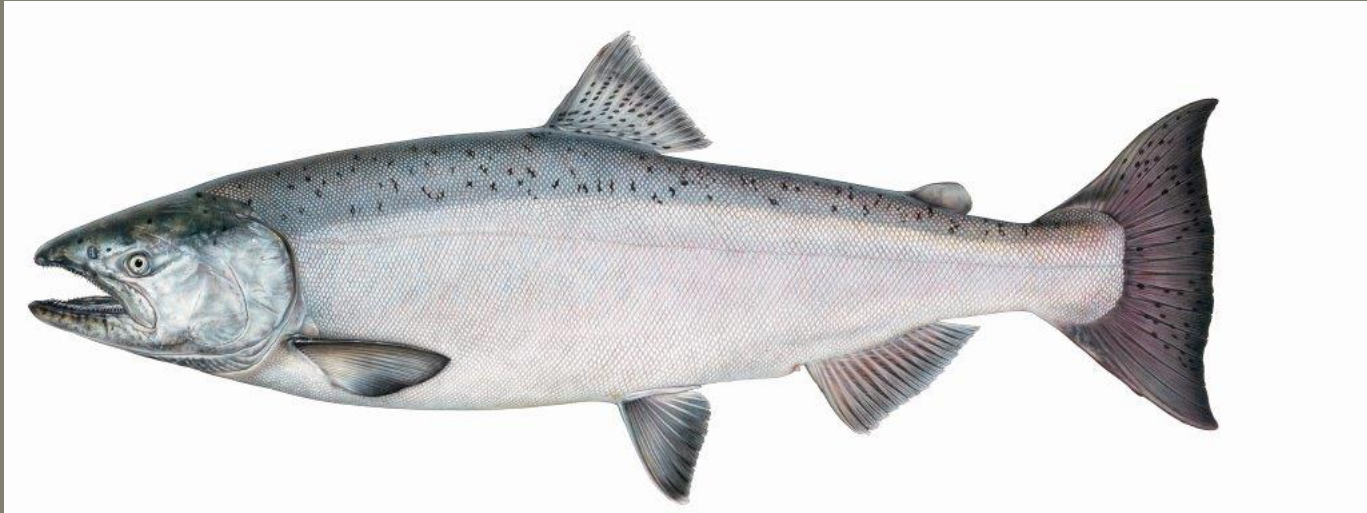
Natural-Origin Forecast up: 12,655 vs. 4,108



Hatchery-Origin Forecast up: 53,218 vs. 30,179



FALL CHINOOK SUMMARY



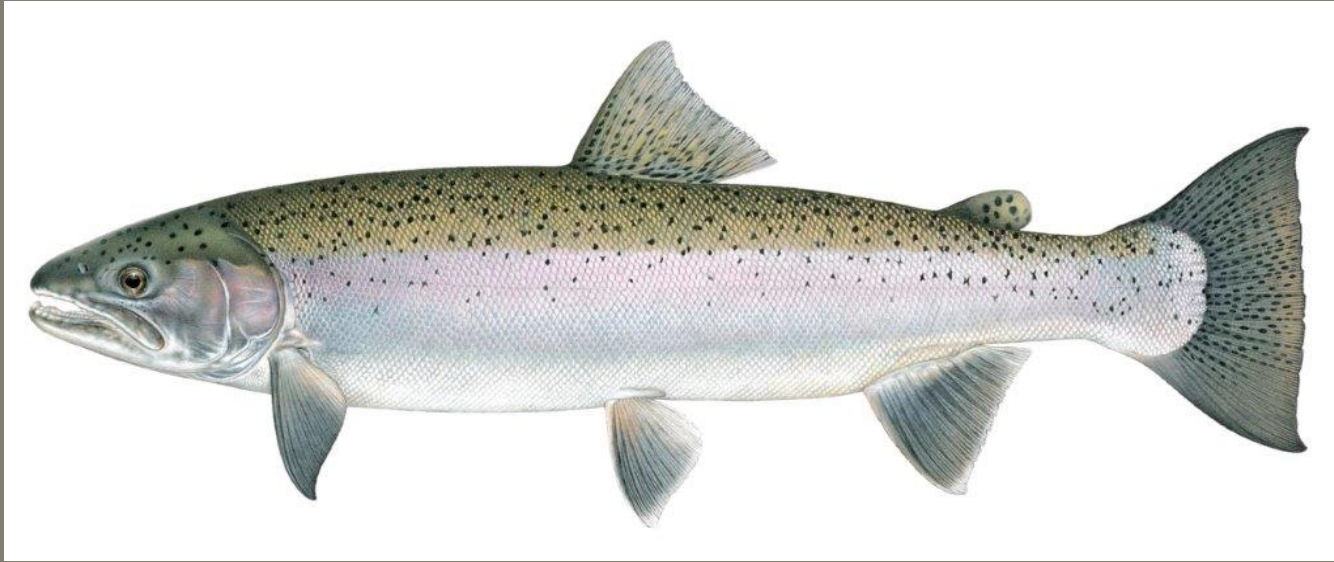
Natural-Origin Forecast down: 6,113 vs. 6,966



Hatchery-Origin Forecast down: 12,013 vs. 17,814



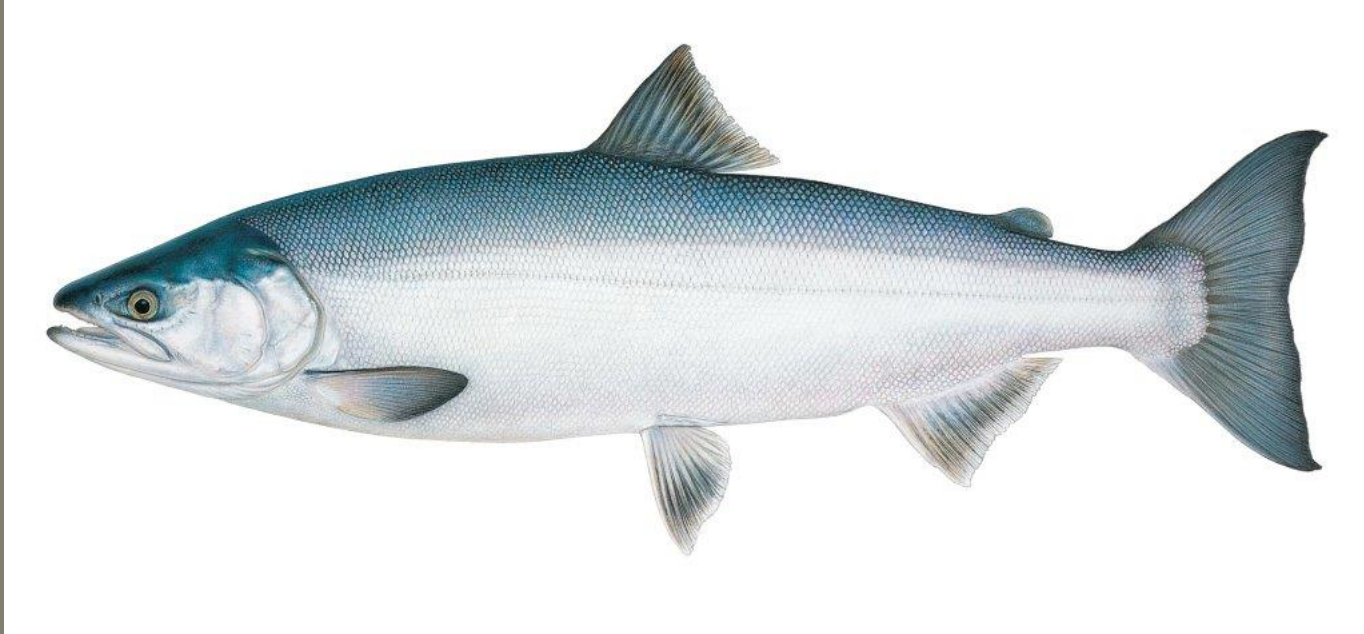
SUMMER STEELHEAD SUMMARY



Natural-Origin Forecast up: 24,780 vs. 10,540 ↑

Hatchery-Origin Forecast up: 71,300 vs. 59,028 ↑

SOCKEYE SUMMARY



Natural-Origin Forecast up: 216 vs. 14



Hatchery-Origin Forecast down: 162 vs. 188



COLUMBIA RIVER SALMON AND STEELHEAD RETURNS



NPCC – March 2018

Presented by: Washington Department of Fish and Wildlife

U.S. v Oregon

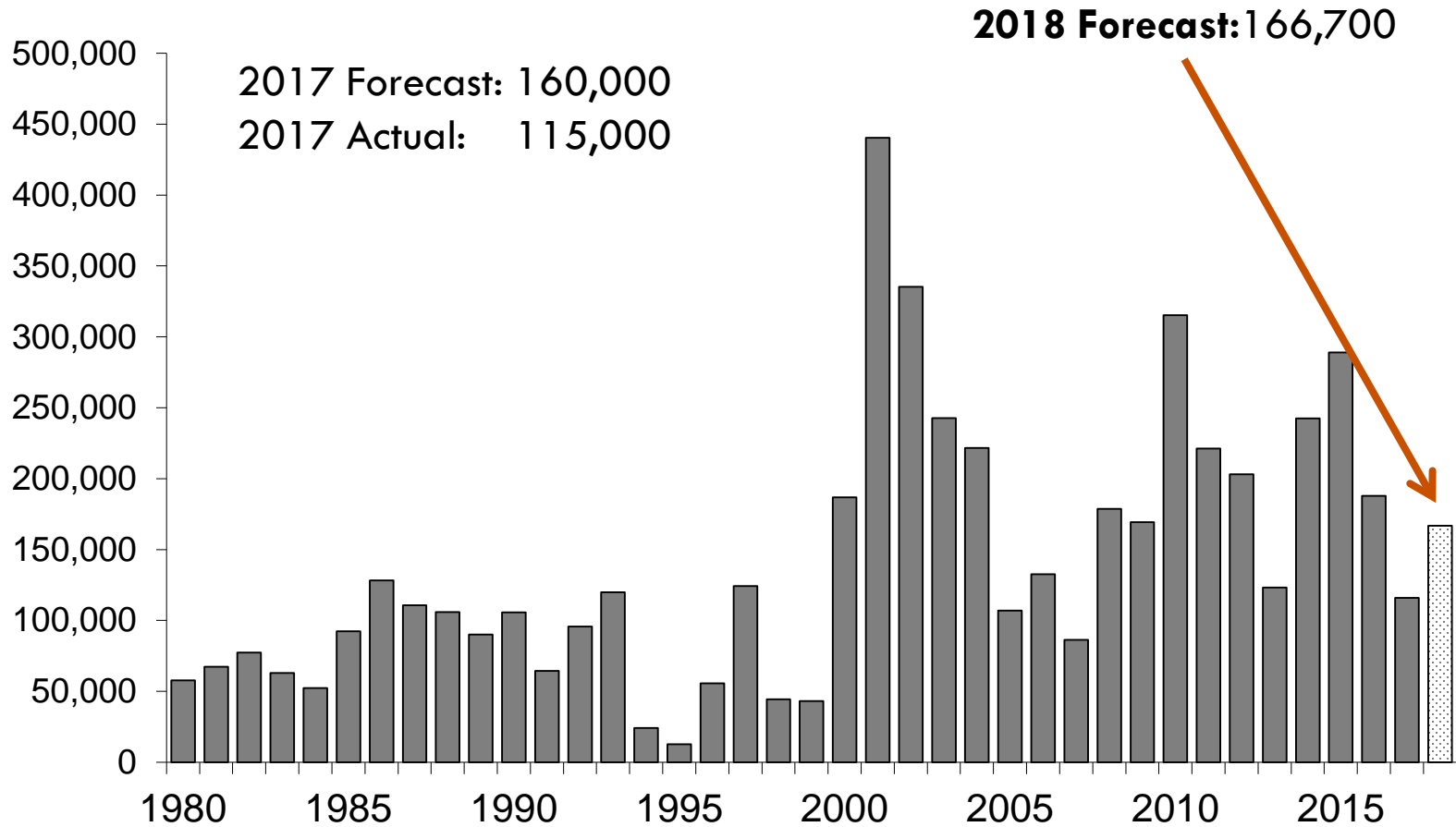
Technical Advisory Committee

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 2016, TAC met 21 times between May 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.

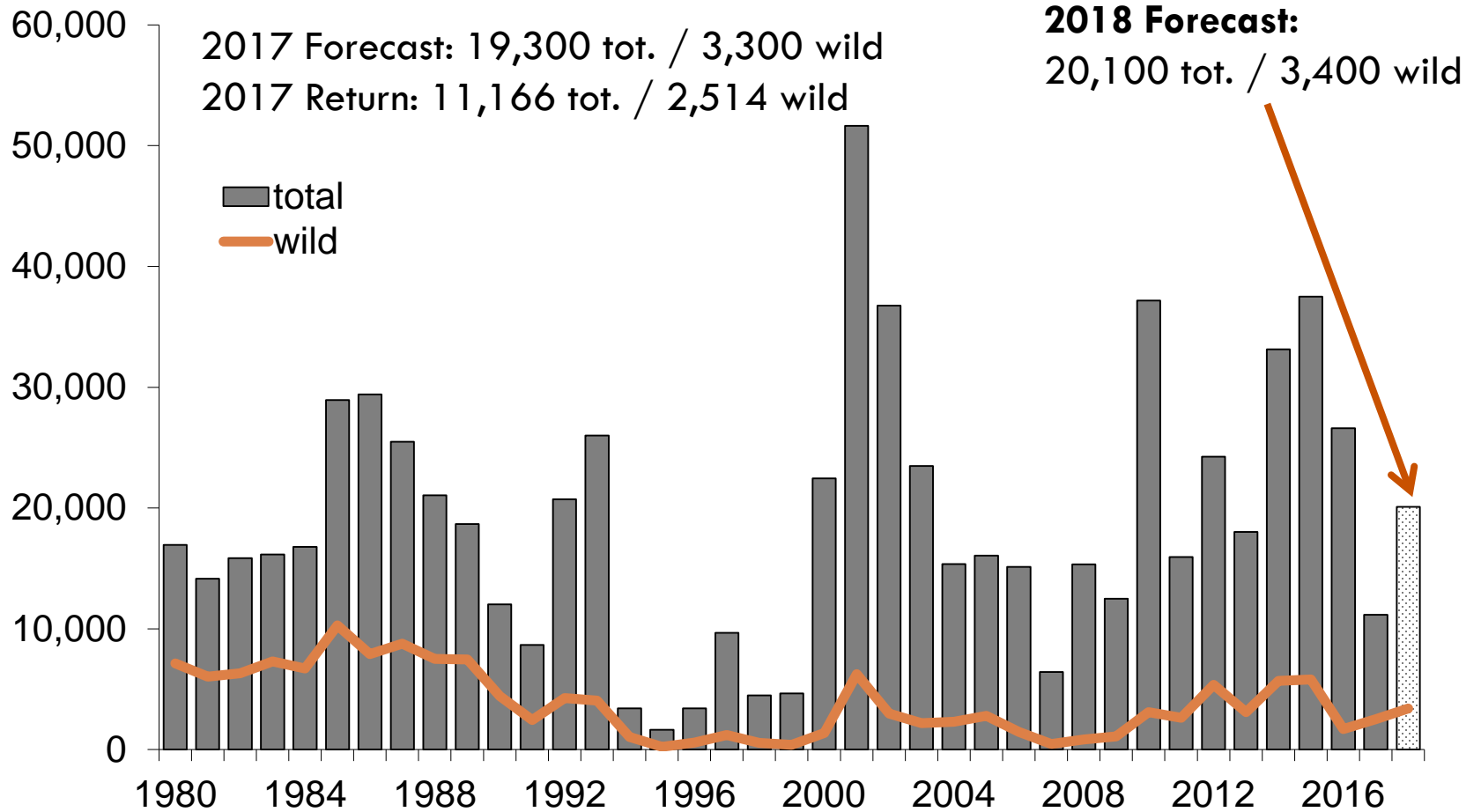
Upriver Spring Chinook

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



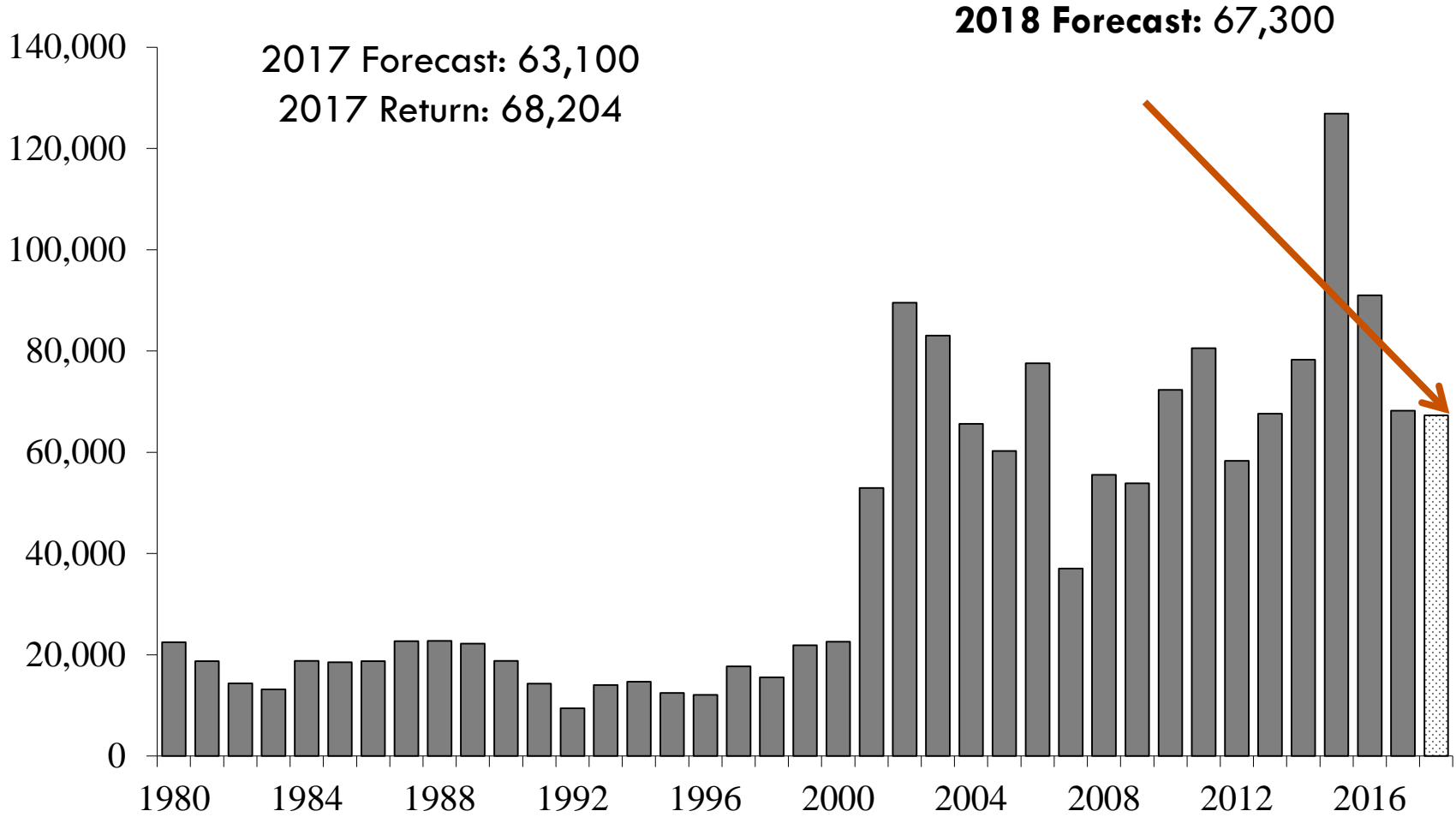
Upper Columbia Spring Chinook

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



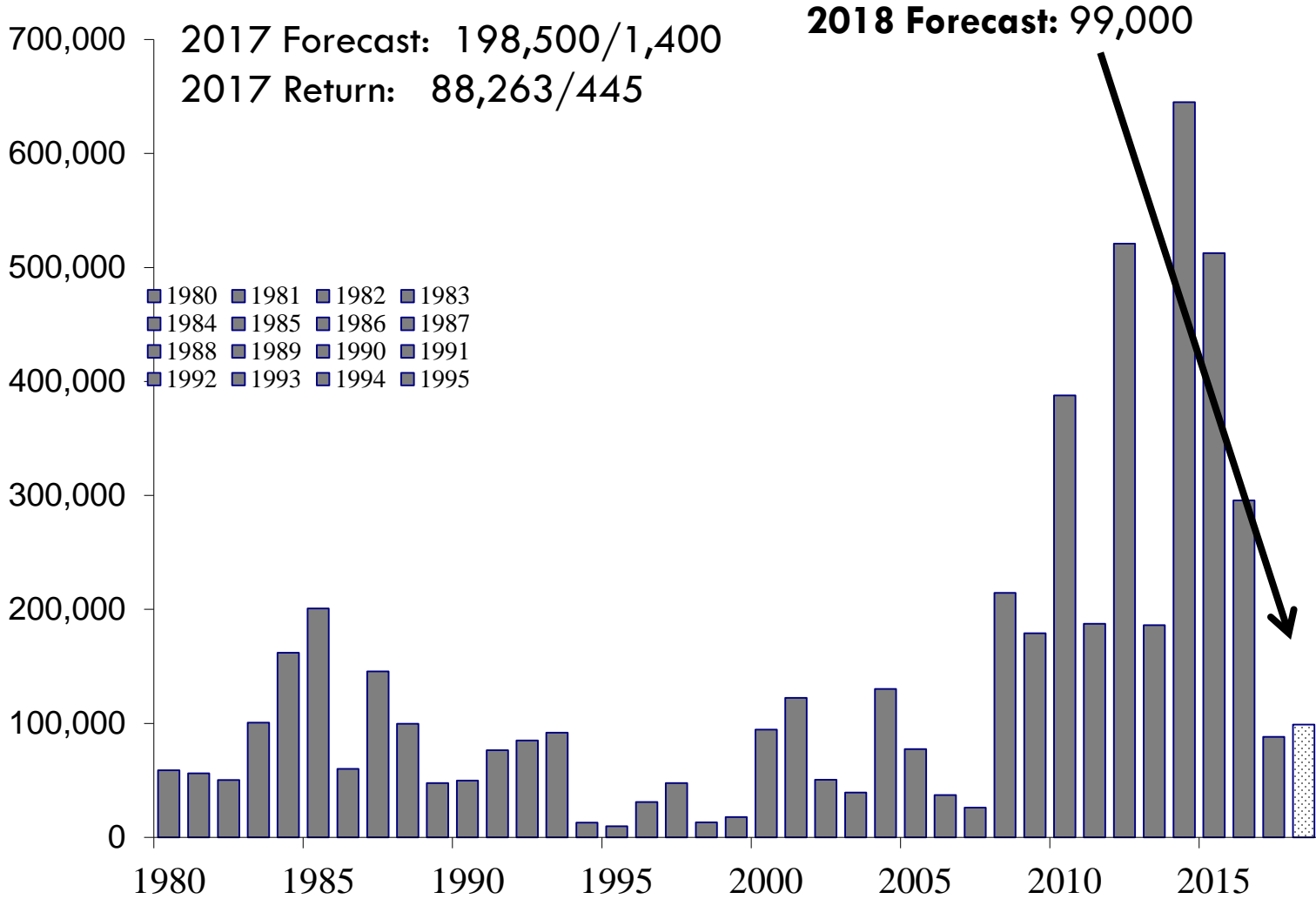
Upper Columbia Summer Chinook

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



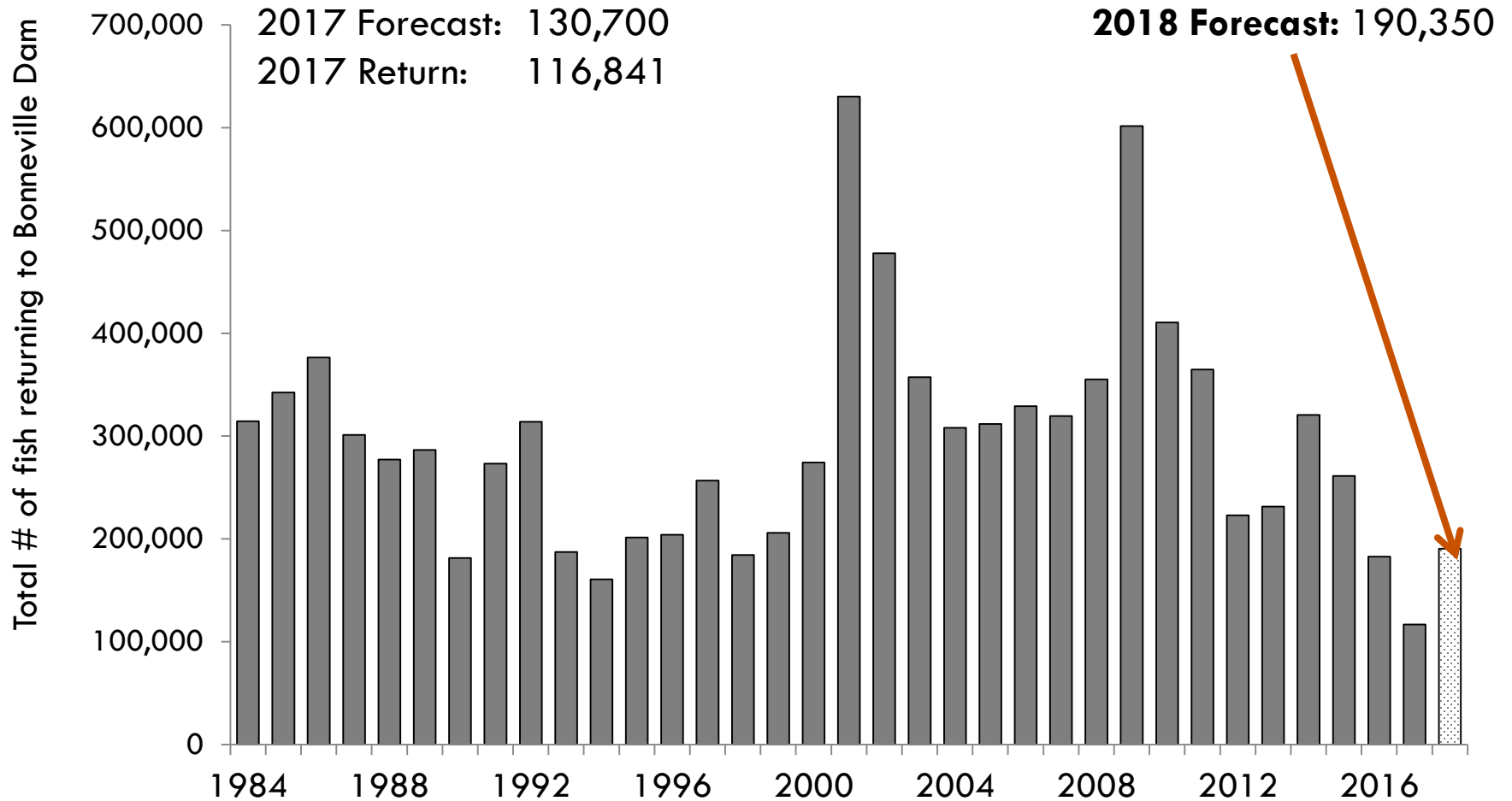
Columbia River Sockeye

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



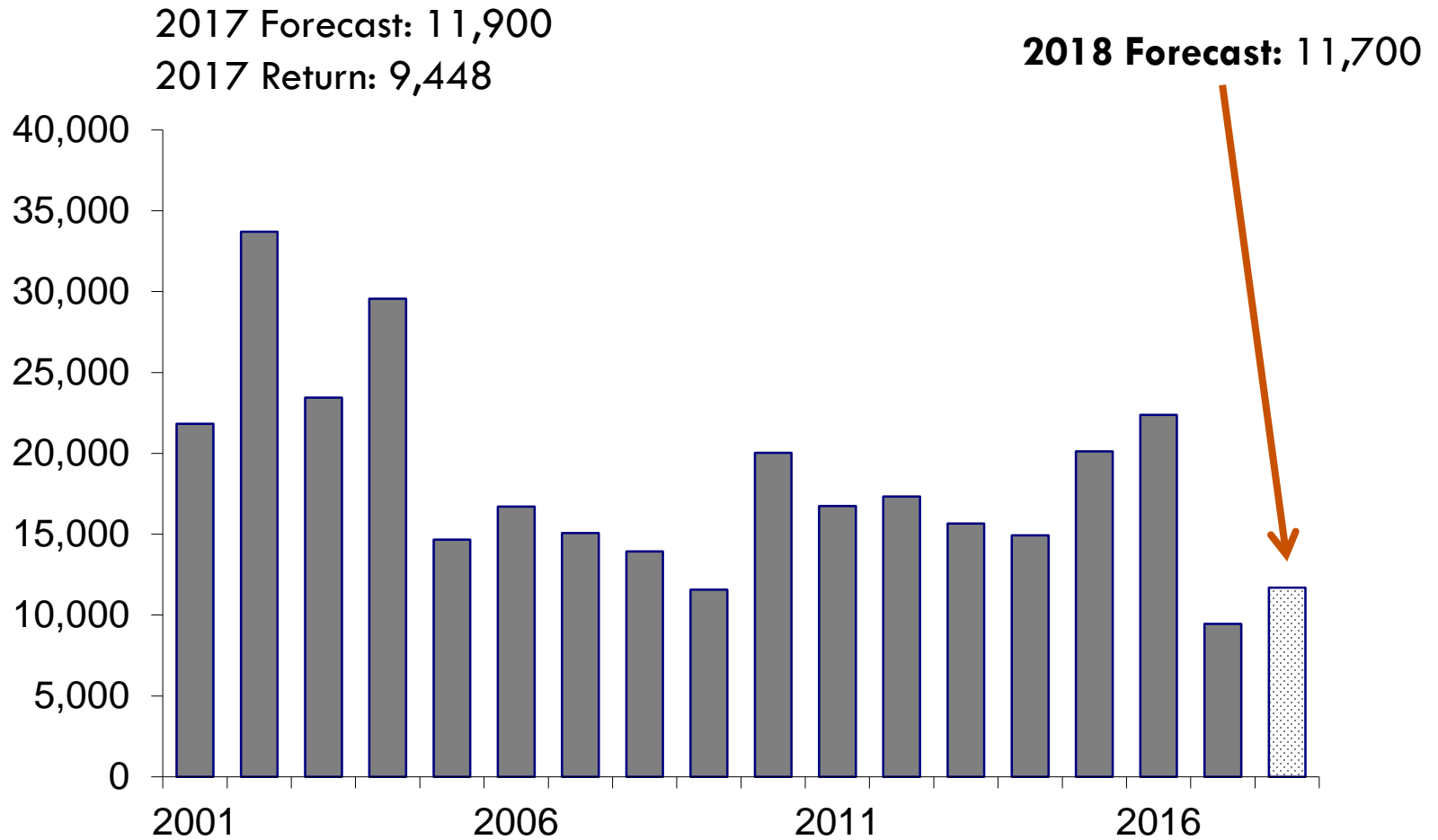
Upriver Summer Steelhead

7



Wild Winter Steelhead

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



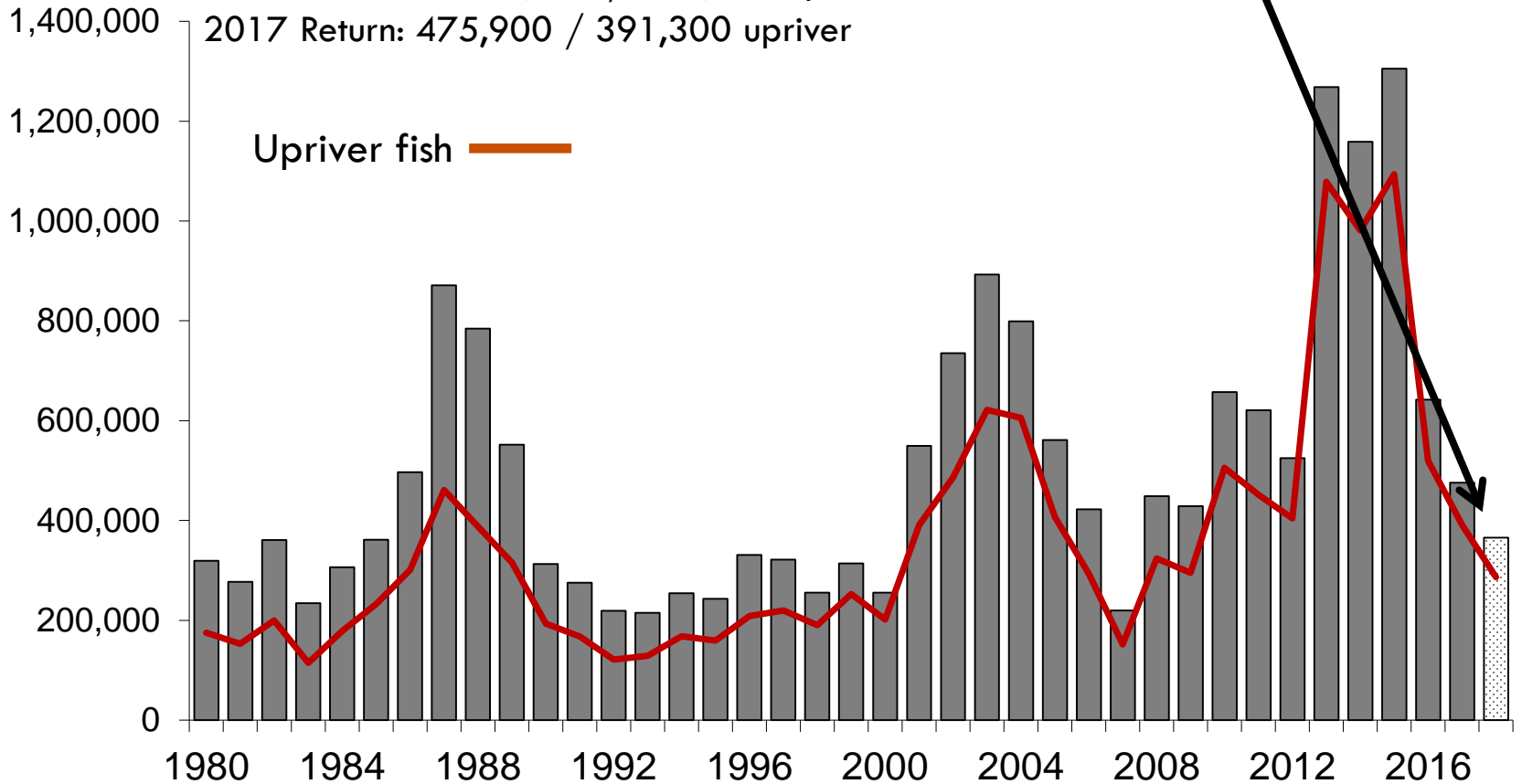
Total Fall Chinook

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

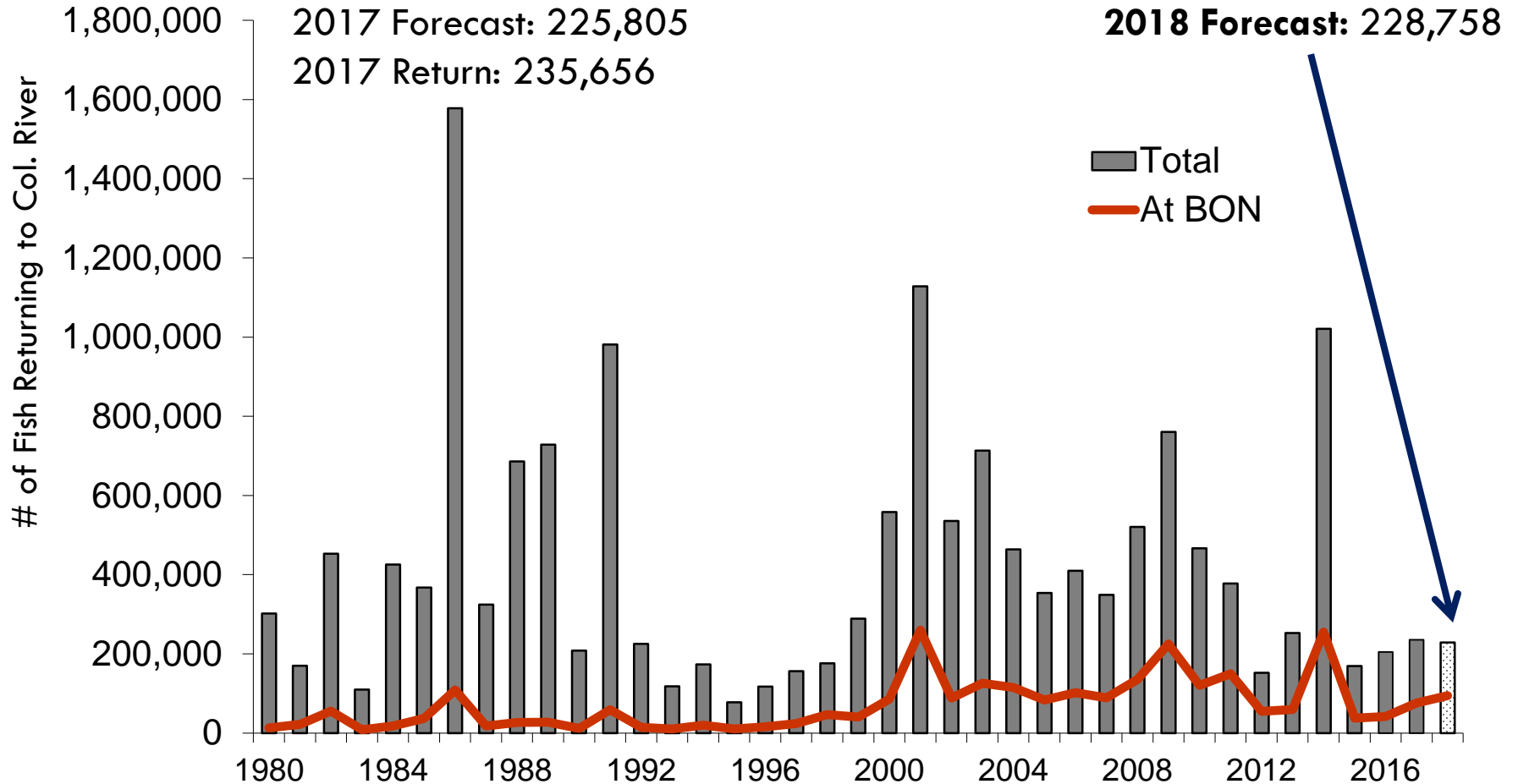
2018 Forecast: 365,600 / 286,600 upriver

2017 Forecast: 582,600 / 460,500 upriver

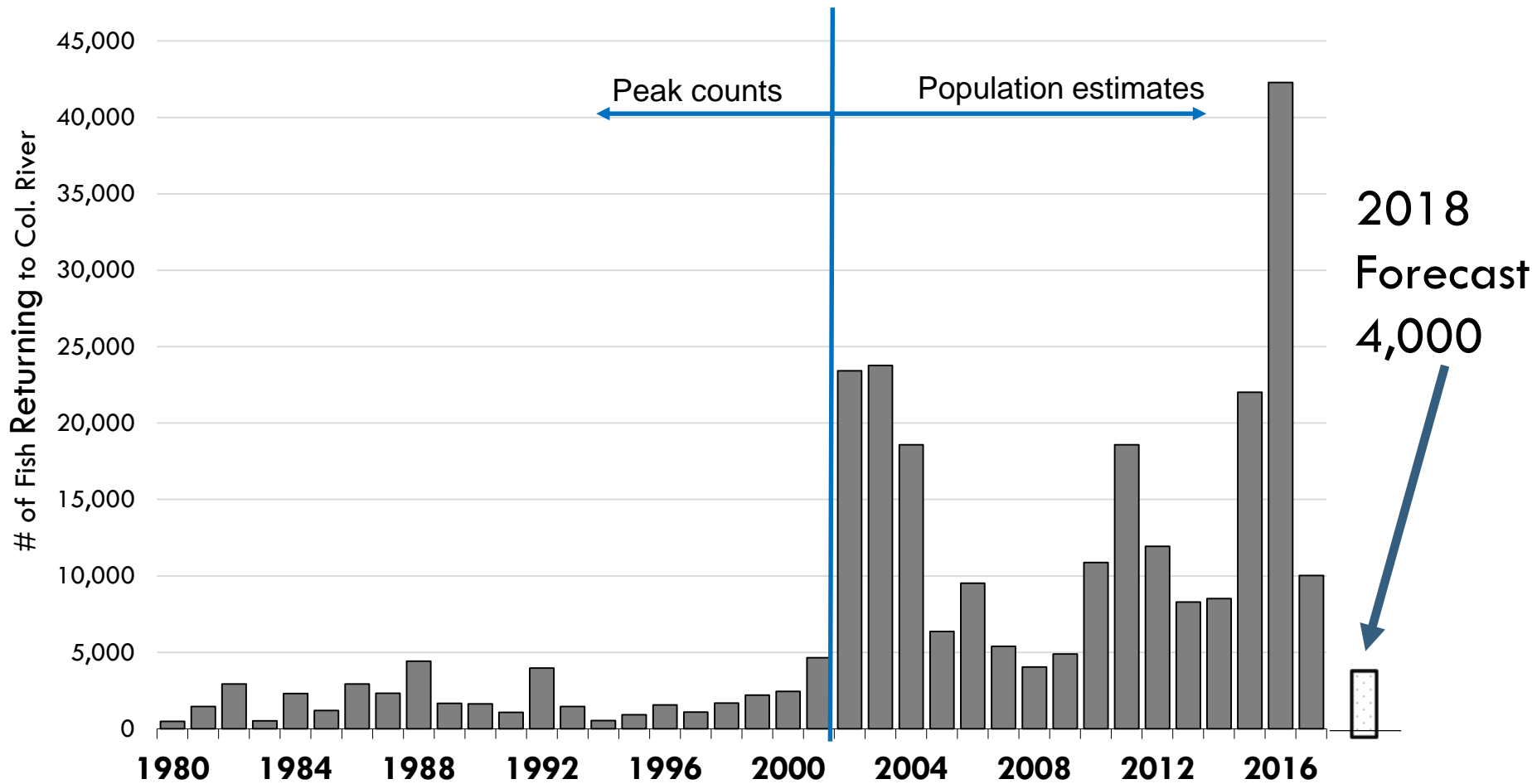
2017 Return: 475,900 / 391,300 upriver



Columbia River Coho Returns

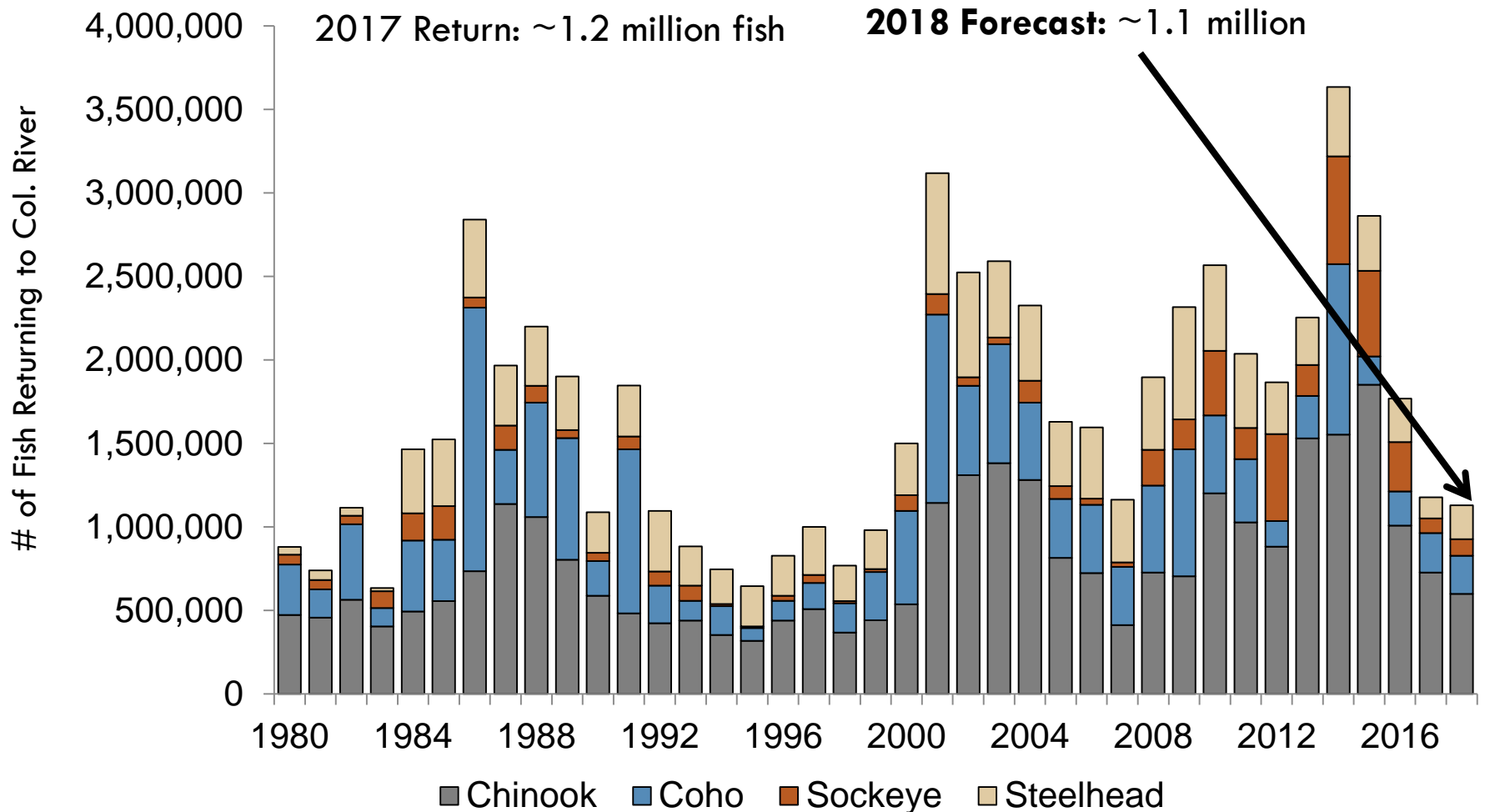


Columbia River Chum

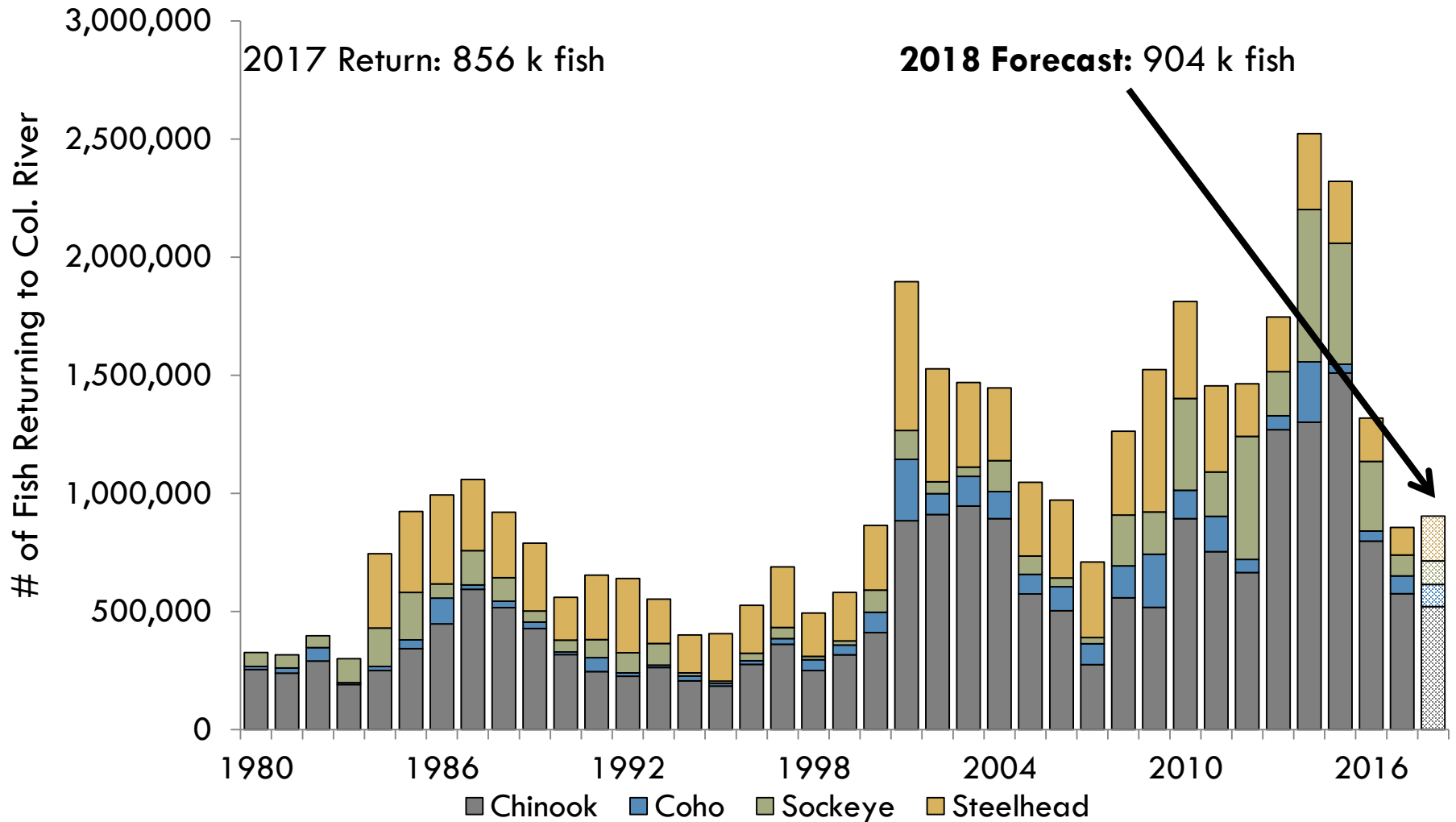


TOTAL Return of Salmonids to the Columbia River

12



UPRIVER Salmonids Returning to the Columbia River



2017 Fisheries Conservation

14

- ▣ Summer Steelhead return was the lowest in the last 25 years
- ▣ Co-managers worked together to reduce recreational impact to steelhead
- ▣ There was heighten concerned for Snake River B-run that return primarily to the Clearwater and Salmon Drainges in Idaho
- ▣ Columbia (OR & WA) and Snake (WA)
 - Rolling closures in mainstem Columbia Aug – Dec to protect B runs
 - Hatchery limit reduced from 2+ in a normal year to 1
 - WA & OR closed tributaries to steelhead angling or limited angling to C&R
 - Snake River C&R until mid-Oct. and 1 hatchery steelhead < 28”
 - No fishing in Upper Columbia

2017 Non-Indian Sport Fisheries

15

▣ Spring Chinook

- Below Bonneville:
 - 126,800 angler trips
 - 12,700 hatchery fish kept
- Bonneville to WA/OR border:
 - 1,400 hatchery fish kept
- Snake River (WA waters):
 - 1,300 hatchery fish kept

▣ Summer Season

- Below Bonneville:
 - 58,100 angler trips
 - 3,100 hatchery Chinook
 - 4,300 hatchery steelhead
 - 700 sockeye
- Bonneville - Priest Rapids:
 - 100 hatchery Chinook
 - 500 sockeye
- Priest Rapids – Chief Joseph:
 - 4,100 hatchery Chinook
 - 5,500 sockeye

▣ Fall Season

- Buoy 10:
 - 95,000 angler trips
 - 17,800 Chinook kept
 - 9,200 hatchery coho kept
- Below Bonneville:
 - 133,300 angler trips
 - 25,100 Chinook kept
 - 1,300 hatchery coho kept
 - 1,900 hatchery steelhead kept
- Hanford Reach:
 - 44,100 angler trips
 - 16,900 Chinook kept

2017 Non-Indian Commercial Fisheries

16

MAINSTEM FISHERIES

- ▣ Spring Season –
 - 3,300 hatchery Chinook
 - 6 periods (65 hrs total)
- ▣ Summer Season –
 - 3,000 Chinook/ 400 sockeye
 - 2 periods (16 hrs total)
- ▣ Fall Season –
 - 58,900 Chinook
 - 1,100 Coho
 - includes seine fishery:
 - 1,000 Chinook and 500 Coho

SELECT AREA FISHERIES (SAFE)

- ▣ Spring Season
 - 7,300 Chinook
- ▣ Summer Season
 - 1,800 Chinook
- ▣ Fall Season
 - 12,400 Fall Chinook
 - 34,700 Coho

2017 Treaty Indian Fisheries

17

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

- ▣ Spring Chinook –
 - 5,200 fish
- ▣ Summer Chinook –
 - 18,600 fish
- ▣ Sockeye –
 - 12,800 fish
- ▣ Summer Steelhead –
 - 2,700 in spring/summer
 - 10,800 in fall
 - 13,500 TOTAL
- ▣ Fall Chinook –
 - 134,100
- ▣ Coho –
 - 5,100

Questions?

18



Impact of Recent Observations on Salmon Returns

*Northwest Power and Conservation Council
March 14th, 2017*



Brian Burke
NOAA Fisheries, NWFSC

Supported by:



Field Sampling

Juvenile Salmon & Ocean Ecosystem Survey (JSOES):

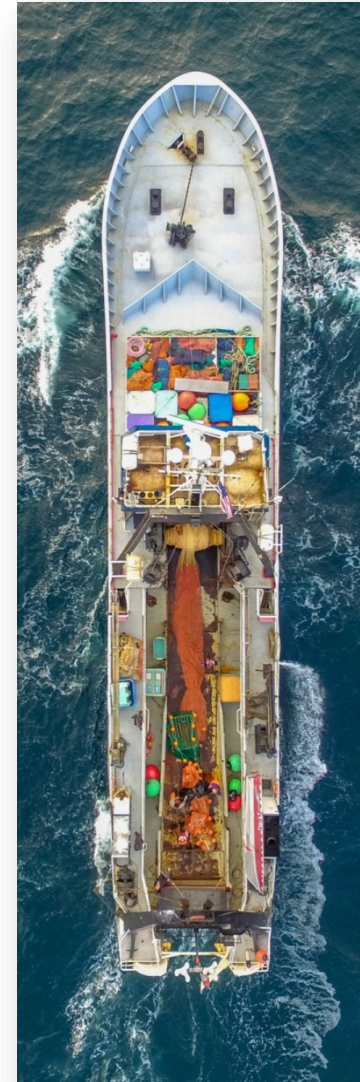
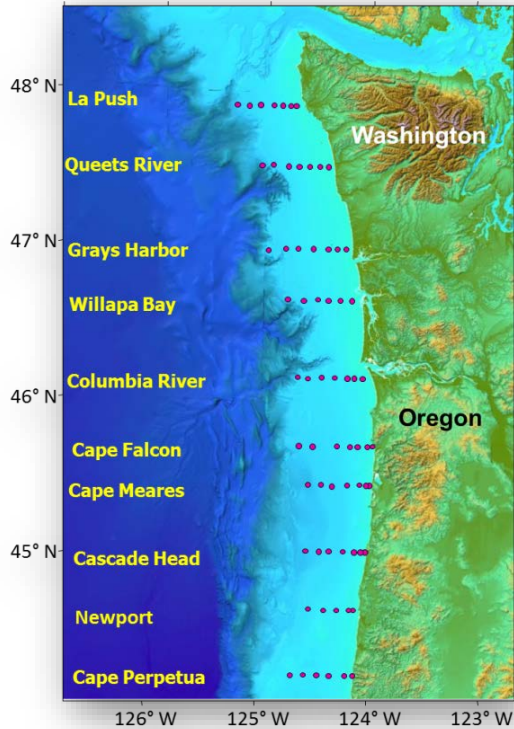
- May (2006 – 2012, 2015 - present)
- June (1998 – present)
- September (1998 – 2012, 2015)

Newport Line

- Biweekly (1996-present)

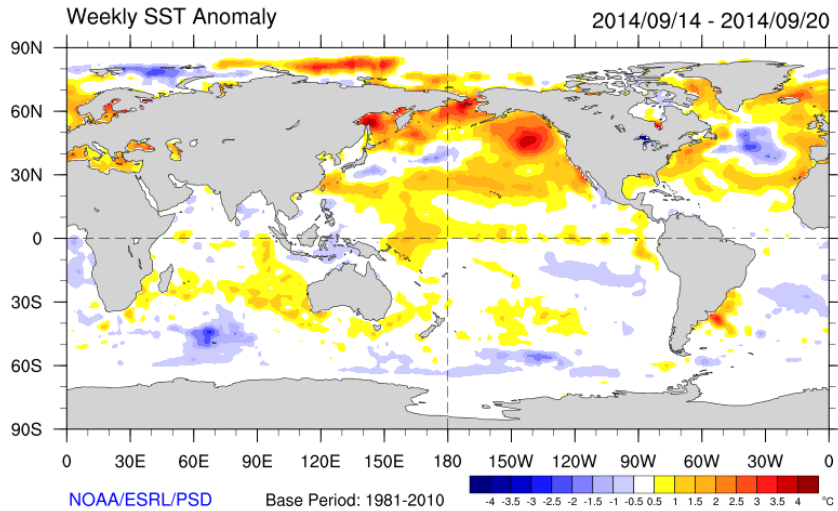
Micronekton Survey, 30 m

- June (2011, 2013 - present)



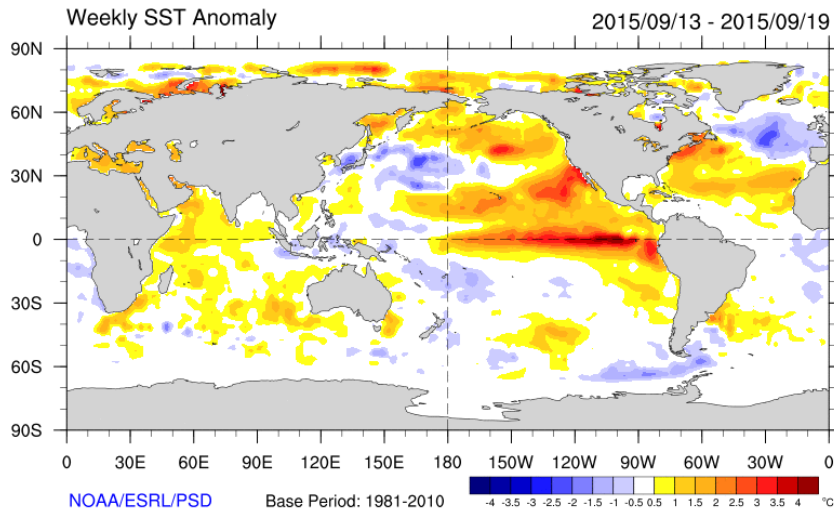
Pacific Basin-Scale Dynamics

September 2014

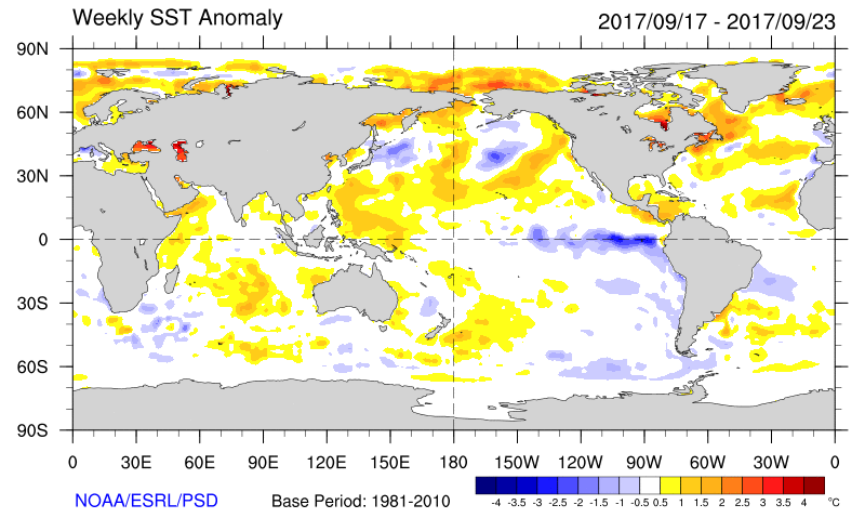


- The blob
- El Niño
- La Niña (x2)

September 2015



September 2017



Biological Response

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

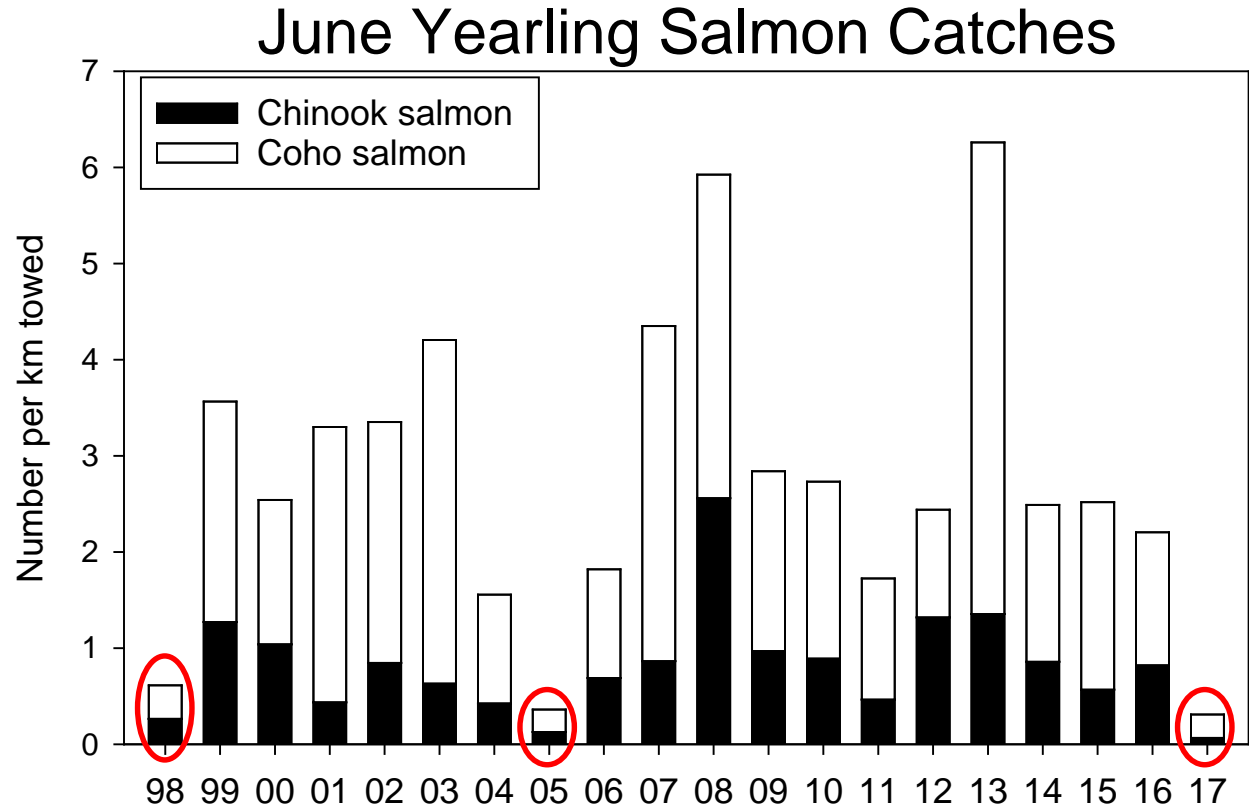
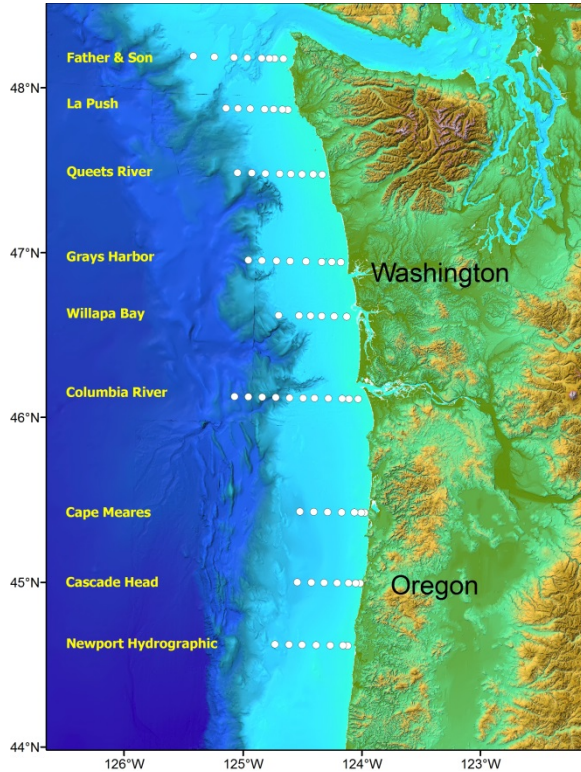


Extremely low
Pacific cod
abundance in
Gulf of Alaska



Crab and clam
fishery closures

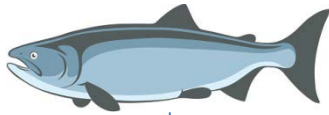
Extremely Low Salmon Abundance



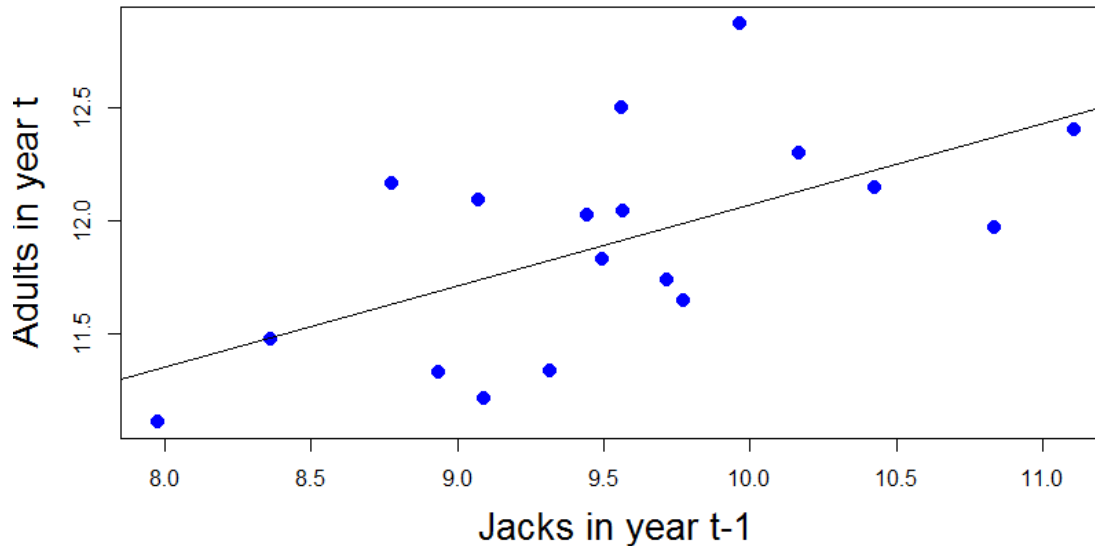
Good – Fair – Poor

		Year																			
<i>Ecosystem Indicators</i>		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Basin-scale physical indices	PDO (Sum Dec-March)	17	6	3	12	7	19	11	15	13	9	5	1	14	4	2	8	10	20	18	16
	PDO (Sum May-Sept)	10	4	6	5	11	16	15	17	12	13	2	9	7	3	1	8	18	20	19	14
	ONI (Average Jan-June)	19	1	1	6	13	15	14	16	8	11	3	10	17	4	5	7	9	18	20	12
Regional physical indices	4605SST (°C; May-Sept)	16	9	3	4	1	8	20	15	5	17	2	10	7	11	12	13	14	19	18	6
	Upper 20 m T (°C; Nov-Mar)	19	11	8	10	6	14	15	12	13	5	1	9	16	4	3	7	2	20	18	17
	Upper 20 m T (°C; May-Sept)	16	12	14	4	1	3	20	18	7	8	2	5	13	10	6	17	19	9	15	11
	Deep temperature (°C; May-Sept)	20	6	8	4	1	10	12	16	11	5	2		14	9	3	15	19	18	13	17
	Deep salinity (May-Sept)	19	3	9	4	5	16	17	10	7	1	2	14	18	13	12	11	20	15	8	6
Regional biological indices	Copepod richness anom. (no. species; May-Sept)	17	2	1	7	6	13	12	16	14	10	8	9	15	4	5	3	11	18	19	14
	N. copepod biomass anom. (mg C m ⁻³ ; May-Sept)	17	13	9	10	3	15	12	18	14	11	6	8	7	1	2	4	5	16	19	17
	S. copepod biomass anom. (mg C m ⁻³ ; May-Sept)	19	2	5	4	3	13	14	18	12	10	1	7	15	9	8	6	11	16	17	16
	Biological transition (day of year)	17	11	6	7	8	12	10	16	15	3	1	2	14	4	9	5	13	20	20	20
	Ichthyoplankton biomass (log (mg C 1000 m ⁻³); Jan-Mar)	20	11	3	7	9	18	17	13	16	15	2	12	4	14	10	8	19	5	6	1
	Ichthyoplankton community index (PCO axis 1 scores; Jan-Mar)	9	13	1	6	4	10	18	16	3	12	2	14	15	11	5	7	8	17	20	19
	Chinook salmon juvenile catches (no. km ⁻² ; June)	18	4	5	15	8	12	16	19	11	9	1	6	7	14	3	2	10	13	17	20
	Coho salmon juvenile catches (no. km ⁻² ; June)	18	7	12	5	6	2	15	19	16	4	3	9	10	14	17	1	11	8	13	20

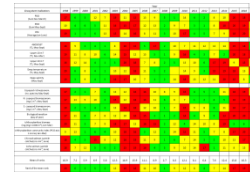
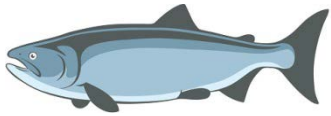
Regression Analysis



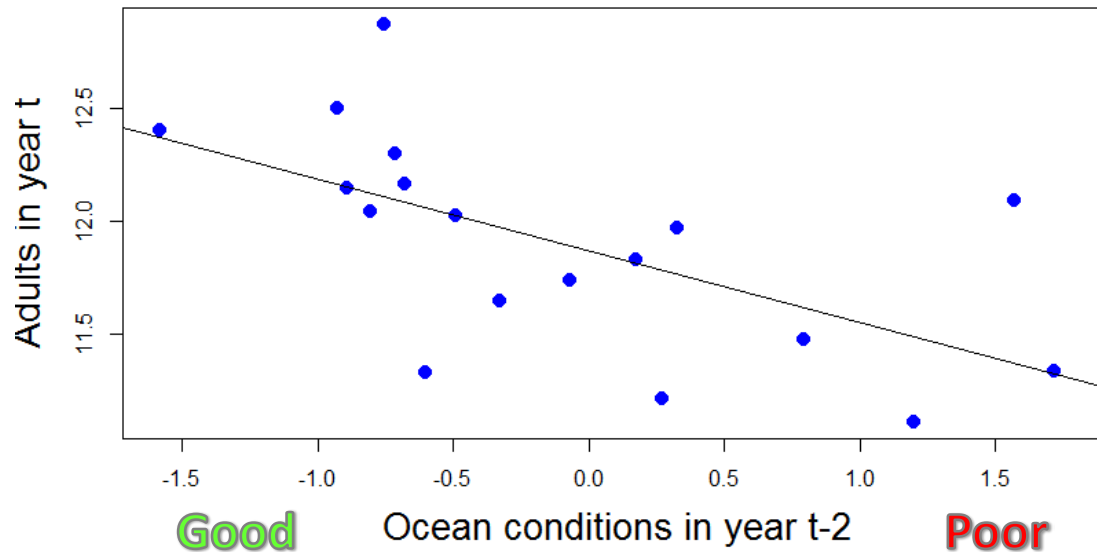
$$y = a + b(\text{Jacks}) + \varepsilon$$



Regression Analysis



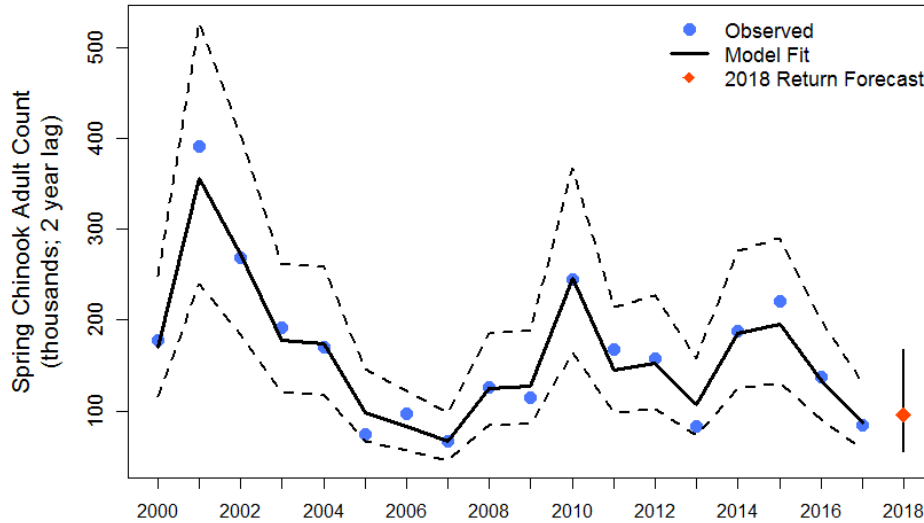
$$y = a + b(Jacks) + c(Ocean) + \varepsilon$$



Chinook at Bonneville Dam

Dynamic Linear Models

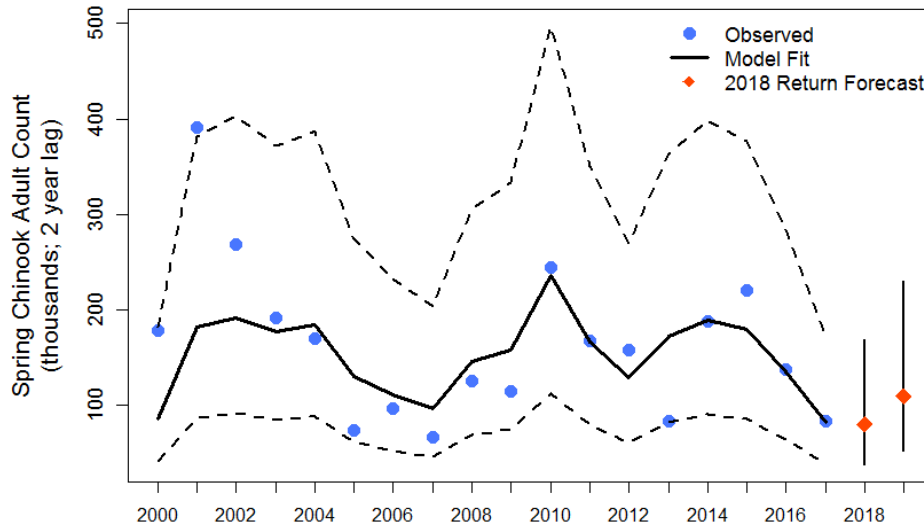
Sibling Regression and the first Principal Component of the stoplight chart



Spring Chinook

March 15 – May 31

Outlook for 2018: **96K (55-168)**



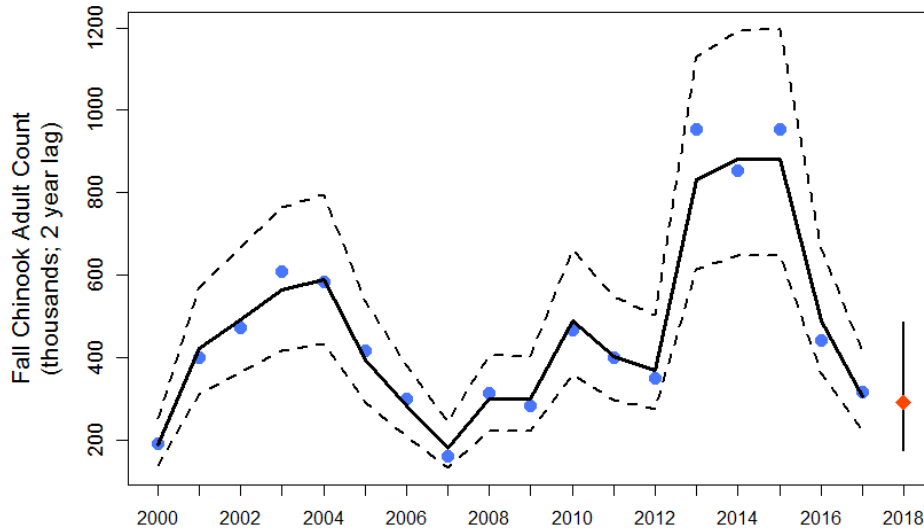
Outlook for 2019: **109K (52 – 230)**

(no jack information)

Chinook at Bonneville Dam

Dynamic Linear Models

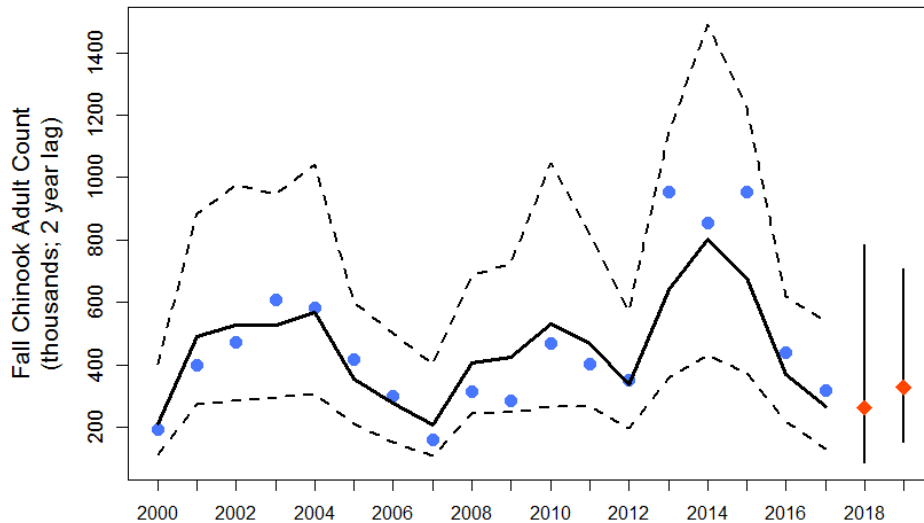
Sibling Regression and the first Principal Component of the stoplight chart



Fall Chinook

Aug 1 – Nov 15

Outlook for 2018: **292K (175 - 487)**

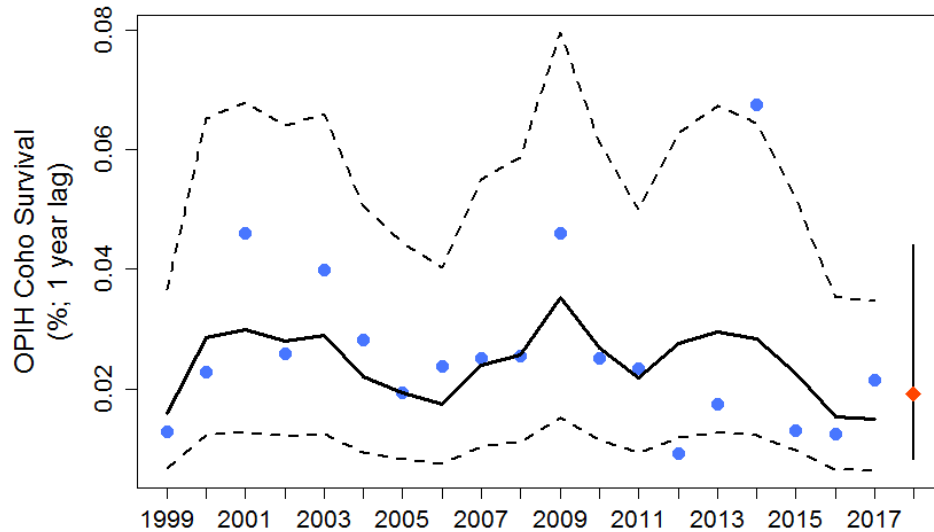


Outlook for 2019: **327K (152 – 707)**

Coho at Bonneville Dam

Dynamic Linear Models

First Principal Component of the stoplight chart



Coho

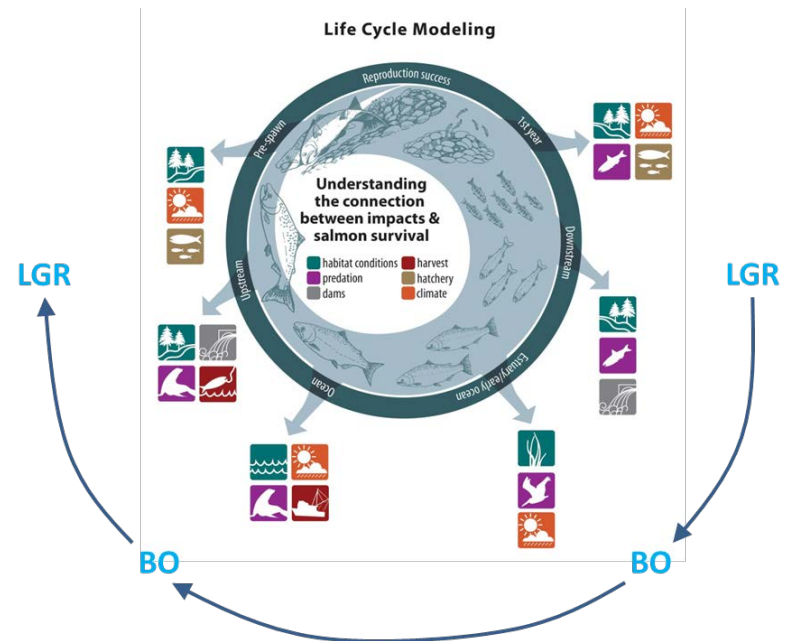
OPIH

Outlook for 2018: **1.9% (0.8 – 4.4)**

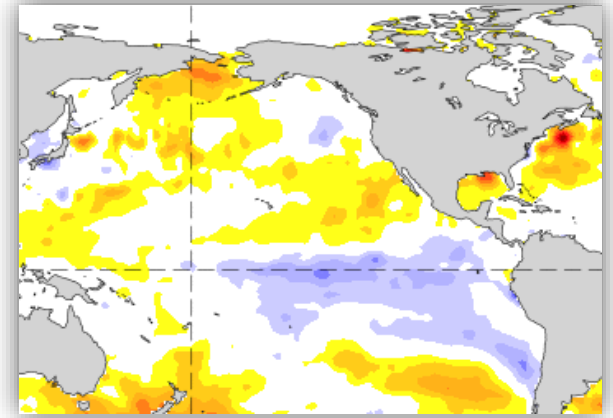
Stock-specific Charts: Interior Spring Chinook

	Year																			
Indicators	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
PDO (winter)	17	6	1	13	7	19	12	11	15	9	5	3	14	4	2	8	10	20	18	16
PDO (spring)	17	5	10	9	6	15	13	18	11	8	2	1	12	4	3	7	16	19	20	14
PDO (summer)	11	5	8	6	10	18	14	16	12	15	1	9	7	3	2	4	17	20	19	13
NPGO (fall)	9	16	19	18	14	10	7	2	4	11	20	13	15	12	17	5	6	1	8	3
ONI (spring)	19	1	3	6	14	11	13	16	7	10	2	9	17	4	5	8	12	18	20	15
SST (WA, spring)	20	6	10	7	5	14	15	17	11	9	1	2	12	4	3	8	16	18	19	13
SST (WA, summer)	17	10	5	4	6	14	20	12	3	19	1	8	2	11	15	9	7	18	16	13
SST (coastwide, spring)	14	1	9	7	6	13	15	17	10	5	2	3	12	8	4	11	18	20	19	16
SST (coastwide, winter)	8	1	10	6	7	14	17	15	9	11	5	12	4	3	2	13	19	20	18	16
Ichthyo. Biomass	1	10	18	14	12	3	4	8	5	6	19	9	17	7	11	13	2	16	15	20
S. Cop. Biomass	20	1	4	4	1	13	14	19	12	10	1	7	15	9	7	6	11	17	18	16
Biological Trans	17	8	5	7	9	14	13	18	12	2	1	3	15	6	10	4	11	19	19	16

Example use: Snake River Sp/Su Chinook Life Cycle Modeling



Conclusions



- Blob and El Niño are gone, La Niña diminishing
- The ocean ecosystem (biology) changed significantly, and is still changing
- Expected returns in 2018: similar to 2017 (well below 10 year mean for Chinook)