Fish IN
Fish OUT

Sustainable Land Strategy

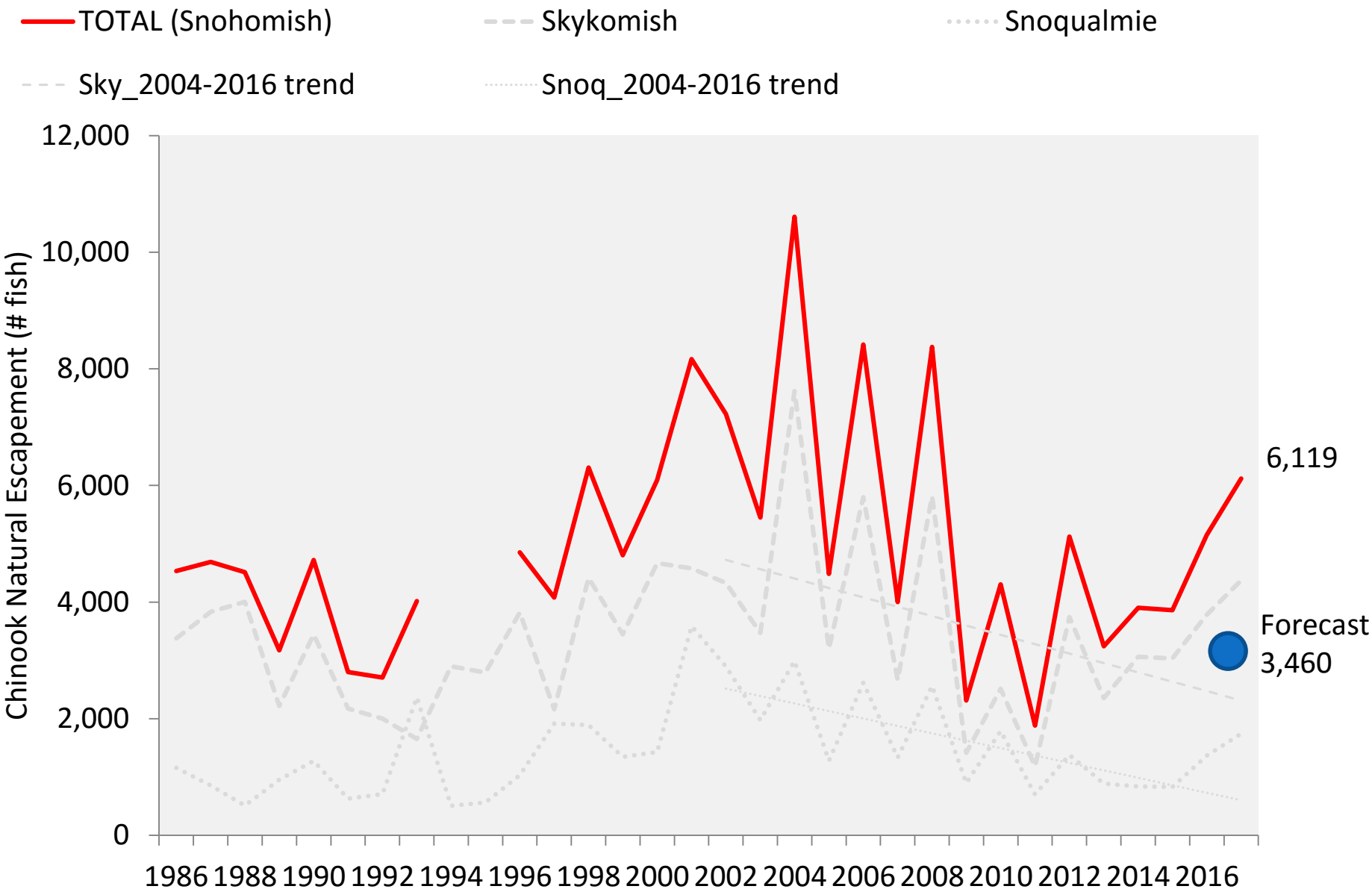
May 9, 2018

Colin Wahl

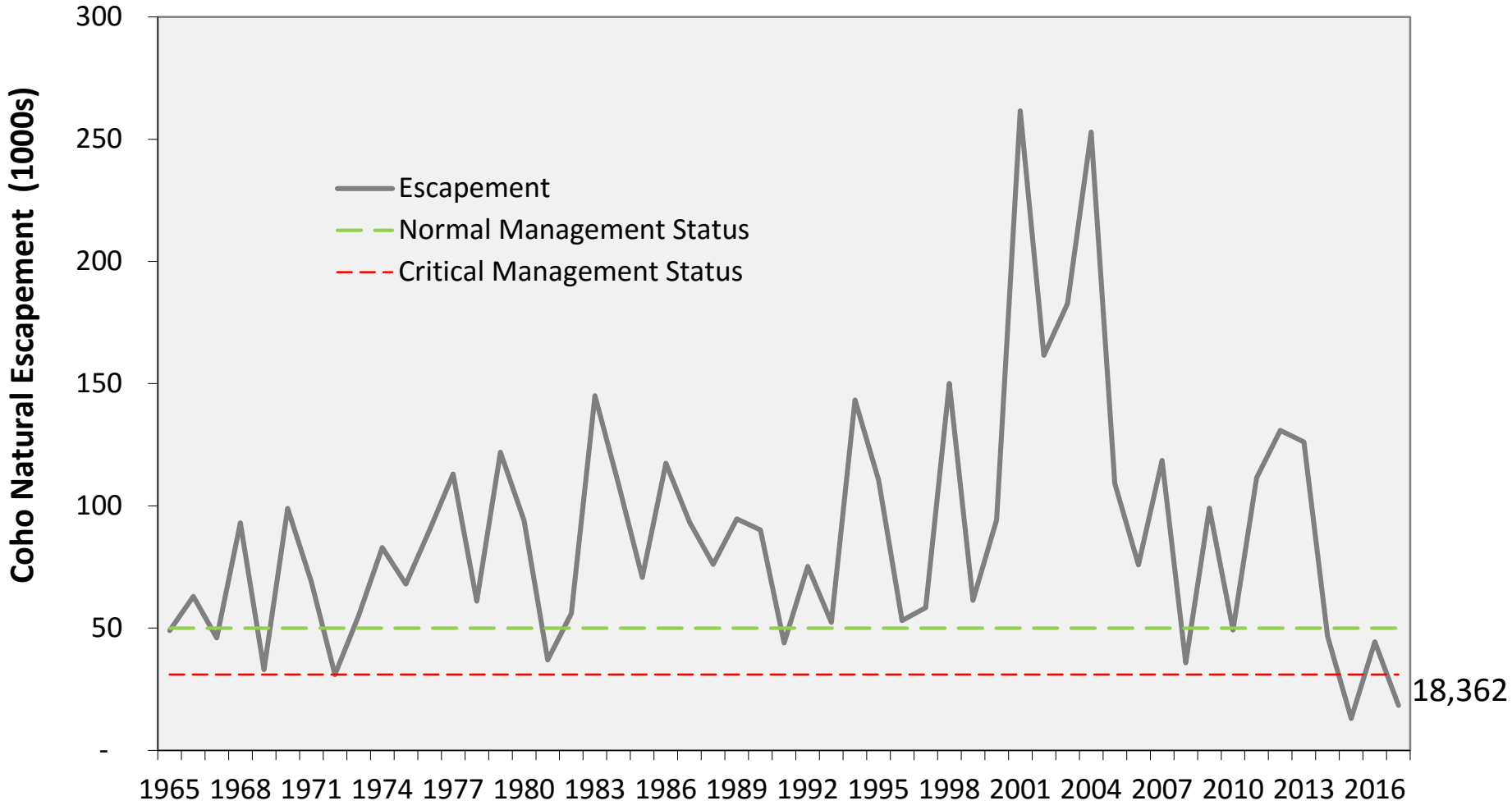
Tulalip Tribes

- Trends
- Trap numbers
- Productivity
- Ocean conditions/factors affecting trends
- 2018 forecast
- FRAM and 2018
- harvest management plan

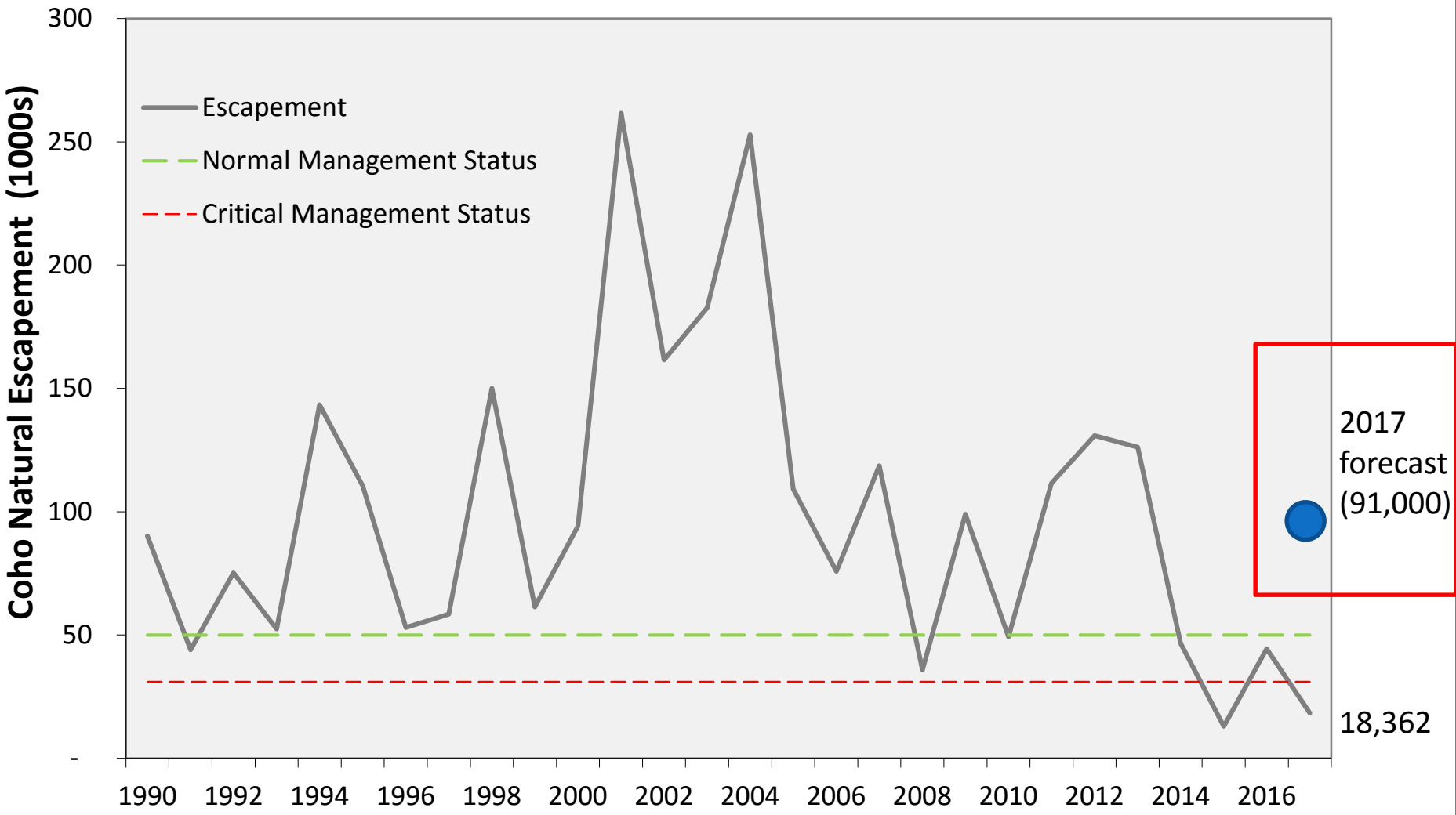
Chinook


TOTAL (Snohomish)
Skykomish
Snoqualmie
Sky_2004-2016 trend
Snoq_2004-2016 trend
Chinook Natural Escapement (# fish)
12,000
10,000
8,000
6,000
4,000
2,000
0
1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
6,119
Forecast
3,460

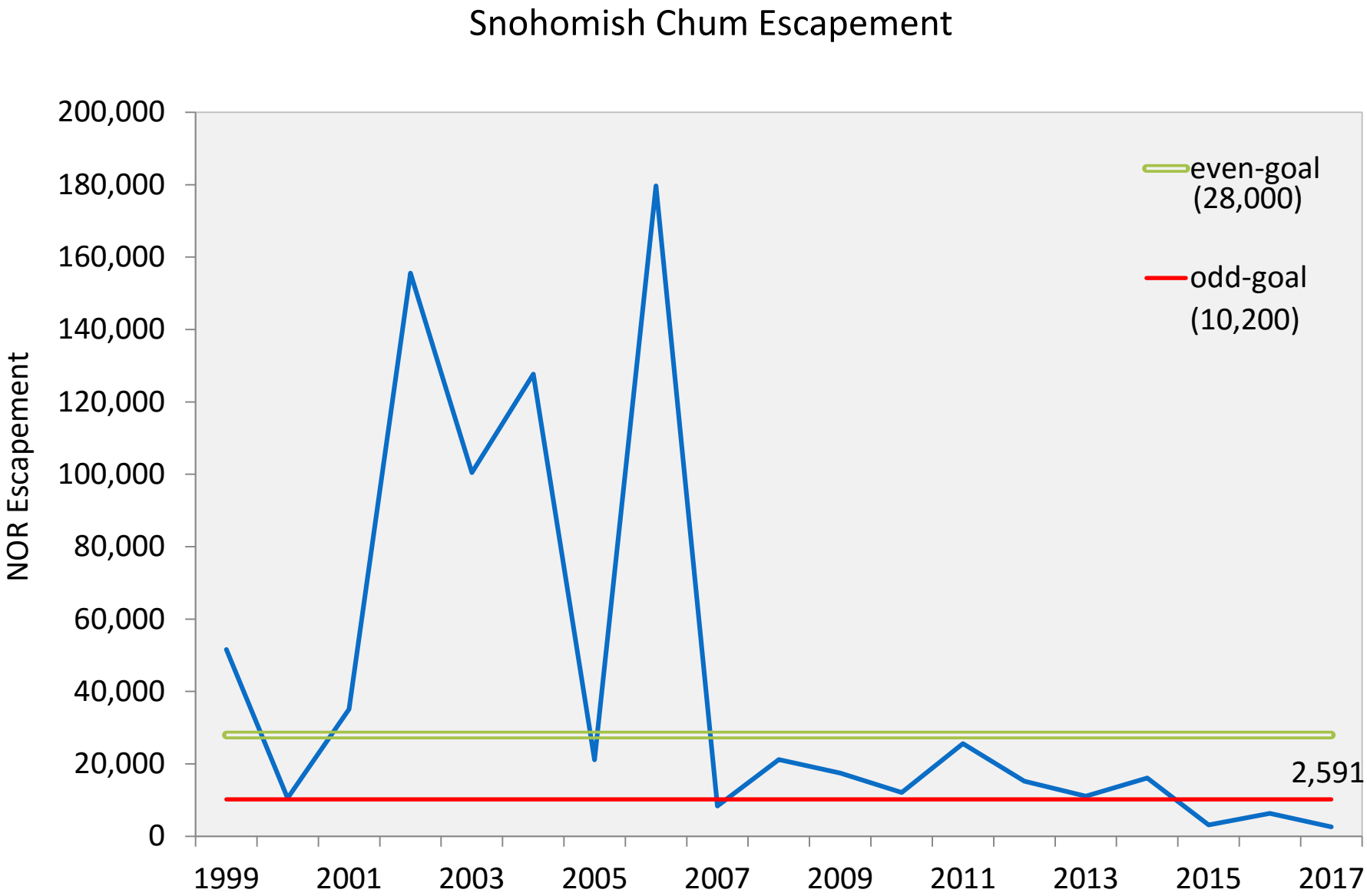
Coho (50 yr record)



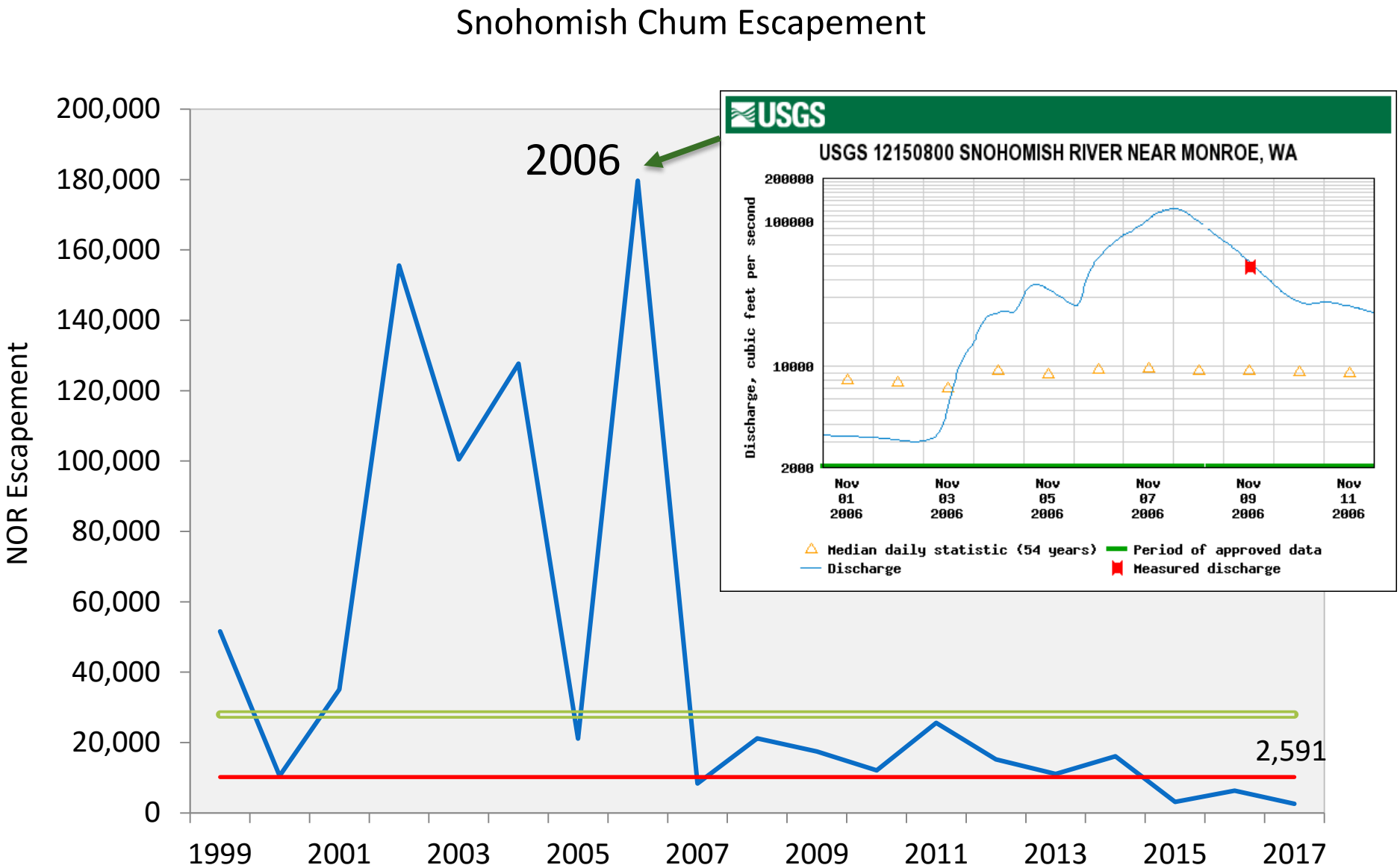
Coho (26 yr record)



Chum

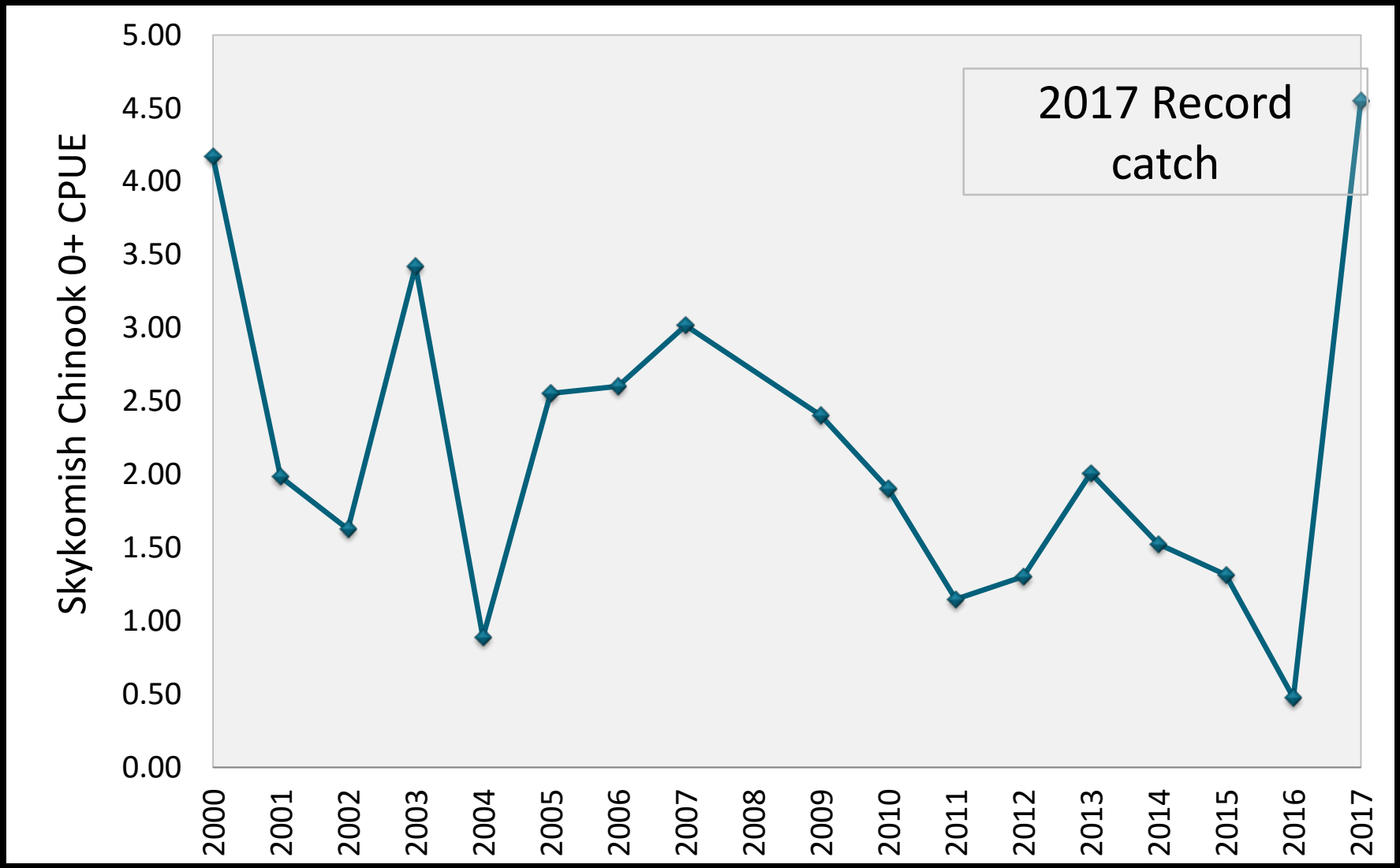

Snohomish Chum Escapement
NOR Escapement
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
even-goal (28,000)
odd-goal (10,200)
2,591

4th highest peak flow on record

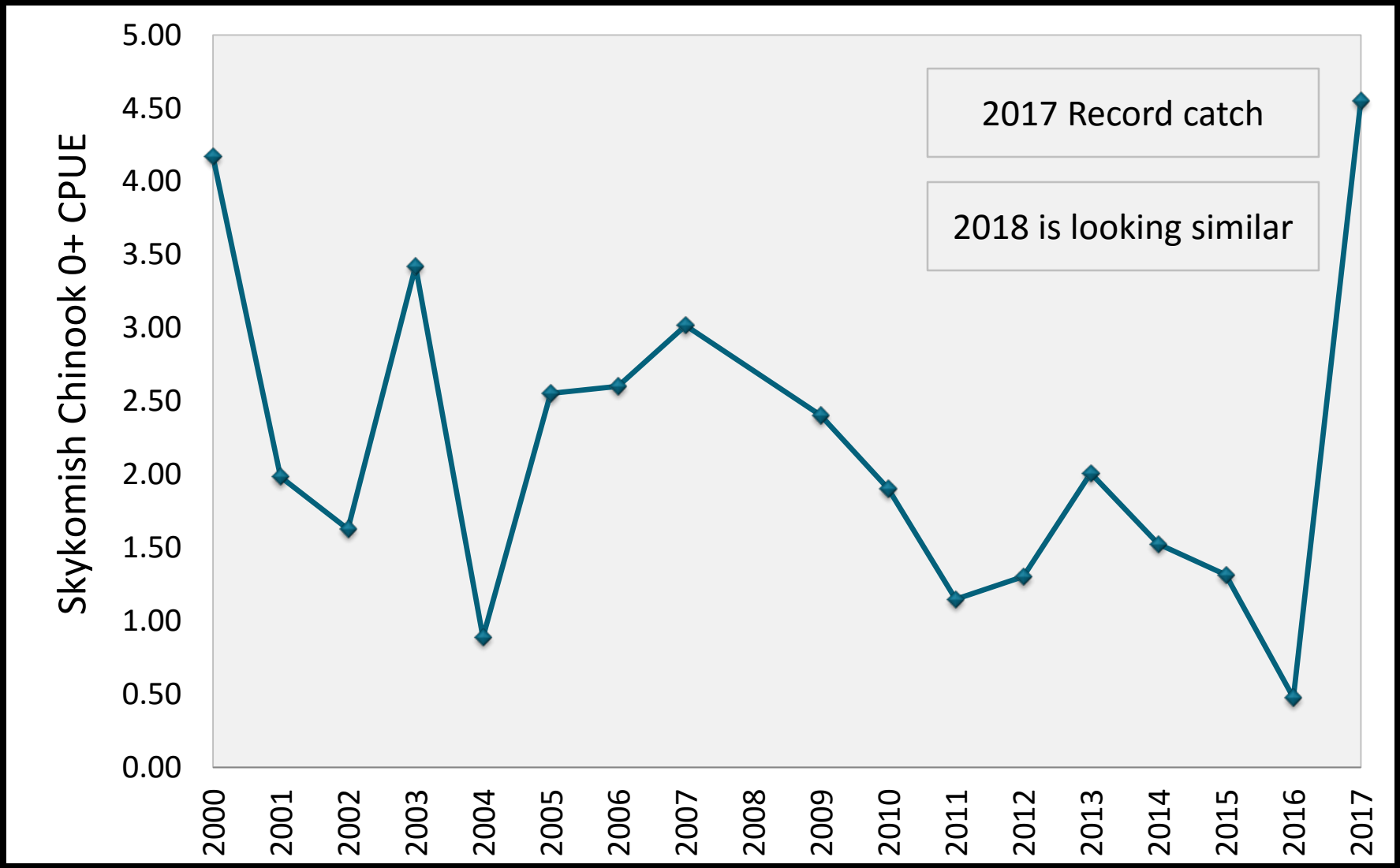


Screw Trap

2017 Chinook (CPUE)

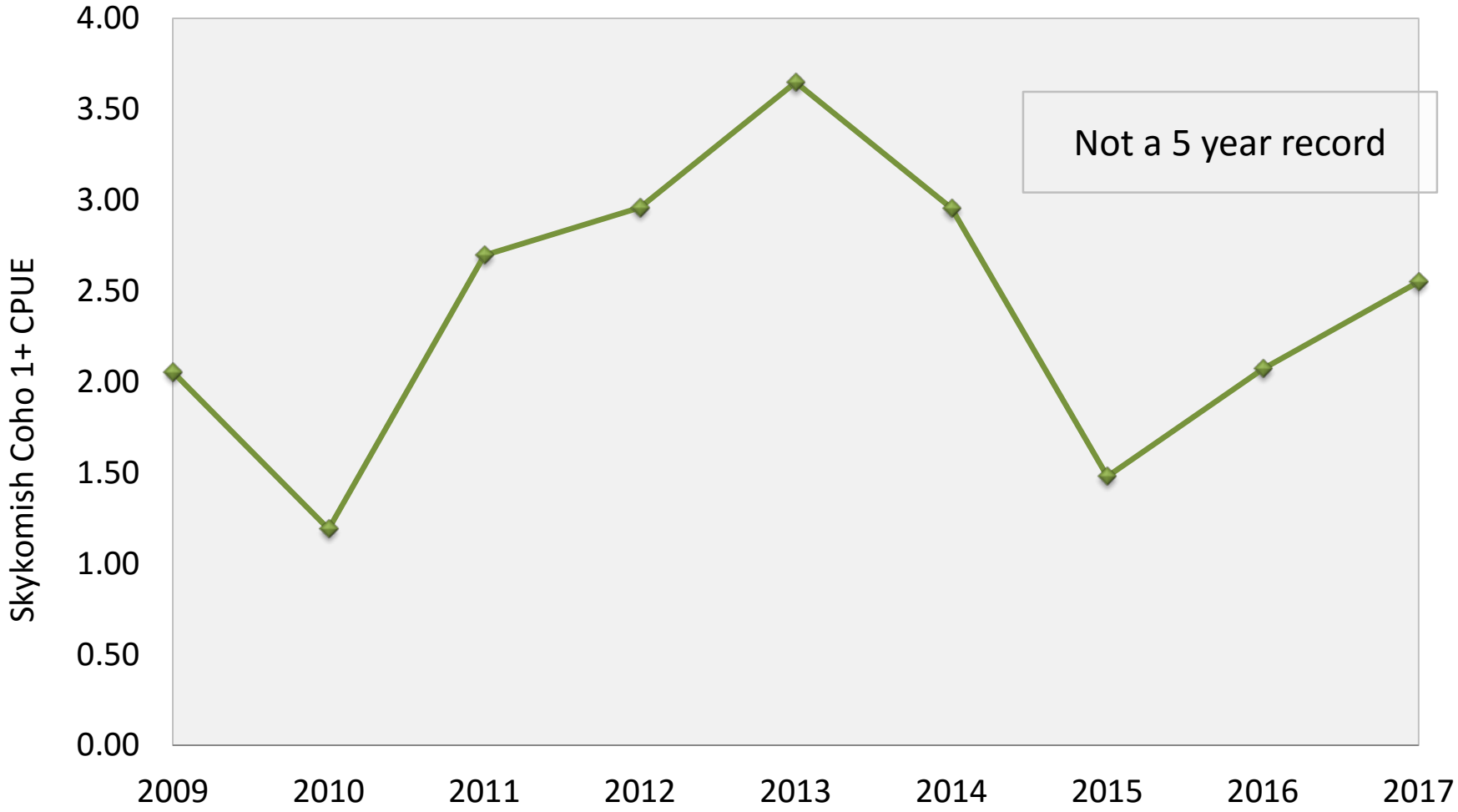


2017 Coho (CPUE)



2017 Coho (CPUE)

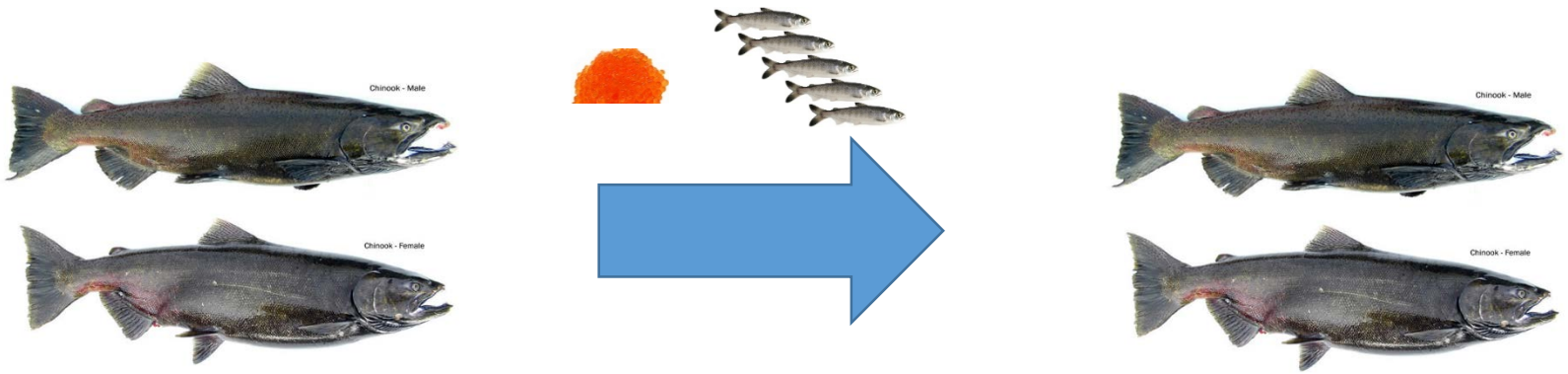
2009 – 2017 Coho



Productivity

Salmon are a naturally productive species

What is Productivity?

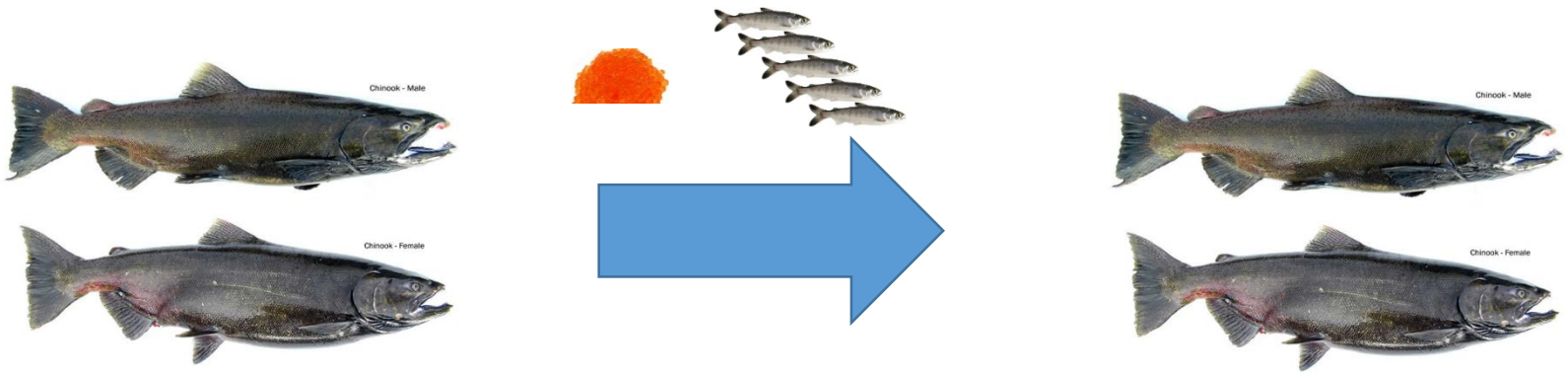


Number of spawners

Number of progeny to reach adulthood

$$\frac{2}{2} = 1$$

Productivity = 1 (replacement)

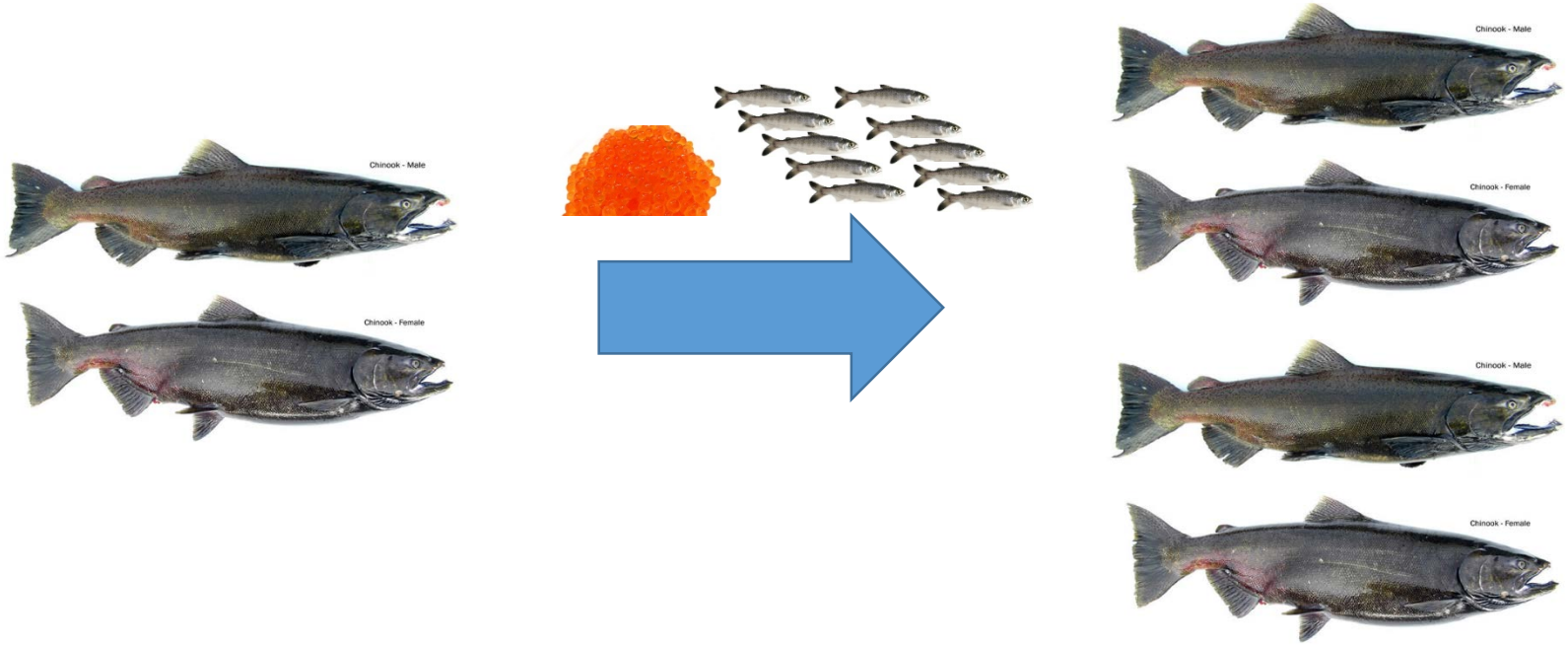


Number of spawners

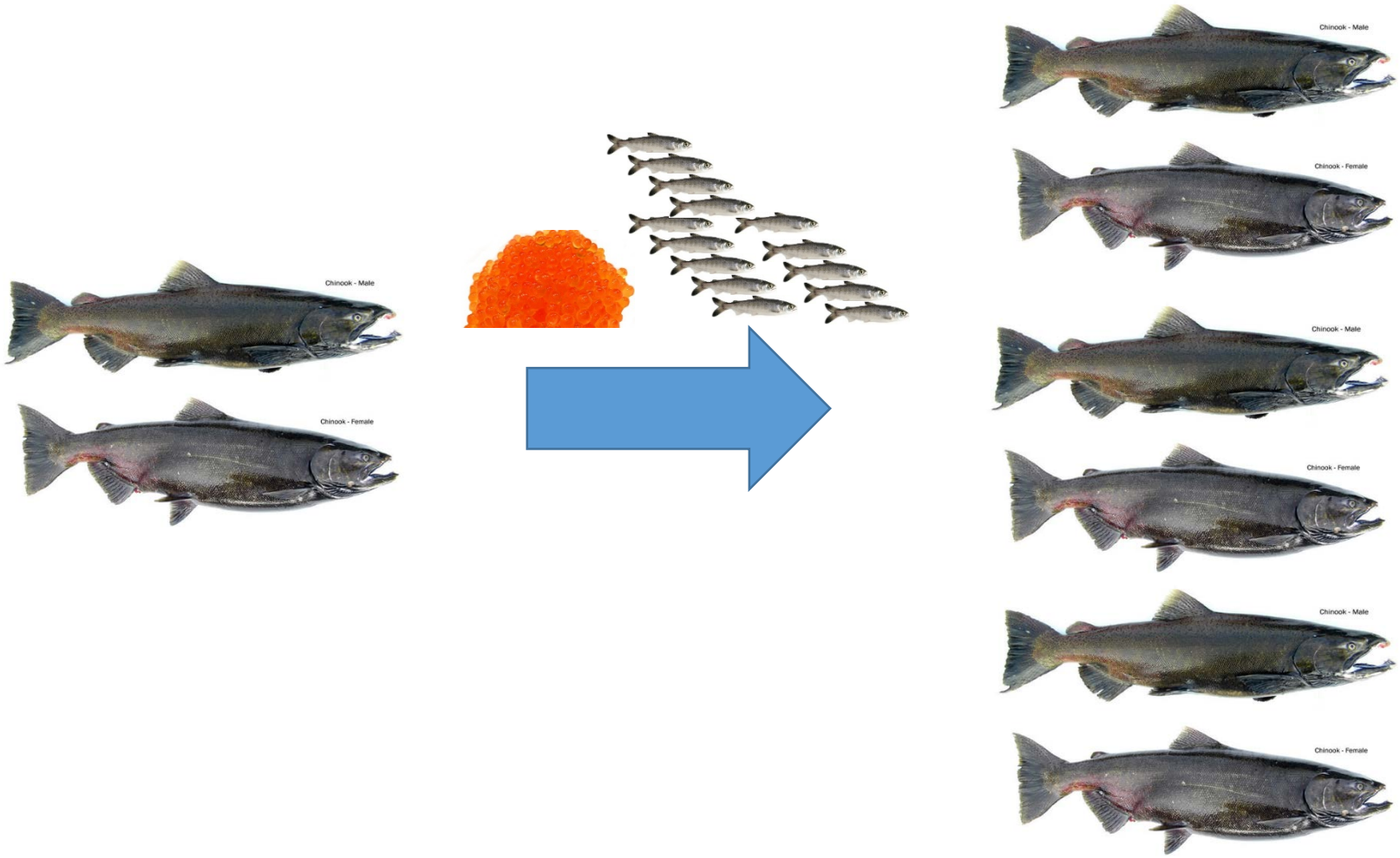
Number of progeny to reach adulthood

$$\frac{2}{2} = 1$$

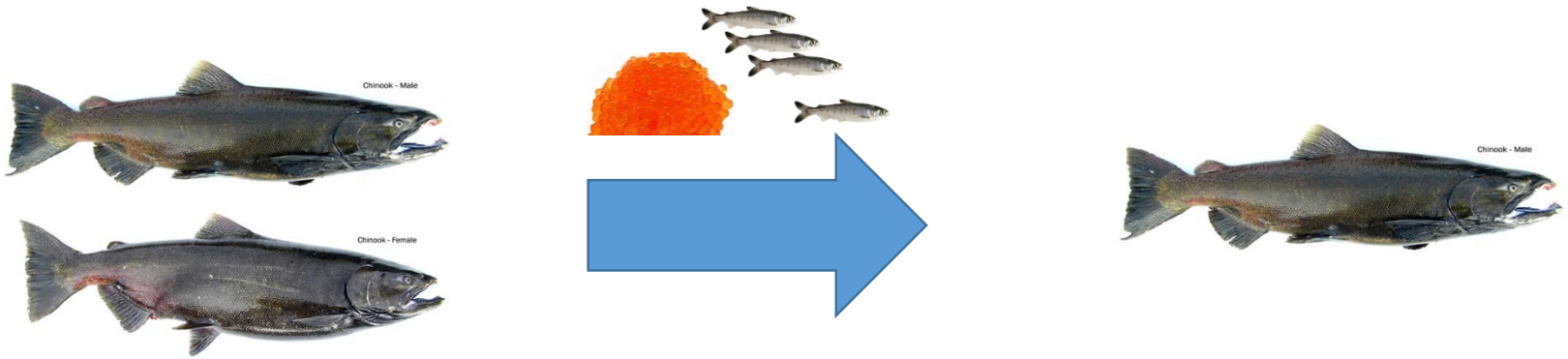
Productivity = 2



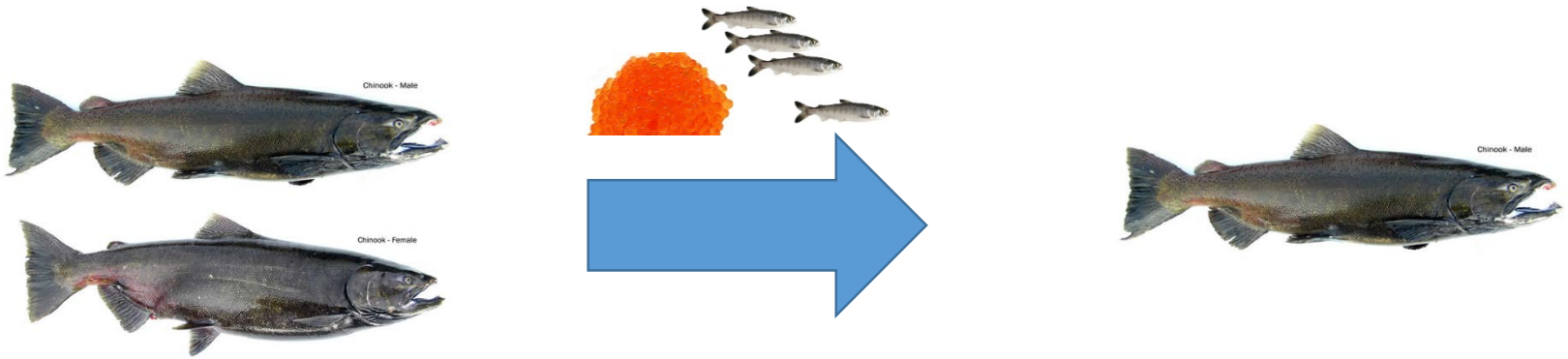
Productivity = 3 (high productivity)



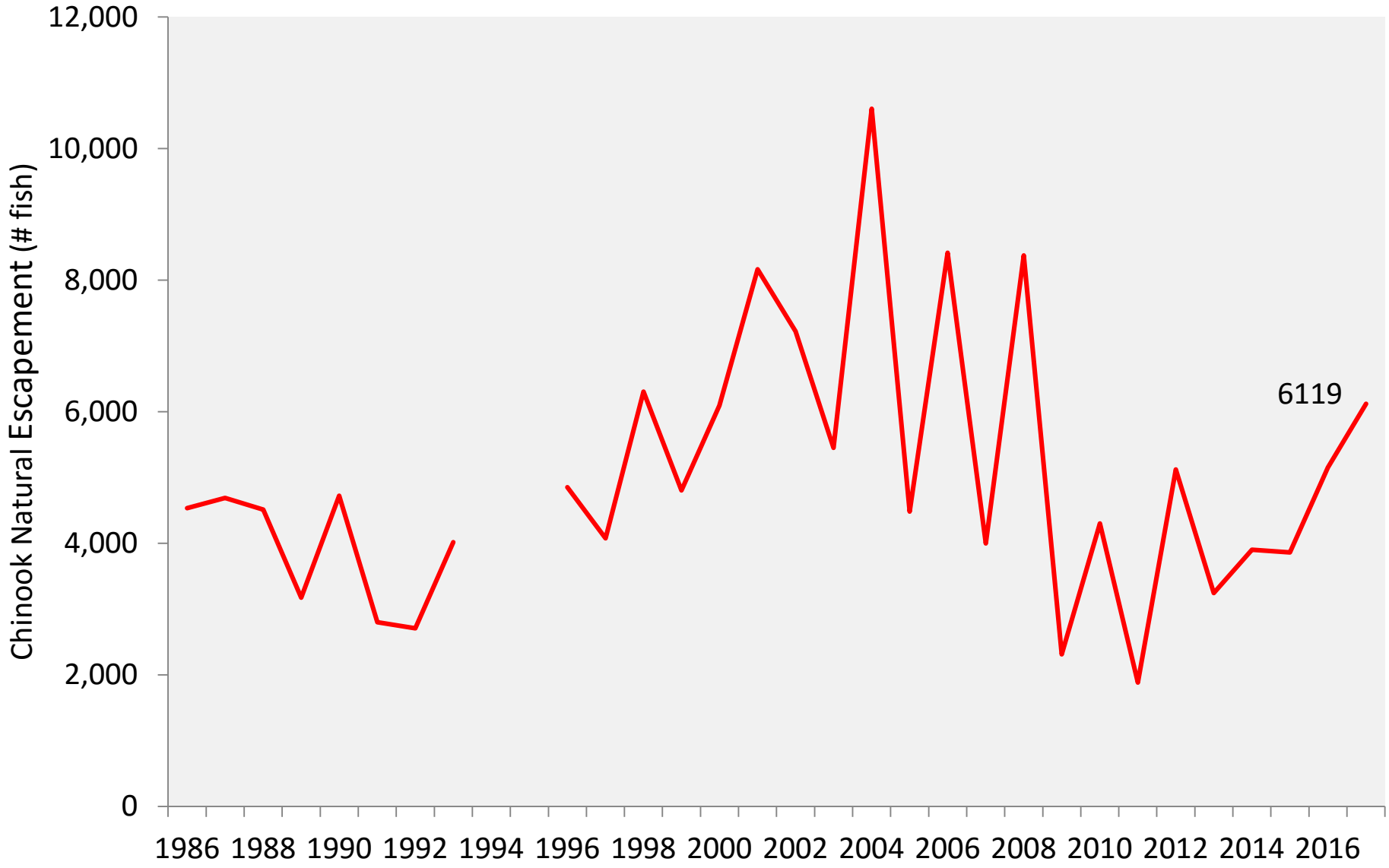
Productivity = 0.5 (Low productivity)



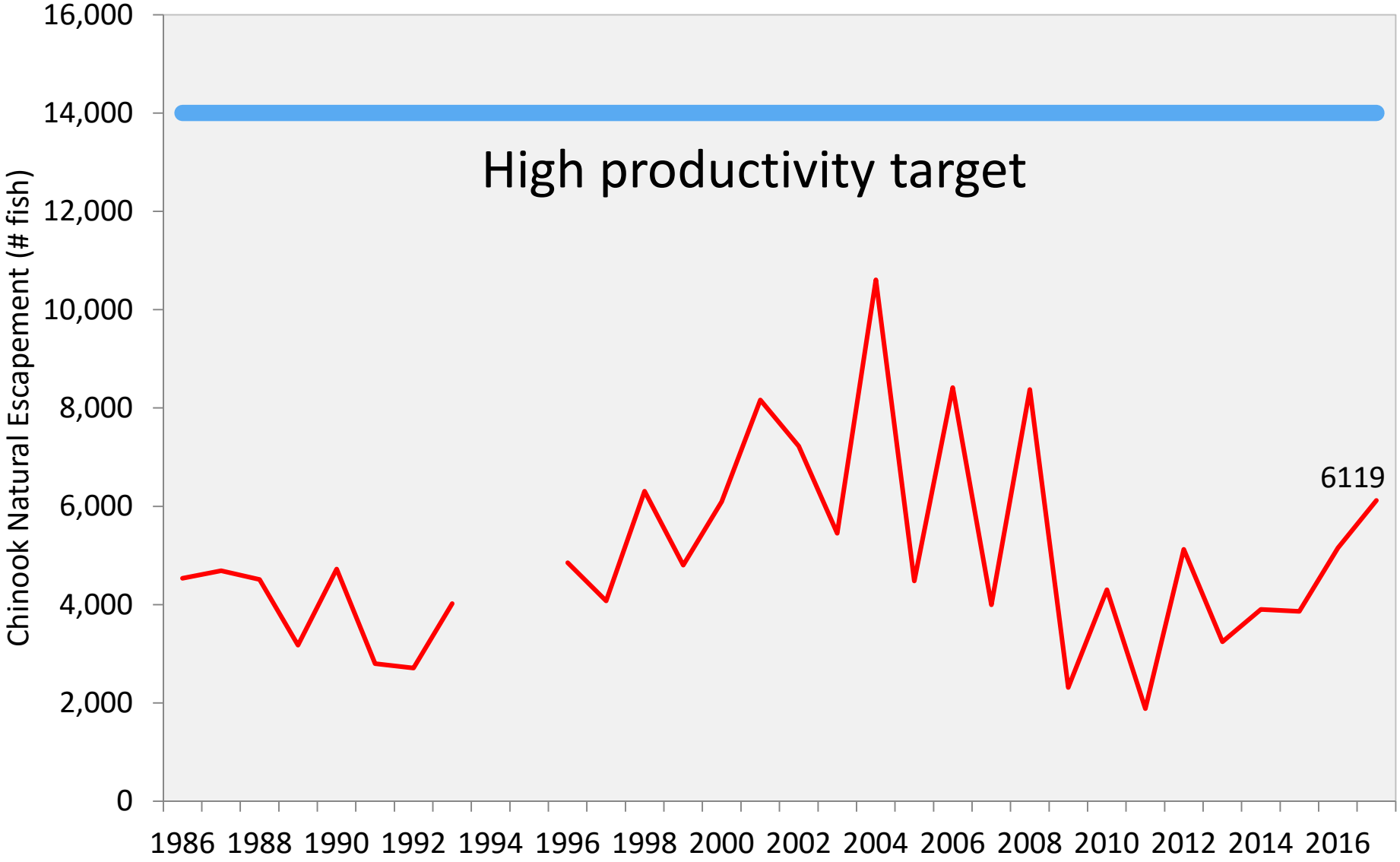
Productivity defines our recovery goals



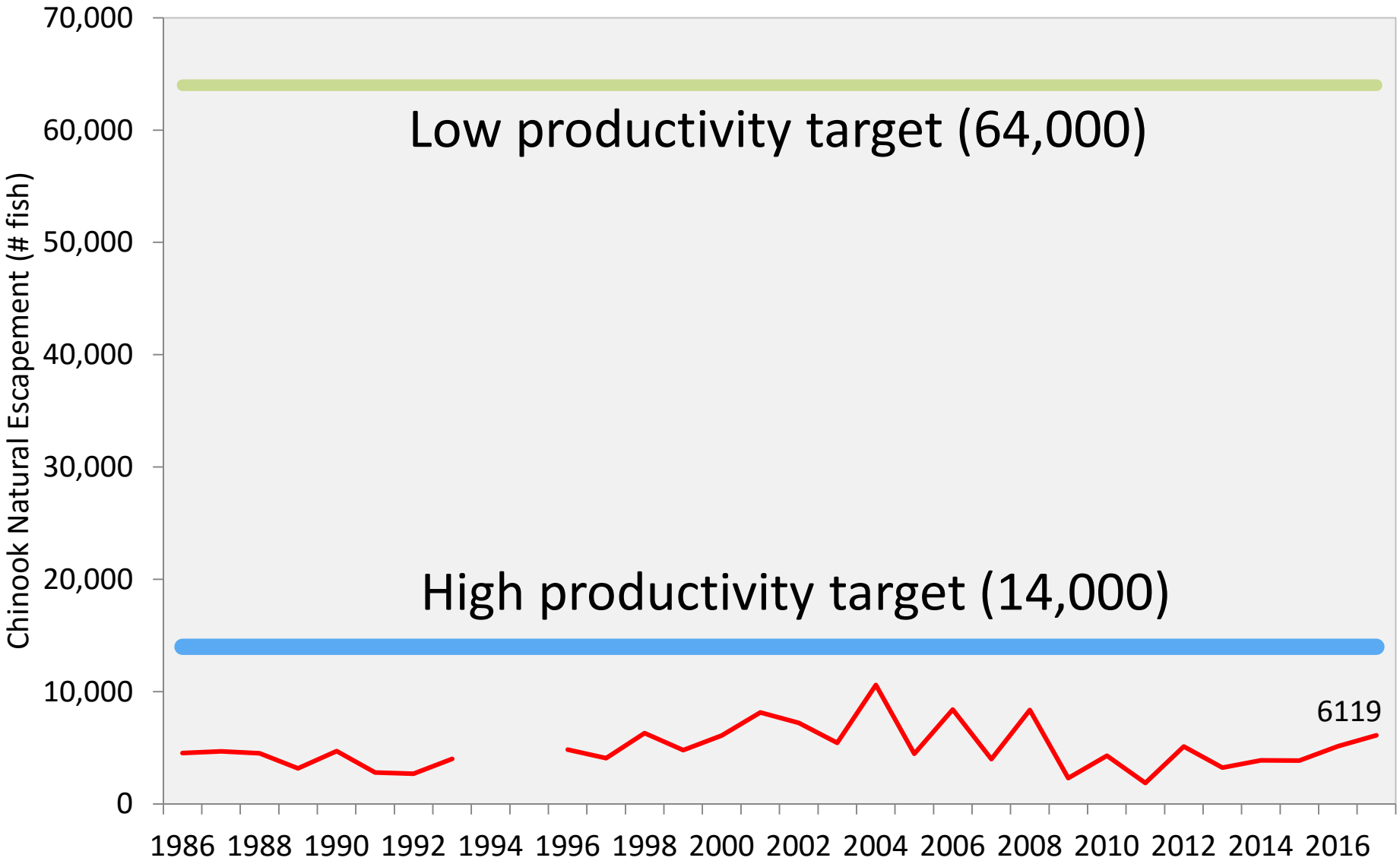
Productivity goals



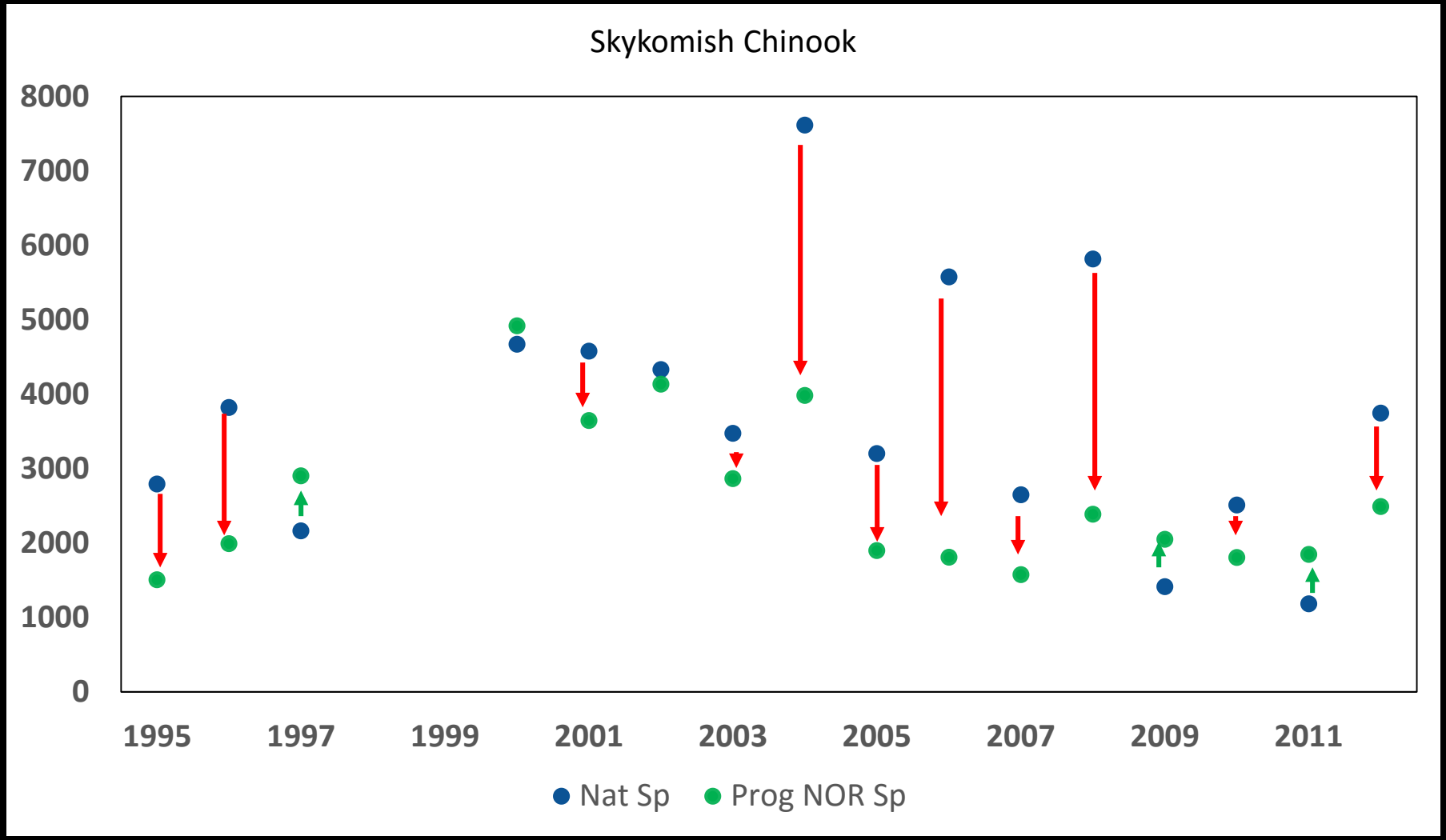
Recovery Goals



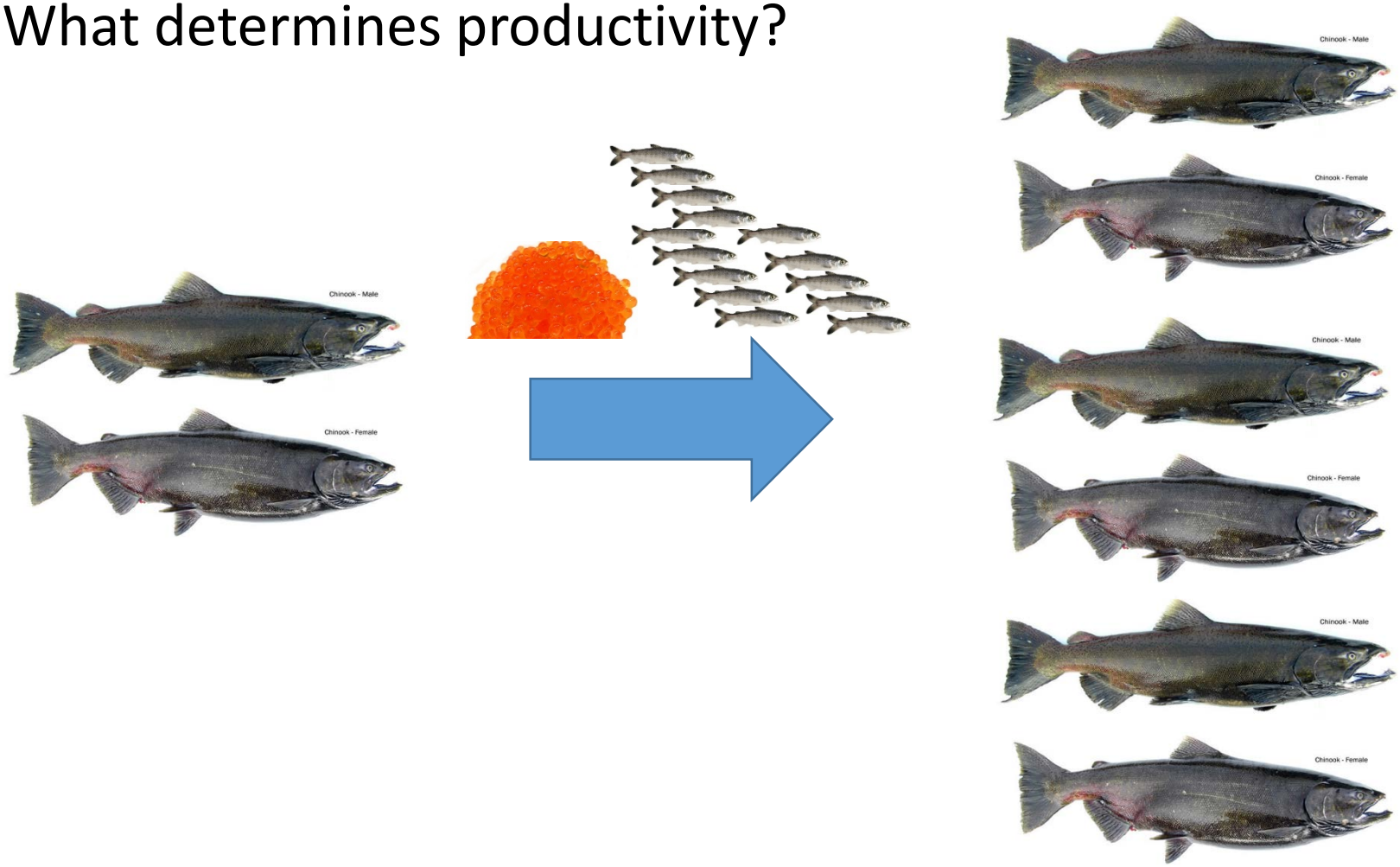
Recovery Goals



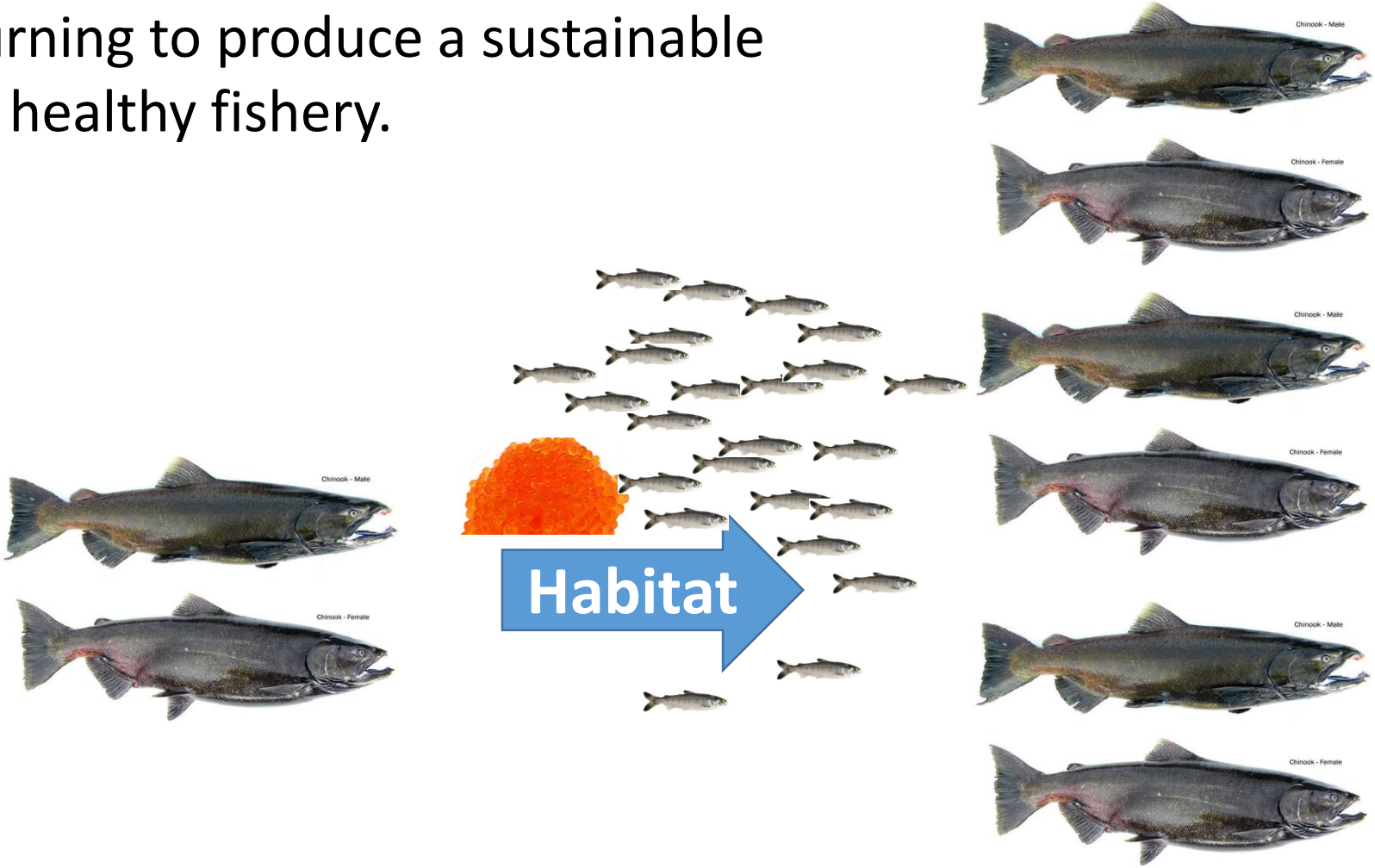
Chinook Productivity



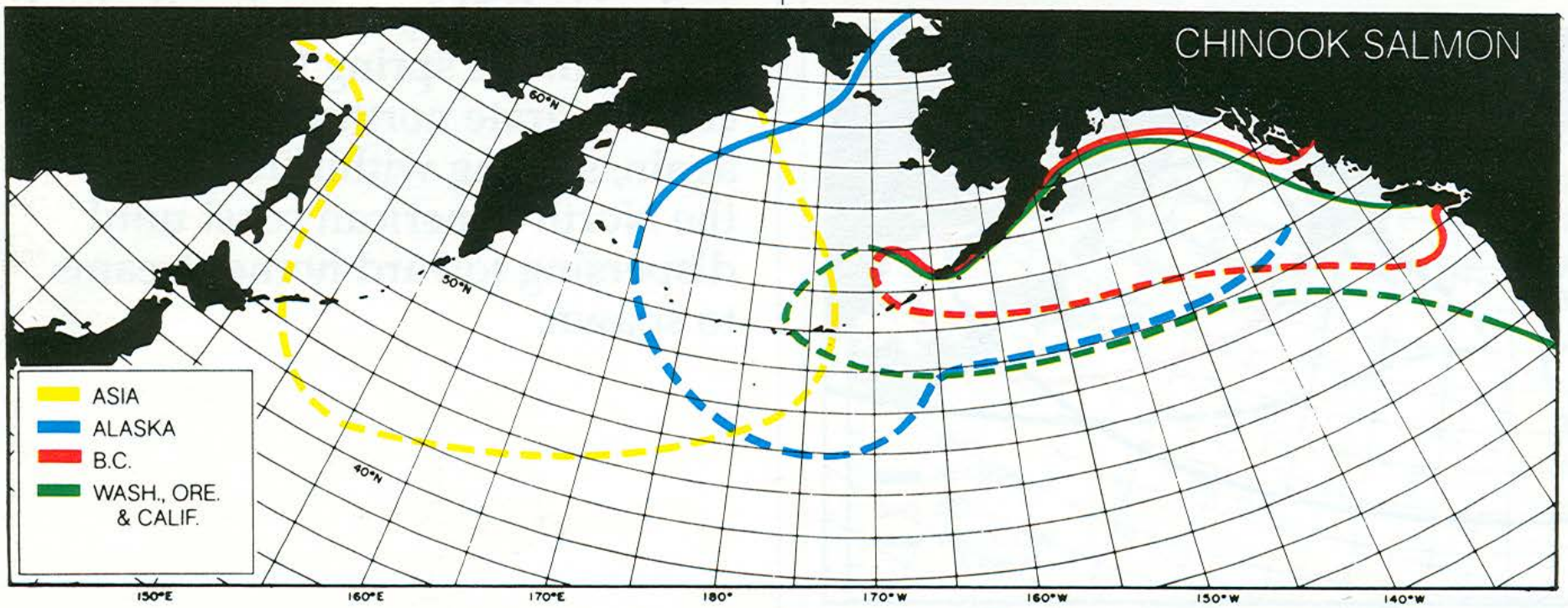
What determines productivity?



If we have the right habitat conditions, we don’t need 64,000 returning to produce a sustainable and healthy fishery.



Chinook Salmon are Widely Distributed



Ocean Conditions - PDO

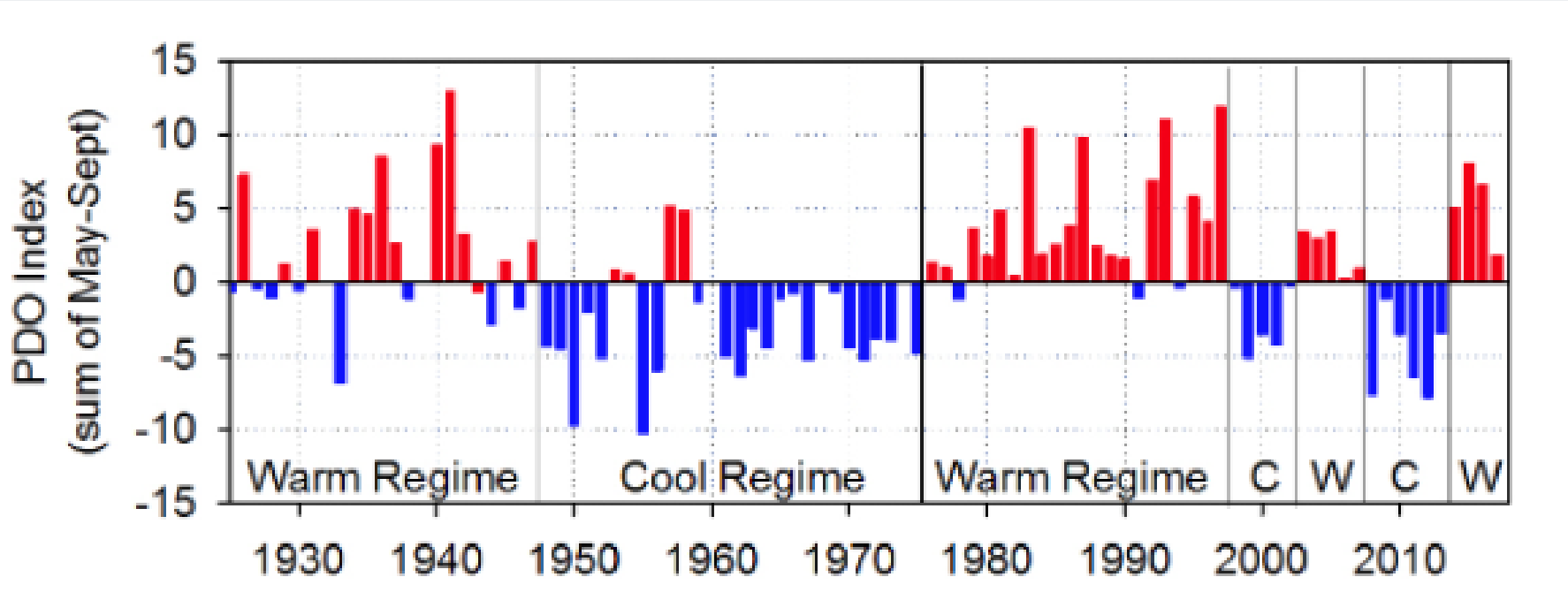


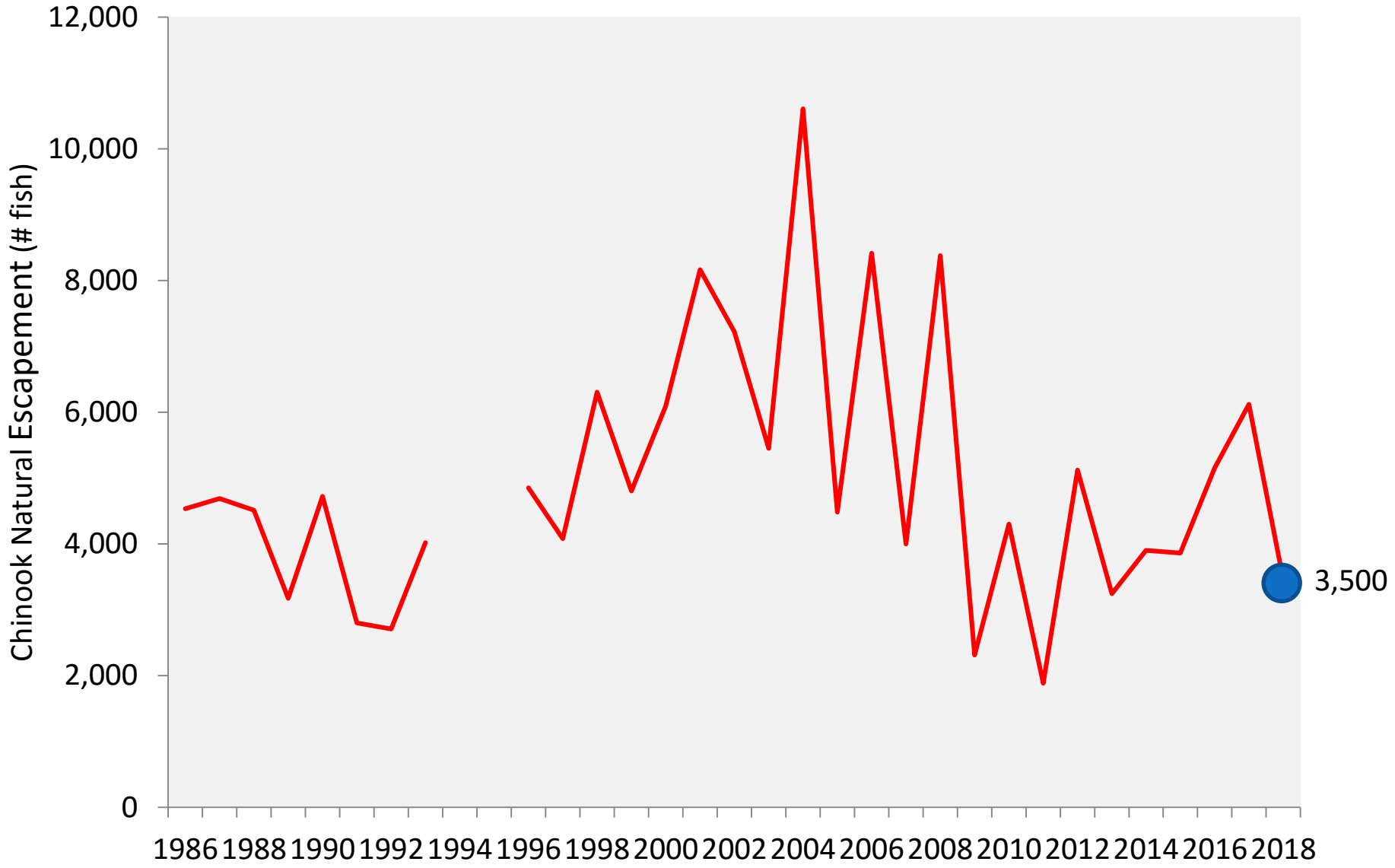
Figure PDO-01. Time series of shifts in sign of the Pacific Decadal Oscillation (PDO), 1925 to present. Values are summed over the months of May through September. Red bars indicate positive (warm) years; blue bars negative (cool) years. Note that 2008 and 2012 were the most negative values recorded since 1956.

www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/ca-pdo.cfm

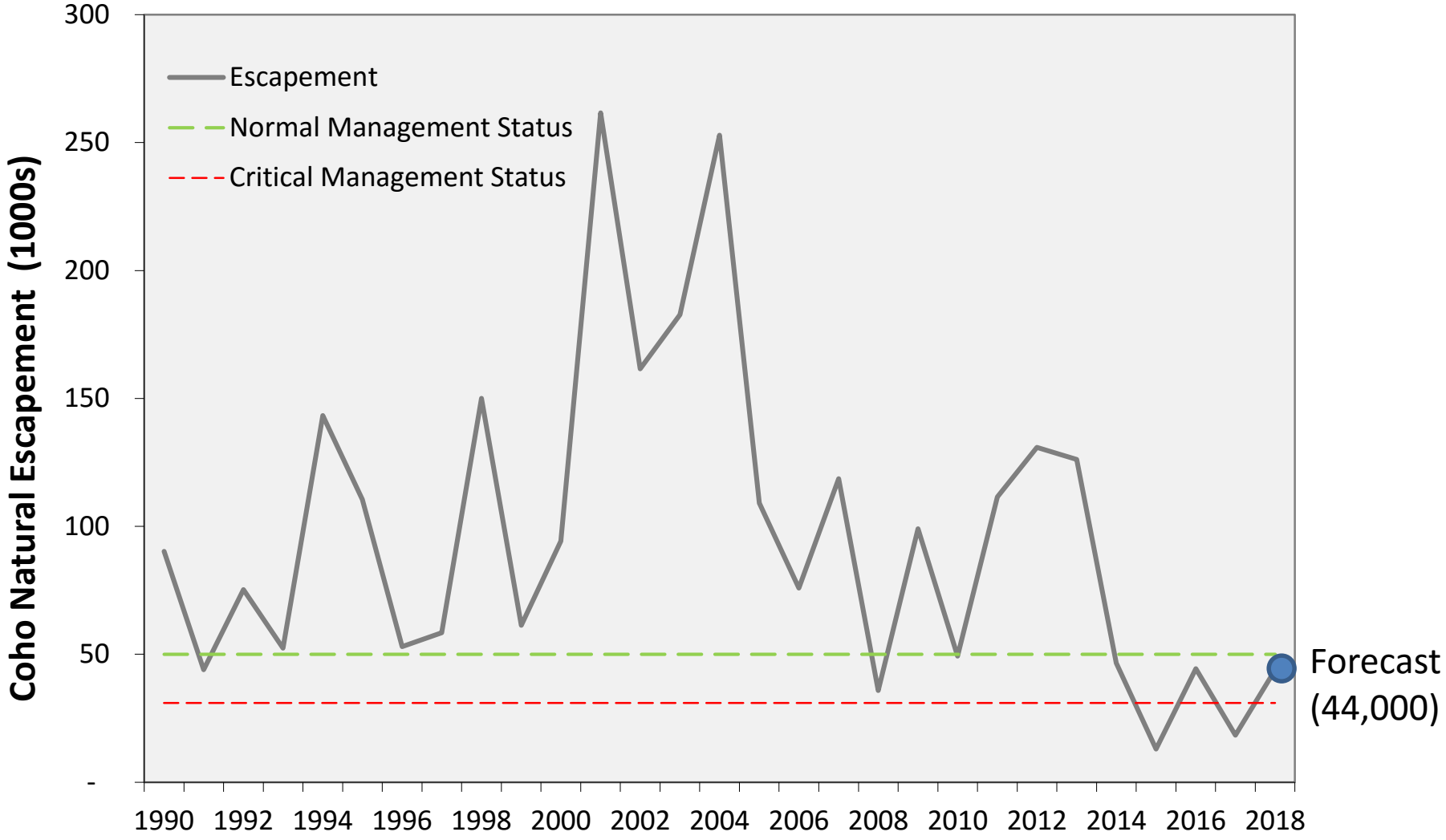
Ocean conditions: indicators

	Year																			
Ecosystem Indicators	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
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
46050 SST (°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	7	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
Copepod richness anom. (no. species; May-Sept)	18	2	1	7	6	13	12	17	15	10	8	9	16	4	5	3	11	19	20	14
N. copepod biomass anom. (mg C m^{-3}; May-Sept)	18	13	9	10	3	15	12	19	14	11	6	8	7	1	2	4	5	16	20	17
S. copepod biomass anom. (mg C m^{-3}; May-Sept)	20	2	5	4	3	13	14	19	12	10	1	7	15	9	8	6	11	17	18	16
Biological transition (day of year)	17	8	5	7	9	14	13	18	12	2	1	3	15	6	10	4	11	20	20	16
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^{-1}; 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^{-1}; June)	18	7	12	5	6	2	15	19	16	4	3	9	10	14	17	1	11	8	13	20
Mean of ranks	17.1	7.0	5.8	6.9	5.8	12.4	15.1	16.2	10.9	8.9	2.7	8.3	12.2	8.2	6.5	7.6	12.3	15.9	16.4	13.9
Rank of the mean rank	20	6	2	5	2	14	16	18	11	10	1	9	12	8	4	7	13	17	19	15

2018 Chinook Forecast

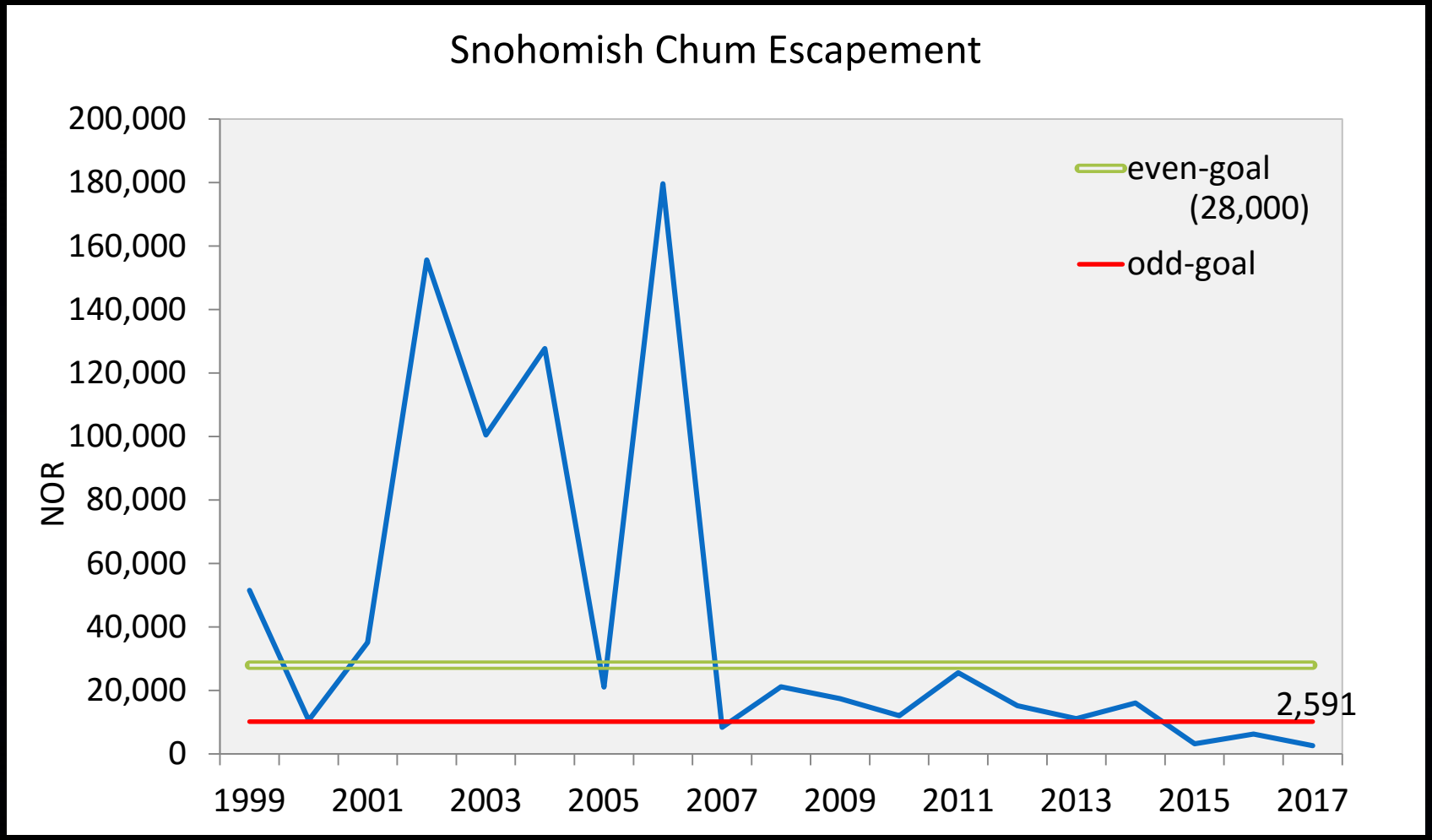


2017 Coho Forecast

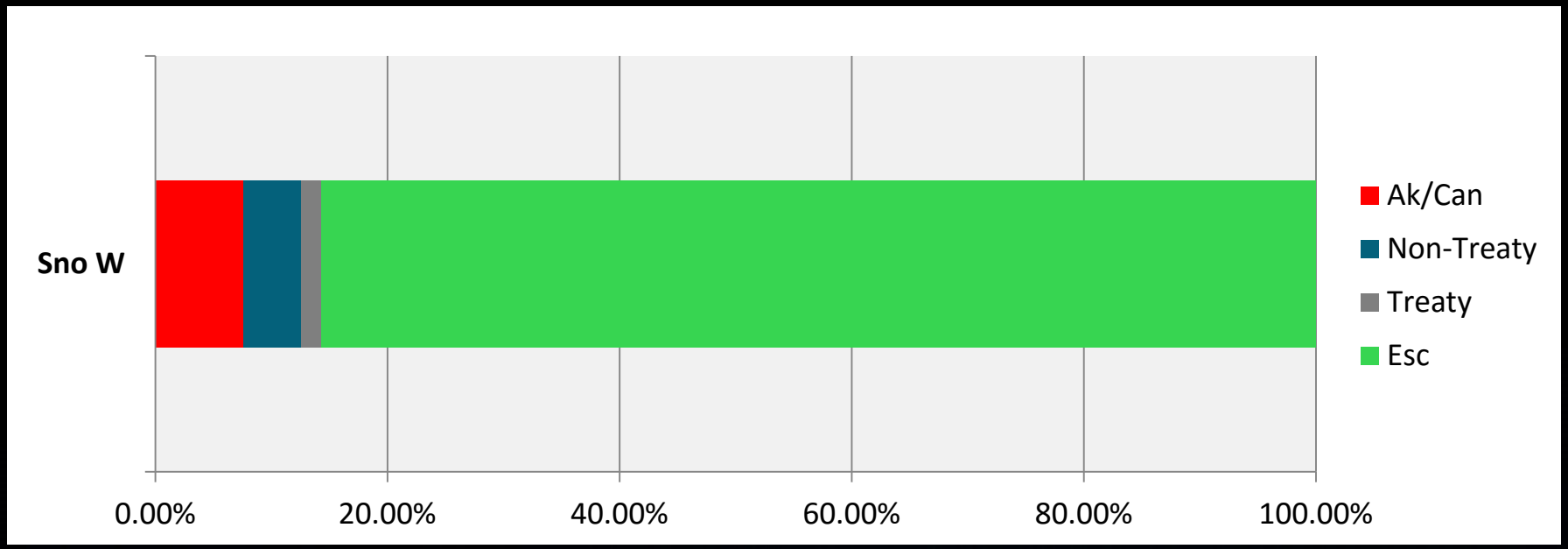


Chum forecast

- Chum = 13,957
  - Escapement goal: 28,000



Wild Chinook exploitation



Questions?