

Recent ocean conditions off the US West Coast: Another very hot year!

Pacific Salmon Commission, Jan 13, 2026



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Today's talk

1. Physical environment drivers

• Bottom line

- Despite a massive heat wave across the entire North Pacific Ocean in 2025,

2.

- conditions don't look too bad for salmon along the West Coast or Alaska

- Columbia salmon forecasts
- California and Alaska ecosystem status (2024/25)

3. Forecasts

- El Niño/La Niña
- Sea surface temperatures



1. Physical environment drivers



Global temperatures

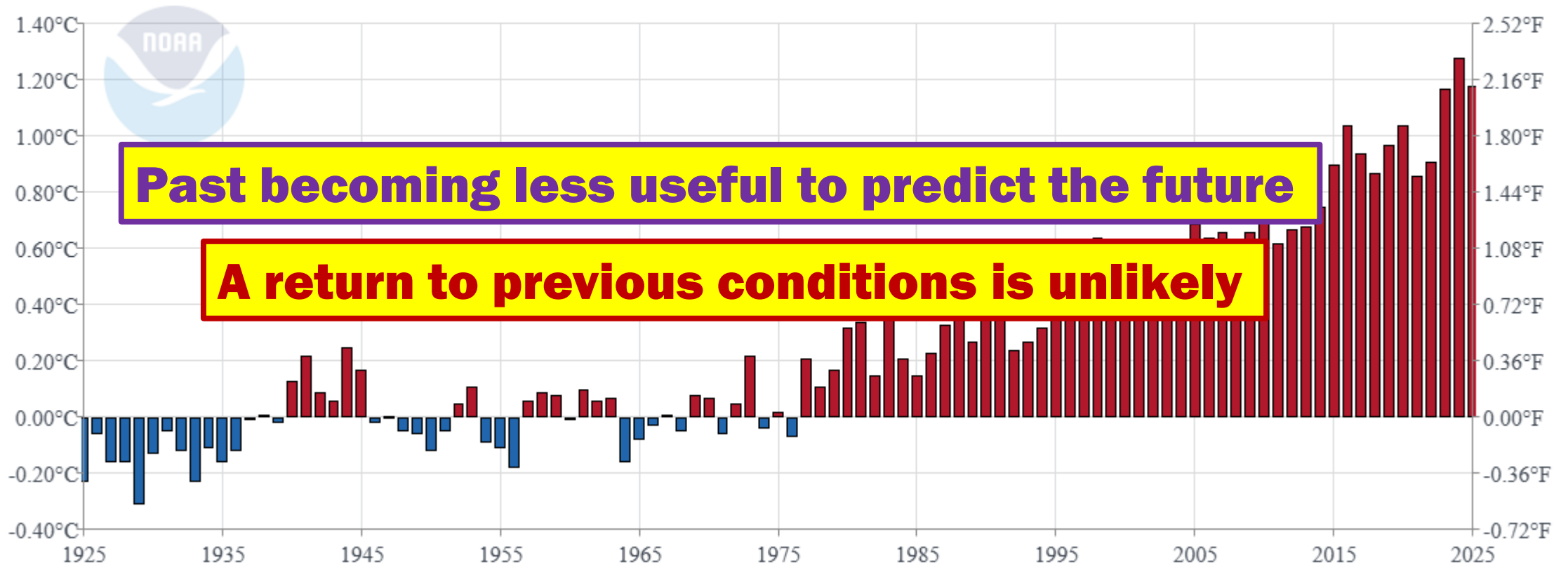
El Niño/La Niña

Marine heat waves

Global temperatures: 2025 will be 2nd or 3rd warmest, 2024 was the warmest year on record

Global Land and Ocean Average Temperature Anomalies

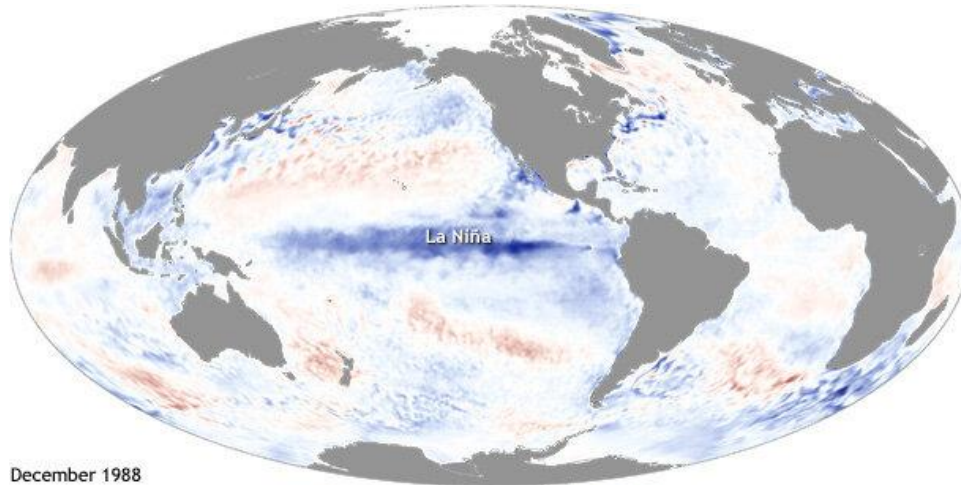
January-November



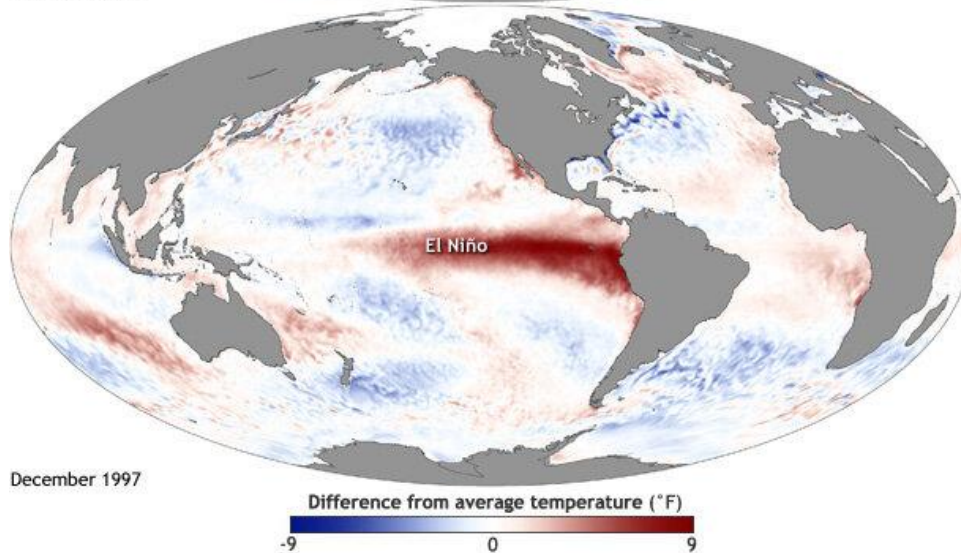
El Niños/La Niñas

El Niños and La Niñas are tropical phenomena that impact global weather

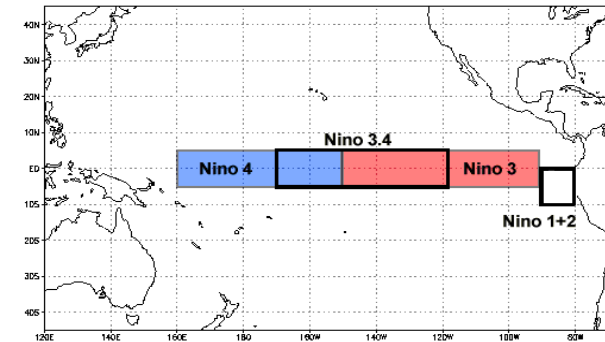
La Niña



El Niño



Measured in the Niño 3.4 area:



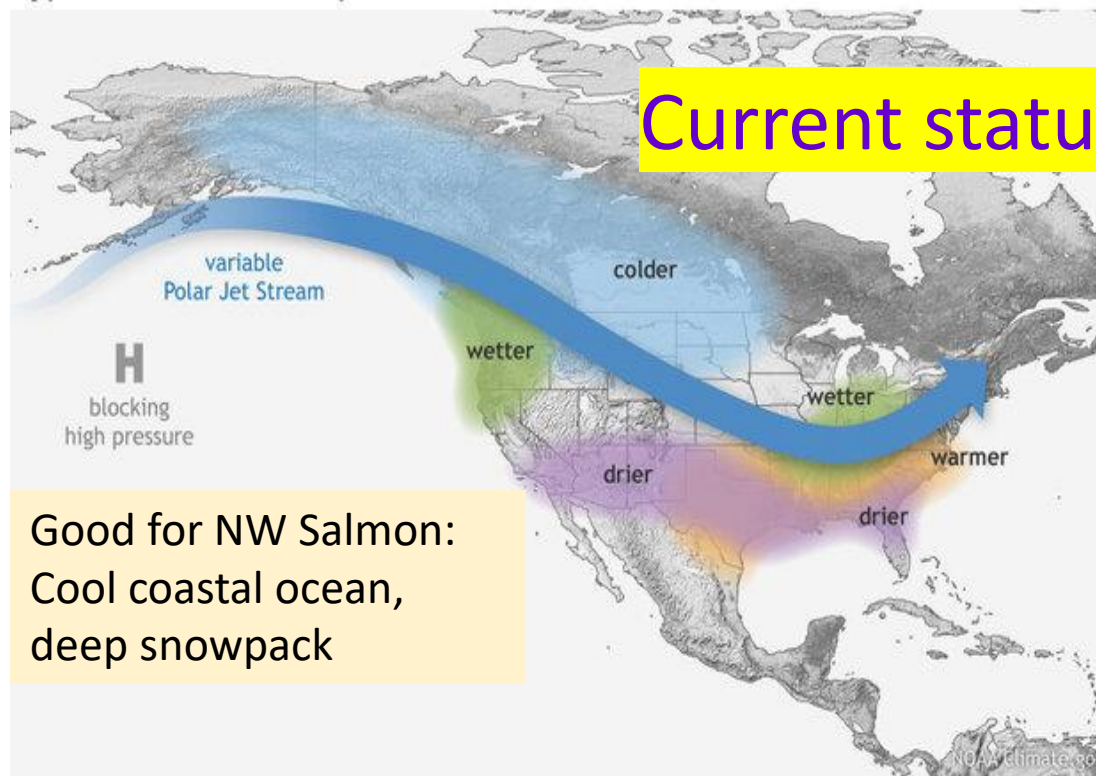
SST Anomalies above +0.5 (El Niño)
or below -0.5 (La Niña) for specified
amount of time

<https://www.climate.gov/enso>

Typical El Niño/La Niña patterns in N. America

La Niña

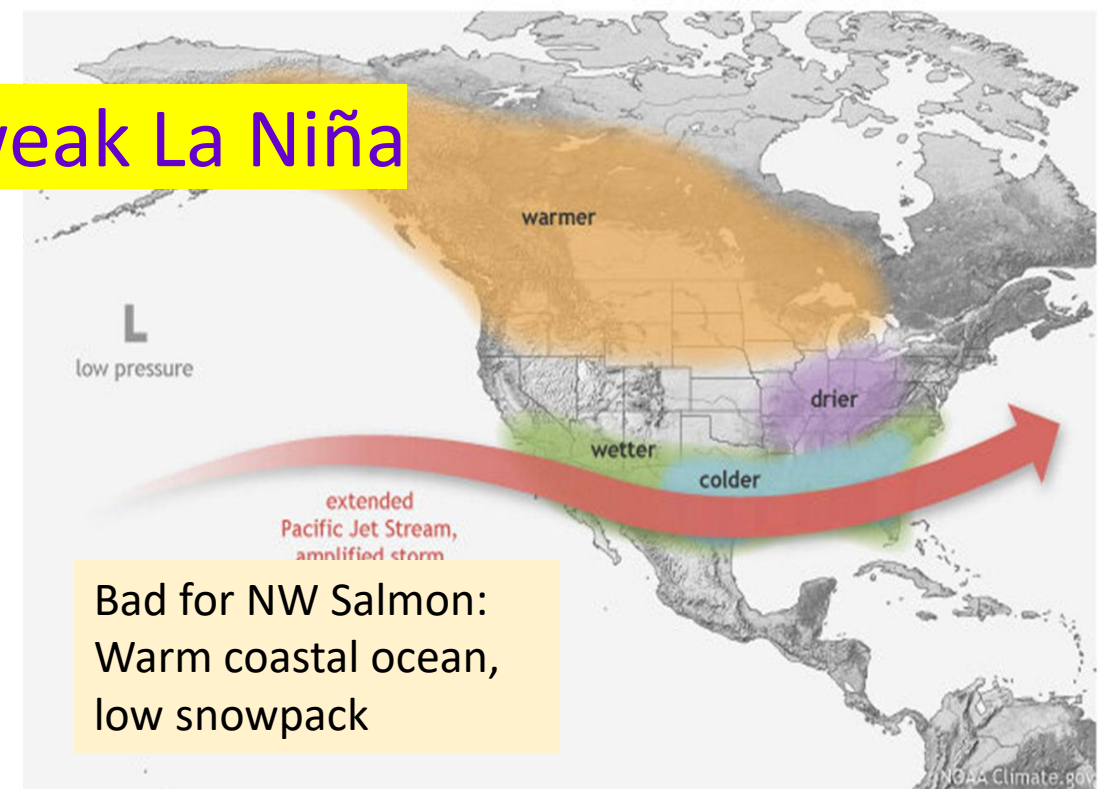
Typical winter La Niña pattern



Current status: weak La Niña

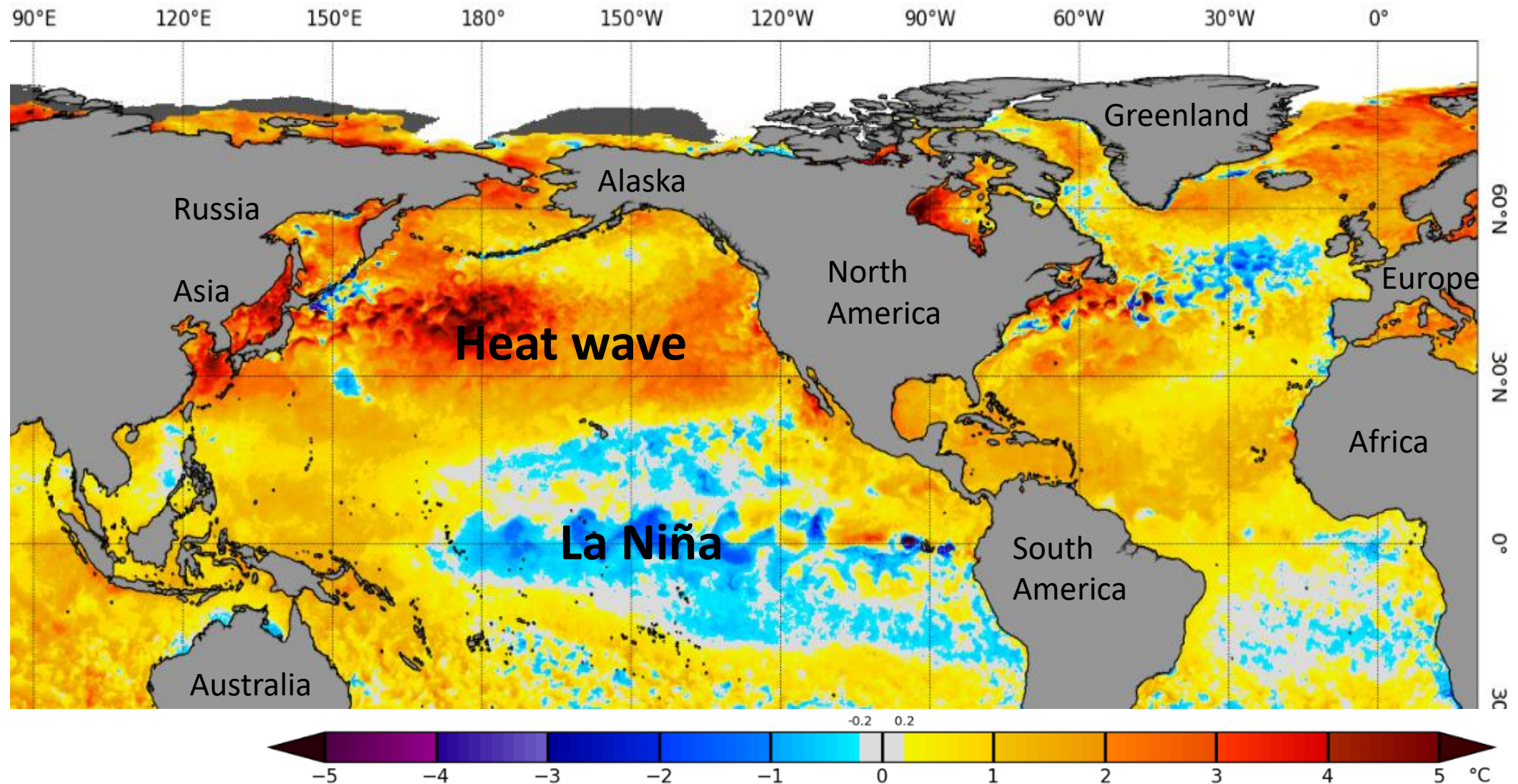
El Niño

WINTER EL NIÑO PATTERN



The 2025 marine heat wave broke many records

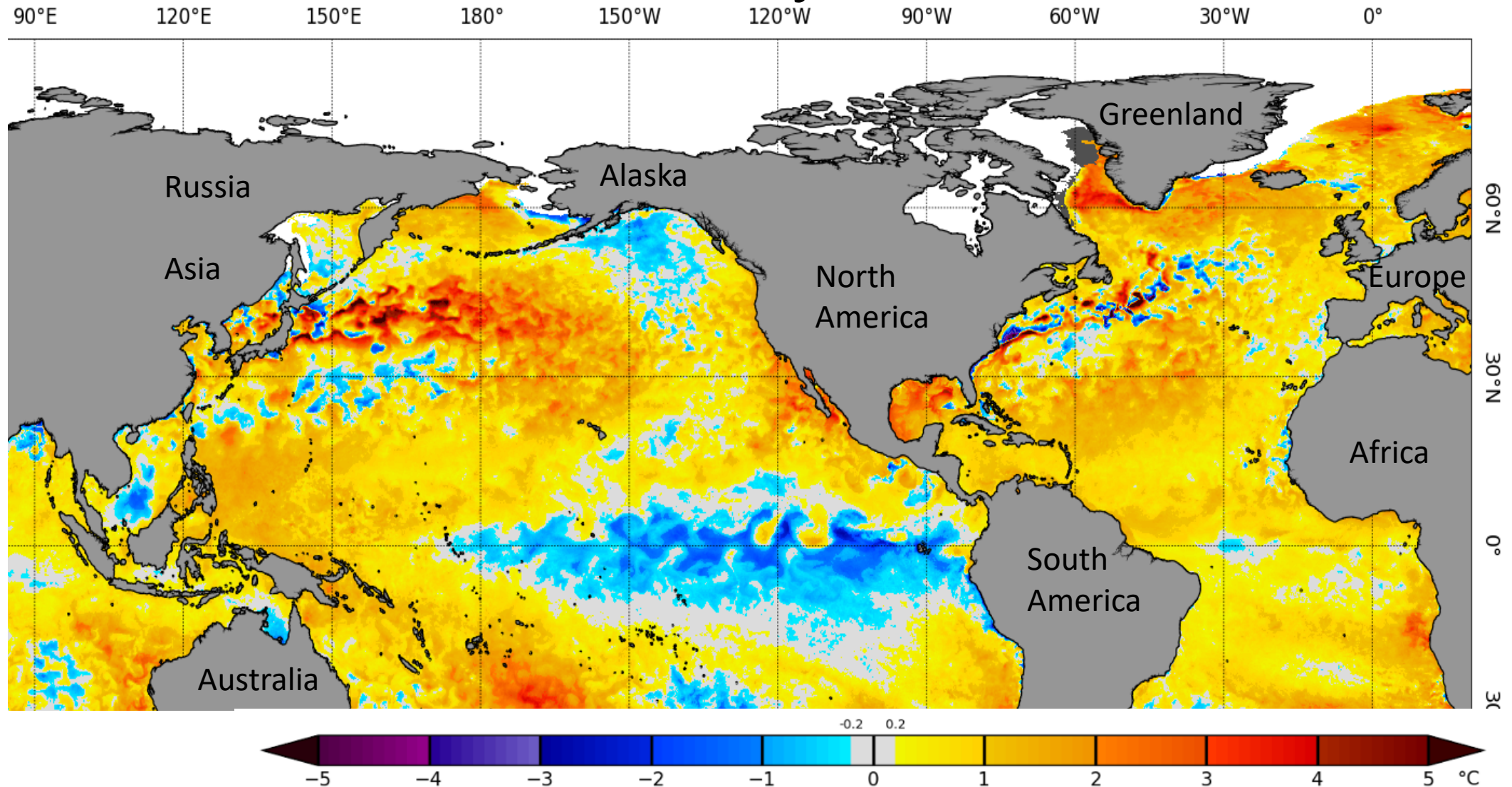
Sea surface temperature (SST) anomalies on 24 September 2025



<https://coralreefwatch.noaa.gov/product/5km/>

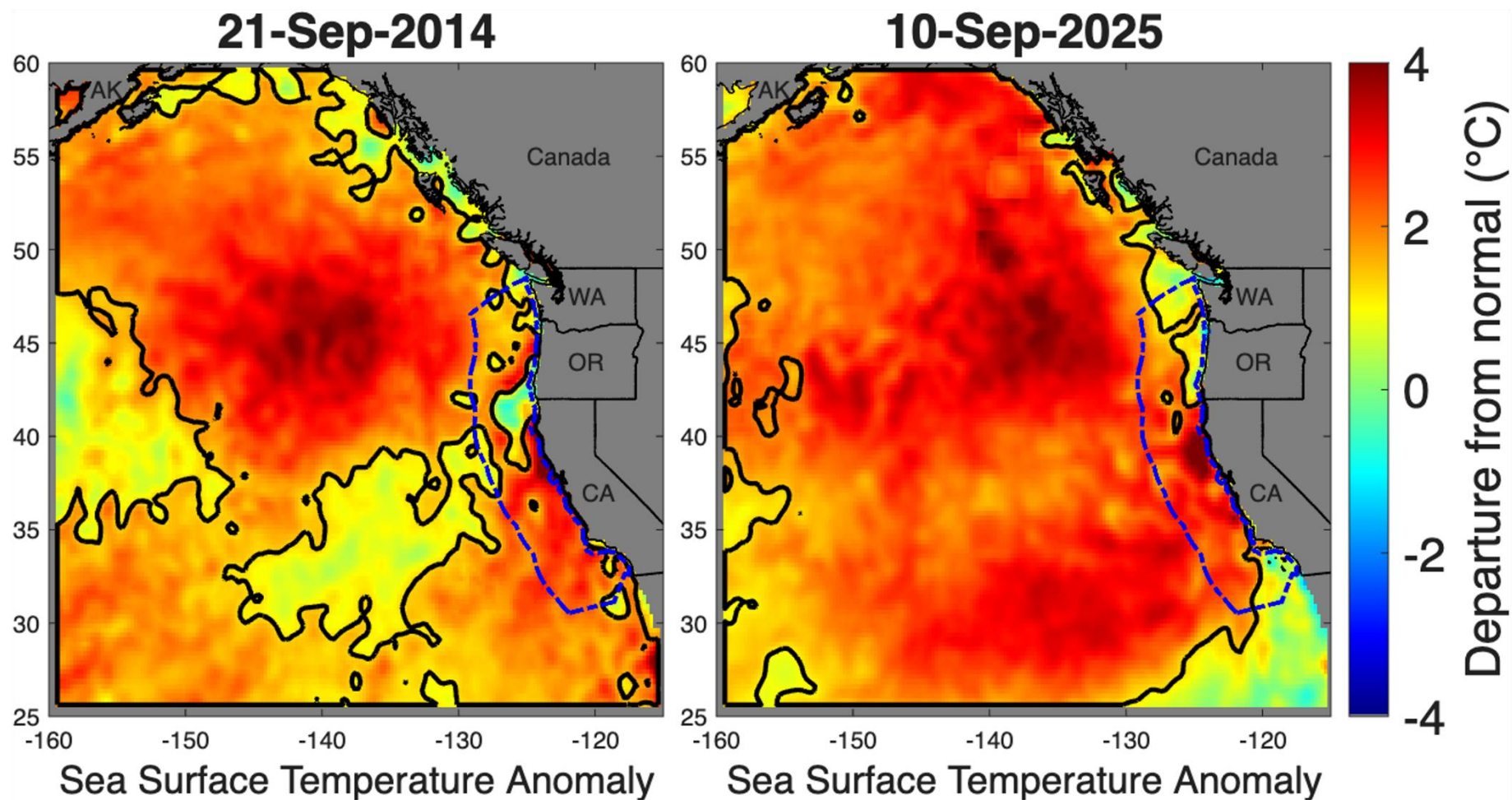
Last week's sea surface temperature anomalies

07 January 2026



<https://coralreefwatch.noaa.gov/product/5km/>

In NE Pacific, the 2025 heat wave was warmer and more widespread than the peak of the “blob”



<https://www.integratedecosystemassessment.noaa.gov/regions/california-current/california-current-marine-heatwave-tracker-blobtracker>

2. Biological response



One of several jumbo-sized ocean sunfish caught during June 2025 juvenile salmon survey

- Unusual observations
- NWFSC stoplight chart
- Columbia River salmon forecasts
- Highlights from California Current and Gulf of Alaska Ecosystem reports (2024, 2025)

2025 observations



Yellowfin tuna on Oregon coast



Marlin in Oregon waters



Albacore tuna in Alaska!



Invasive green crabs
spreading in SE Alaska



Great salmon fishing!



Skipjack tuna in
Sitka, Alaska!

NW/FSC stoplight chart, ocean entry years 1998-2025

ECOSYSTEM INDICATORS		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CLIMATE & ATMOSPHERIC	Ocean basin scale	28	13	6	22	15	27	19	20	21	16	8	4	23	5	2	10	14	26	25	24	18	17	12	9	1	3	11	7
		16	7	13	10	15	25	20	23	19	21	9	18	11	6	5	12	26	28	27	22	17	24	14	8	4	3	2	1
		27	1	1	9	18	20	19	22	10	16	3	14	23	5	8	10	12	24	28	17	7	25	21	5	3	15	26	13
LOCAL PHYSICAL	Local physical indicators	23	8	10	6	7	15	28	17	2	19	1	13	3	9	11	21	26	25	24	16	20	27	12	5	22	18	14	4
		27	21	13	9	12	19	22	18	17	5	1	8	24	11	2	7	4	28	26	23	16	20	3	10	15	6	25	14
		20	12	15	5	1	3	27	23	9	11	2	7	19	10	8	22	26	17	14	18	21	28	25	4	24	6	13	16
		27	7	9	5	1	12	15	19	13	6	2	8	14	11	4	17	26	24	16	21	22	20	28	3	25	23	10	18
		27	4	13	5	6	21	22	14	8	2	3	18	24	16	17	15	28	19	11	10	7	12	26	1	25	20	23	9
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		11	6	4	7	8	12	20	25	1	16	3	13	17	5	2	10	9	23	26	27	22	24	18	15	14	19	28	21
		25	2	7	22	6	10	20	27	16	13	1	8	5	18	3	4	9	19	24	28	23	17	26	14	12	21	15	11
		26	15	23	8	10	9	25	27	21	3	5	12	13	22	17	2	14	20	19	28	4	18	24	16	11	7	6	1
MEANS & RANKS	Ranks	24.1	8.8	10.1	10.2	8.4	17.7	21.4	22.4	14.3	12.6	4.1	11.3	16.3	9.6	7.8	10.6	16.7	23.3	23.0	21.6	15.9	19.9	15.4	7.4	12.6	12.4	16.2	11.4
		28	5	7	8	4	21	23	25	15	13	1	10	19	6	3	9	20	27	26	24	17	22	16	2	14	12	18	11

<https://www.fisheries.noaa.gov/west-coast/science-data/ocean-ecosystem-indicators-pacific-salmon-marine-survival-northern>

NW/FSC stoplight chart, ocean entry years 1998-2025

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		20	12	15	5																							13	16
		27	7	9	5																							10	18
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		28	2	8	4	3	20	22	27	19	15	1	10	23	14	11	9	17	25	26	24	18	21	13	5	6	12	16	7
		26	15	10	9	13	20	16	25	19	5	1	2	23	3	14	6	6	26	26	24	18	20	8	11	4	17	22	12
		22	4	13	14	1	26	27	19	10	21	3	17	2	9	5	12	25	18	20	16	11	23	8	6	15	7	28	24
		11	6	4	7	8	12	20	25	1	16	3	13	17	5	2	10	9	23	26	27	22	24	18	15	14	19	28	21
		25	2	7	22	6	10	20	27	16	13	1	8	5	18	3	4	9	19	24	28	23	17	26	14	12	21	15	11
		26	15	23	8	10	9	25	27	21	3	5	12	13	22	17	2	14	20	19	28	4	18	24	16	11	7	6	1
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		28	5	7	8	4	21	23	25	15	13	1	10	19	6	3	9	20	27	26	24	17	22	16	2	14	12	18	11

Cool years = good for NW salmon

NW/FSC stoplight chart, ocean entry years 1998-2025

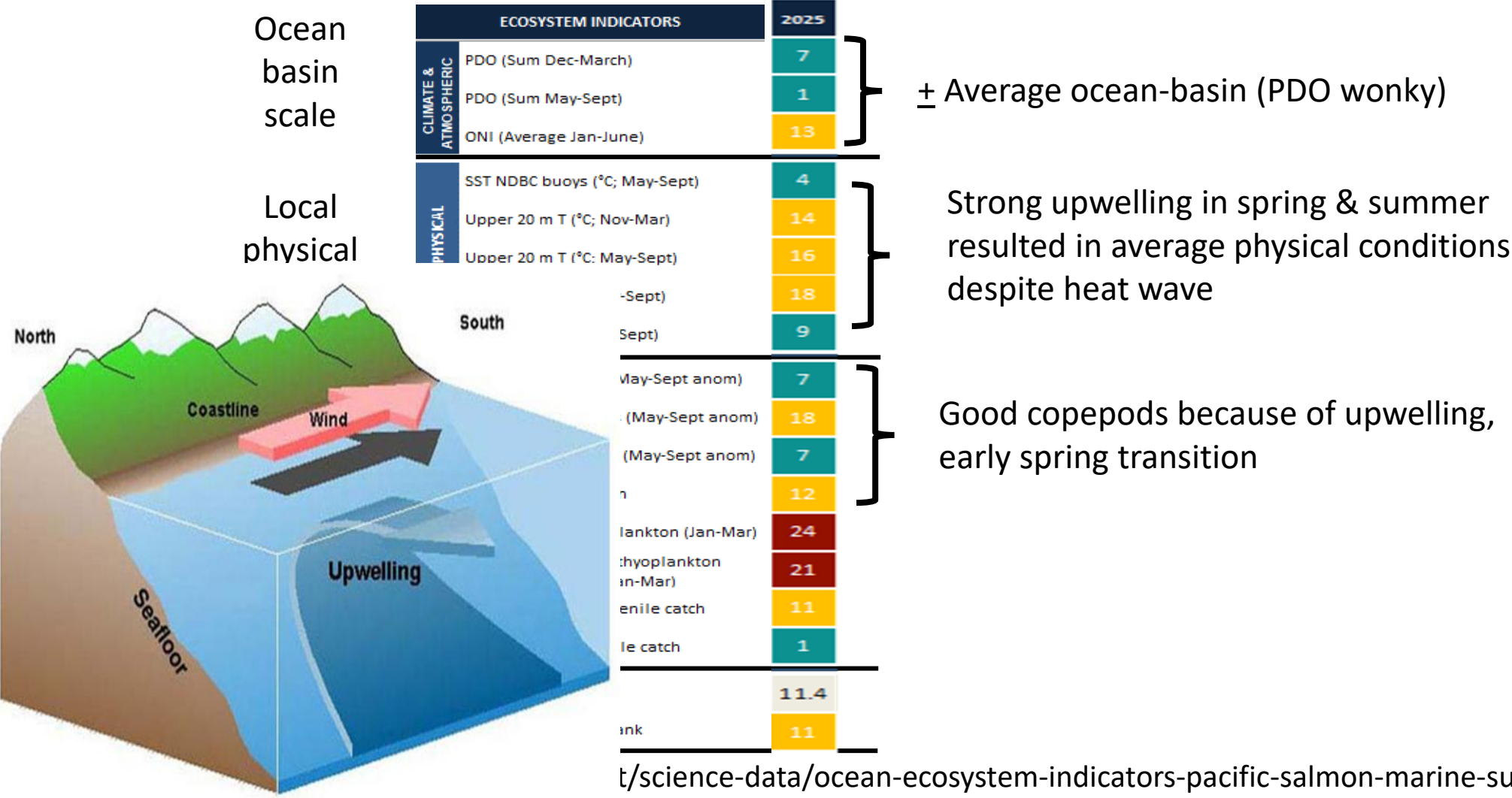
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		27	21	13	9	12	19	22	18	17	5	1	8	24	11	2	7	4	28	26	23	16	20	3	10	15	6	25	14
		Warm years = bad for NW salmon																											
		25	15	10	12	1	26	27	19	10	21	3	17	2	9	5	12	25	18	20	16	11	23	3	6	15	7	28	24
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		22	4	13	14	1	26	27	19	10	21	3	17	2	9	5	12	25	18	20	16	11	23	3	6	15	7	28	24
		11	6	4	7	8	12	20	25	1	16	3	13	17	5	2	10	9	23	26	27	22	24	8	15	14	19	28	21
		25	2	7	22	6	10	20	27	16	13	1	8	5	18	3	4	9	19	24	28	23	17	6	14	12	21	15	11
		26	15	23	8	10	9	25	27	21	3	5	12	13	22	17	2	14	20	19	28	4	18	4	16	11	7	6	1
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		27	21	13	9	12	19	22	18	17	5	1	8	24	11	2	7	4	28	26	23	16	20	3	10	15	6	25	14
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		7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	26	24	16	21	22	20	28	3	25	23	10	18
		5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28	19	11	10	7	12	26	1	25	20	23	9
LOCAL BIOLOGICAL	Local biological indicators	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	27	28	23	19	18	7	5	2	10	17	7
		3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9	24	28	25	11	5	2	1	19	12	3	18
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		26	15	10	9	13	20	16	25	19	5	1	2	23	3	14	6	6	26	26	24	18	20	8	11	4	17	22	12
		22	4	13	14	1	26	27	19	10	21	3	17	2	9	5	12	25	18	20	16	11	23	8	6	15	7	28	24
		11	6	4	7	8	12	20	25	1	16	3	13	17	5	2	10	9	23	26	27	22	24	18	15	14	19	28	21
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<https://www.fisheries.noaa.gov/west-coast/science-data/ocean-ecosystem-indicators-pacific-salmon-marine-survival-northern>

Highlights from entry year 2025



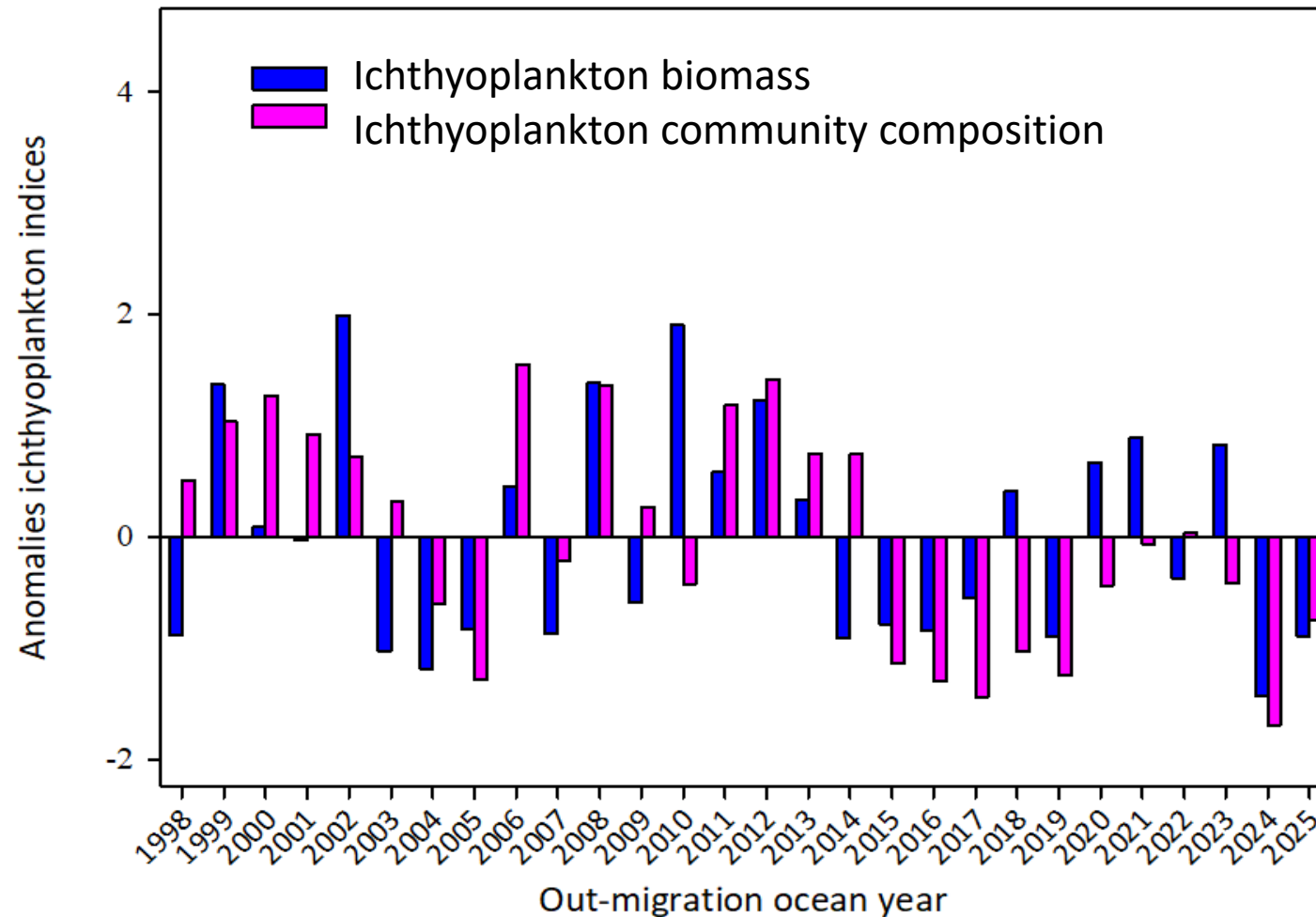
[t/science-data/ocean-ecosystem-indicators-pacific-salmon-marine-survival-northern](https://science-data/ocean-ecosystem-indicators-pacific-salmon-marine-survival-northern)

Highlights from entry year 2025

Ocean basin scale	ECOSYSTEM INDICATORS		2025	} ± Average ocean-basin (PDO wonky)
	CLIMATE & ATMOSPHERIC	PDO (Sum Dec-March)	7	
		PDO (Sum May-Sept)	1	
		ONI (Average Jan-June)	13	
Local physical indicators	LOCAL PHYSICAL	SST NDBC buoys (°C; May-Sept)	4	} Strong upwelling in spring & summer resulted in average physical conditions despite heat wave
		Upper 20 m T (°C; Nov-Mar)	14	
		Upper 20 m T (°C; May-Sept)	16	
		Deep Temp (°C; May-Sept)	18	
		Deep Salinity (May-Sept)	9	
Local biological indicators	LOCAL BIOLOGICAL	Copepod richness (May-Sept anom)	7	} Good copepods because of upwelling, early spring transition
		N copepod biomass (May-Sept anom)	18	
		S copepod biomass (May-Sept anom)	7	
		Biological transition	12	
		Nearshore Ichthyoplankton (Jan-Mar)	24	} Low ichthyoplankton (salmon prey)
		Near & offshore Ichthyoplankton (community index Jan-Mar)	21	
		Chinook salmon juvenile catch	11	
		Coho salmon juvenile catch	1	
	MEANS & RANKS	Mean of ranks	11.4	
		Rank of the mean rank	11	

<https://www.fisheries.noaa.gov/west-coast/science-data/ocean-ecosystem-indicators-pacific-salmon-marine-survival-northern>

2025 Winter ichthyoplankton biomass and community was unfavorable: important prey when salmon first enter ocean

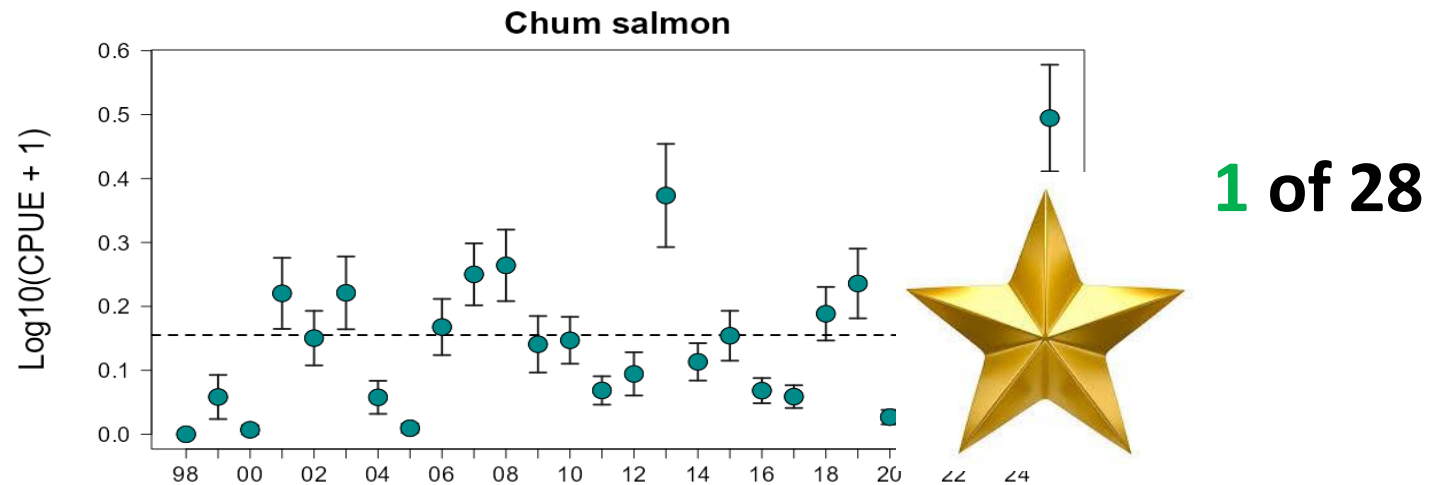
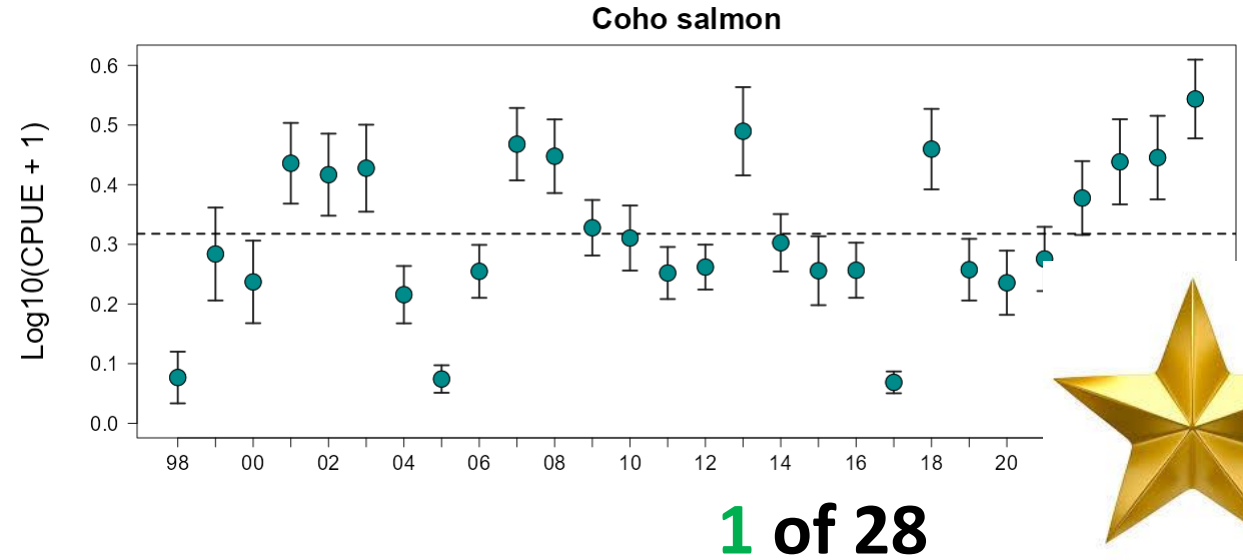
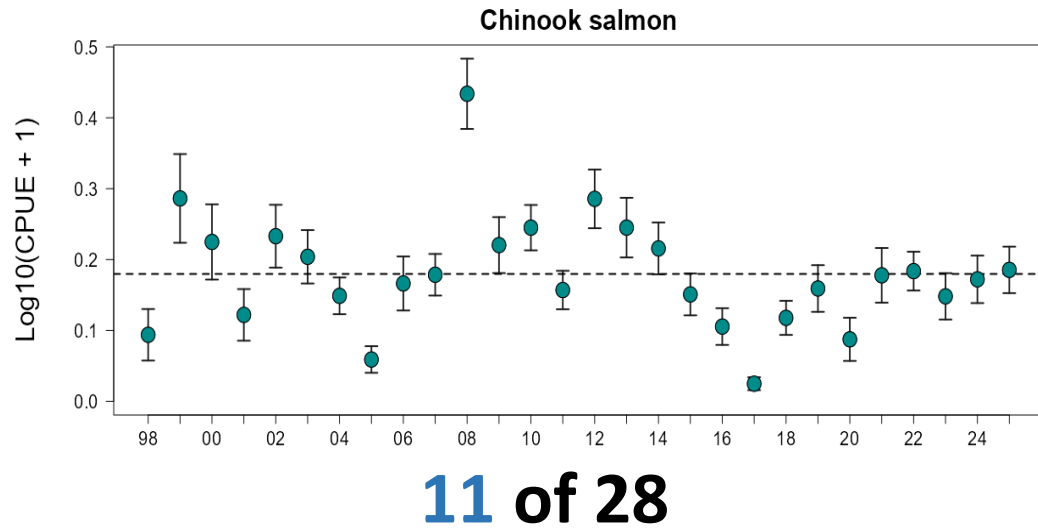


Highlights from entry year 2025

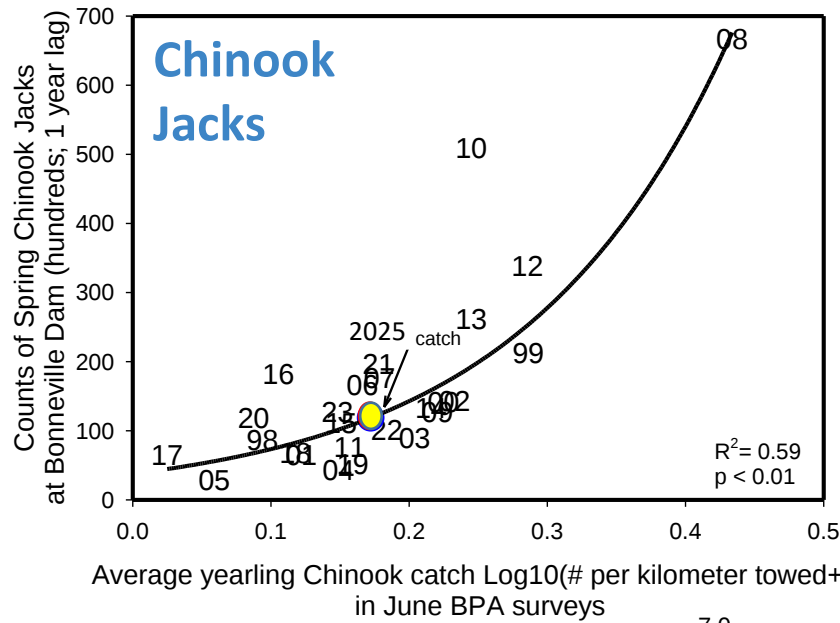
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		Near & offshore Ichthyoplankton (community index Jan-Mar)	21	
		Chinook salmon juvenile catch	11	} Okay juv. Chinook, best coho catches in June juvenile salmon survey
		Coho salmon juvenile catch	1	
	MEANS & RANKS	Mean of ranks	11.4	} Average year
		Rank of the mean rank	11	

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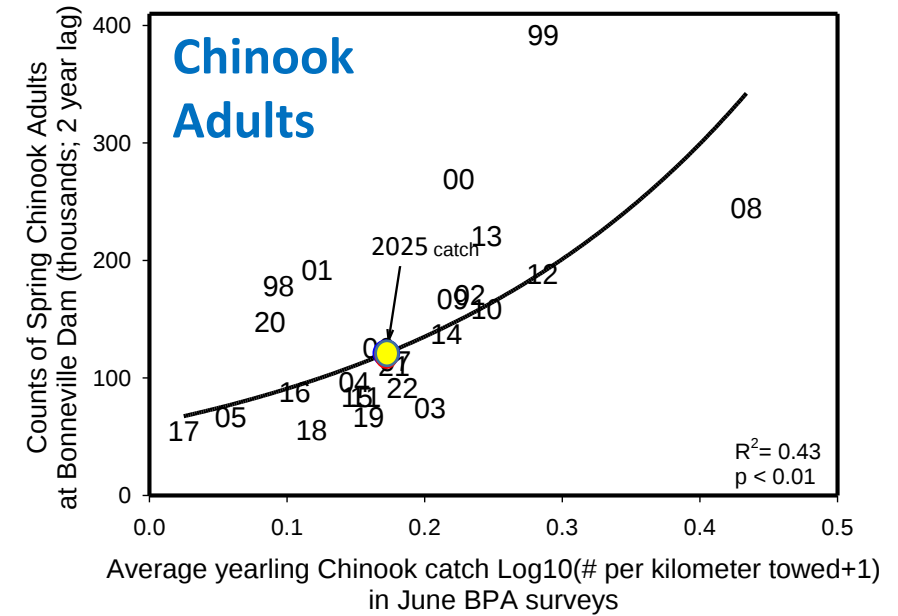
2025 Juvenile salmon survey catches were average for yearling Chinook, but highest ever for coho and chum salmon



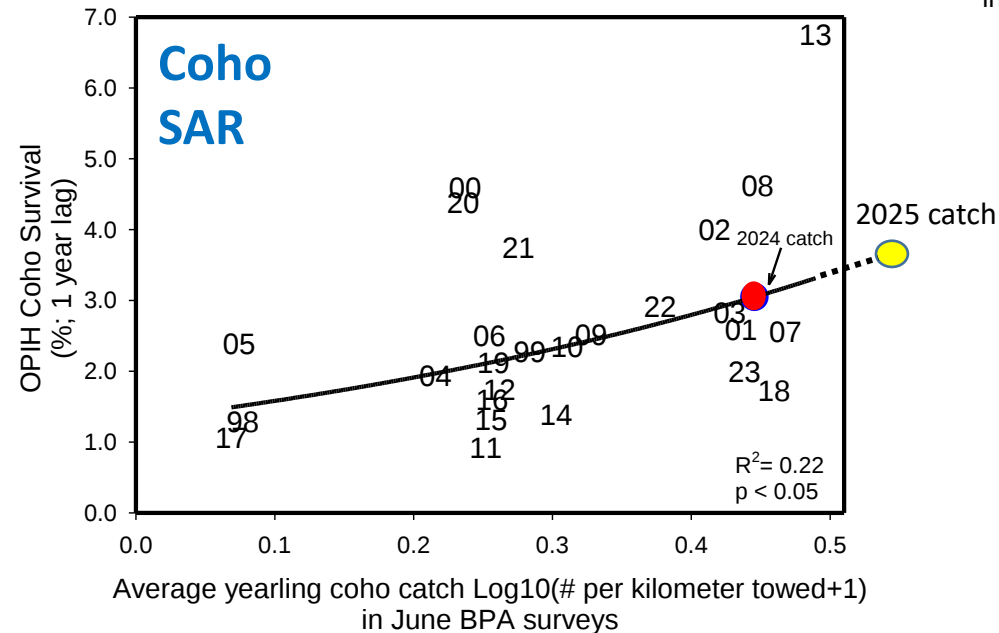
June Catches of Yearling Chinook and coho related to adult returns



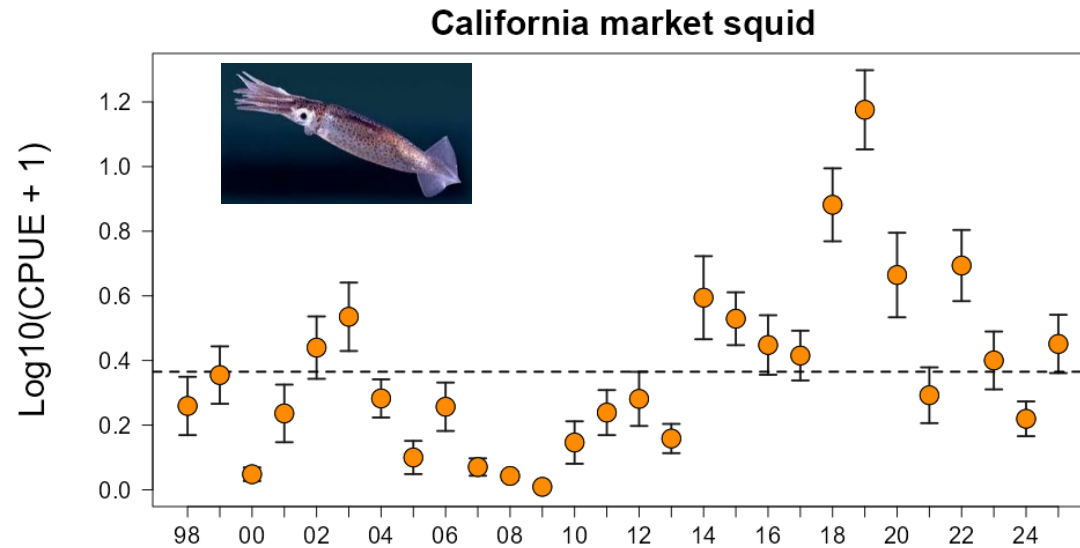
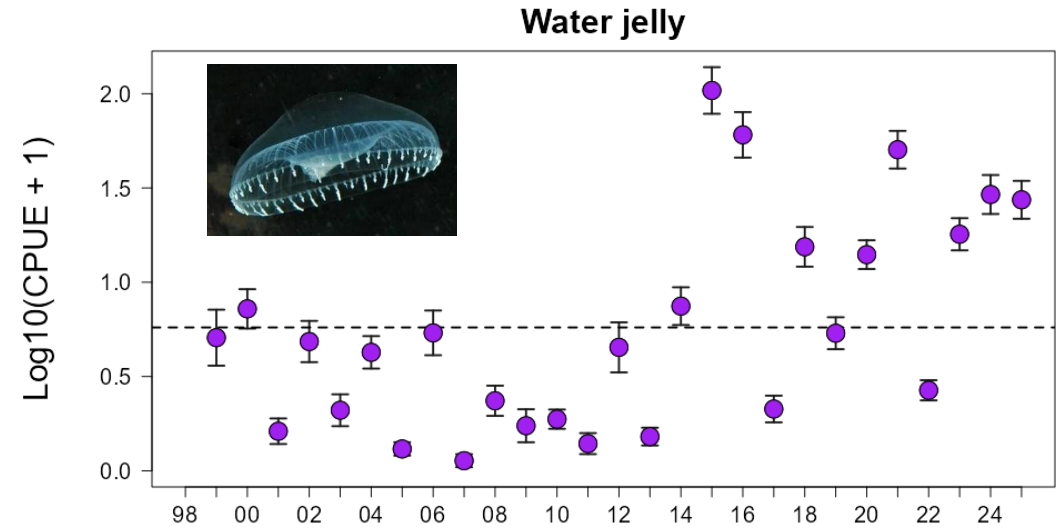
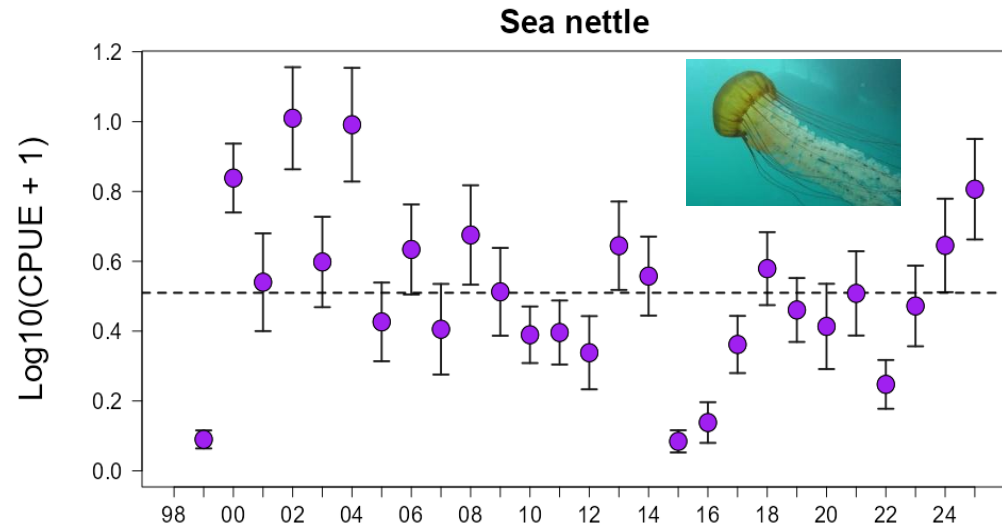
Suggests
modest
Chinook
returns in
2027



Suggests
High Coho
returns in
2026



Other species show mixed trends



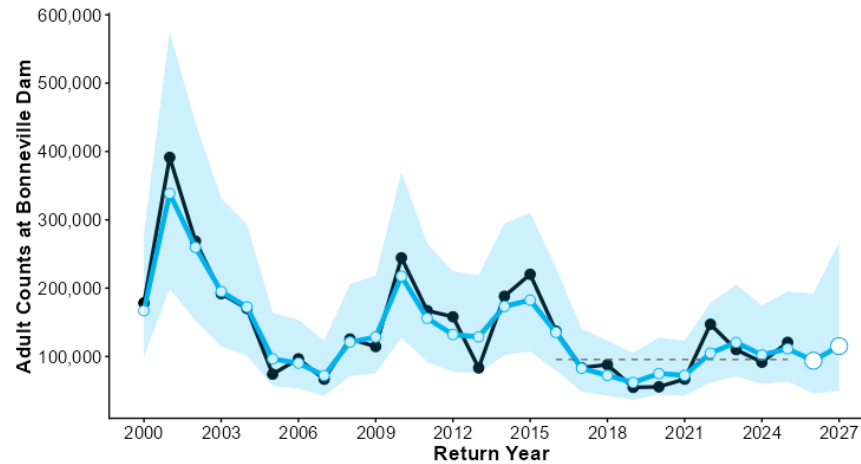
Brian Burke's predictions for Columbia River Chinook and steelhead returns (based on dynamic linear model of stoplight chart)



*Brian Burke on May 2023
juvenile salmon survey*

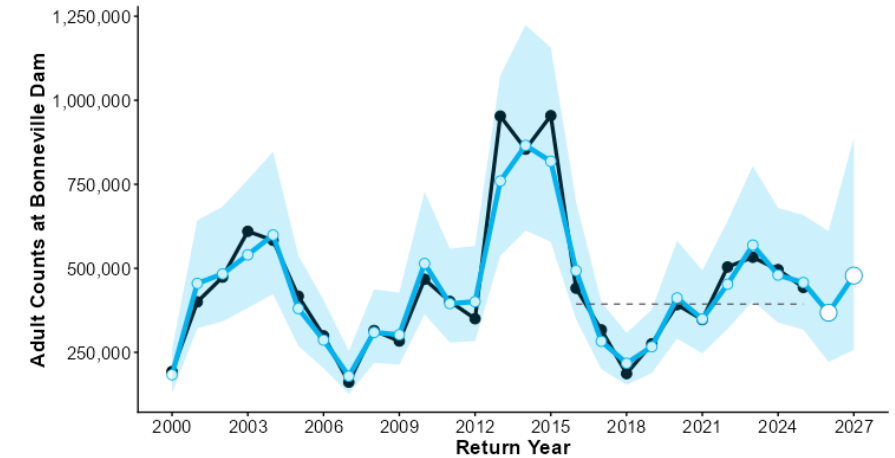
Spring Chinook

Forecast for 2026 = 94K
Forecast for 2027 = 115K



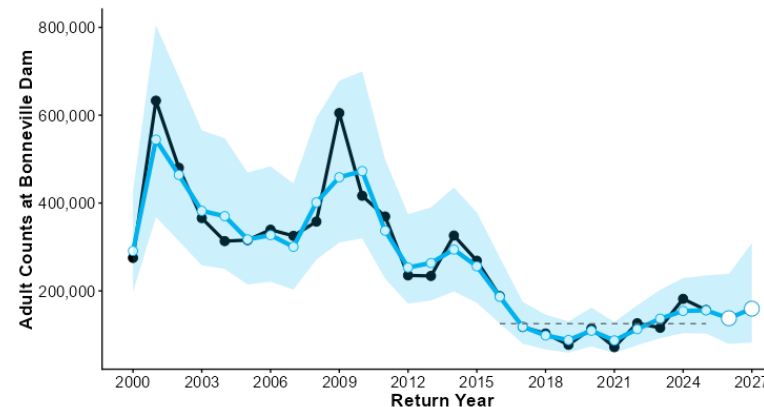
Fall Chinook

Forecast for 2026 = 368K
Forecast for 2027 = 478K



Steelhead

Forecast for 2026 = 138K
Forecast for 2027 = 160K



2024-25 CCIEA Ecosystem Status Report Highlights



**2024
Takeaways**

Favorable
Unfavorable

Coastwide Indicators



<https://www.integratedecosystemassessment.noaa.gov/regions/california-current>

2024-25 CCIEA Ecosystem Status Report Highlights



2024
Takeaways

Favorable
indicators

Zooplankton

Columbia
salmon

Crab
landings

Forage fish

Upwelling 45°N

Krill

Groundfish recruitment

Upwelling 39°N

Salmon outmigration

Forage fish

Upwelling 33°N

Favorable
Unfavorable

2024-25 CCIEA Ecosystem Status Report Highlights



Takeaway

Unfavorable indicators

Community vulnerability



Basin-scale conditions



Marine heat wave



Fishery landings



Harmful algal blooms



Whale entanglement



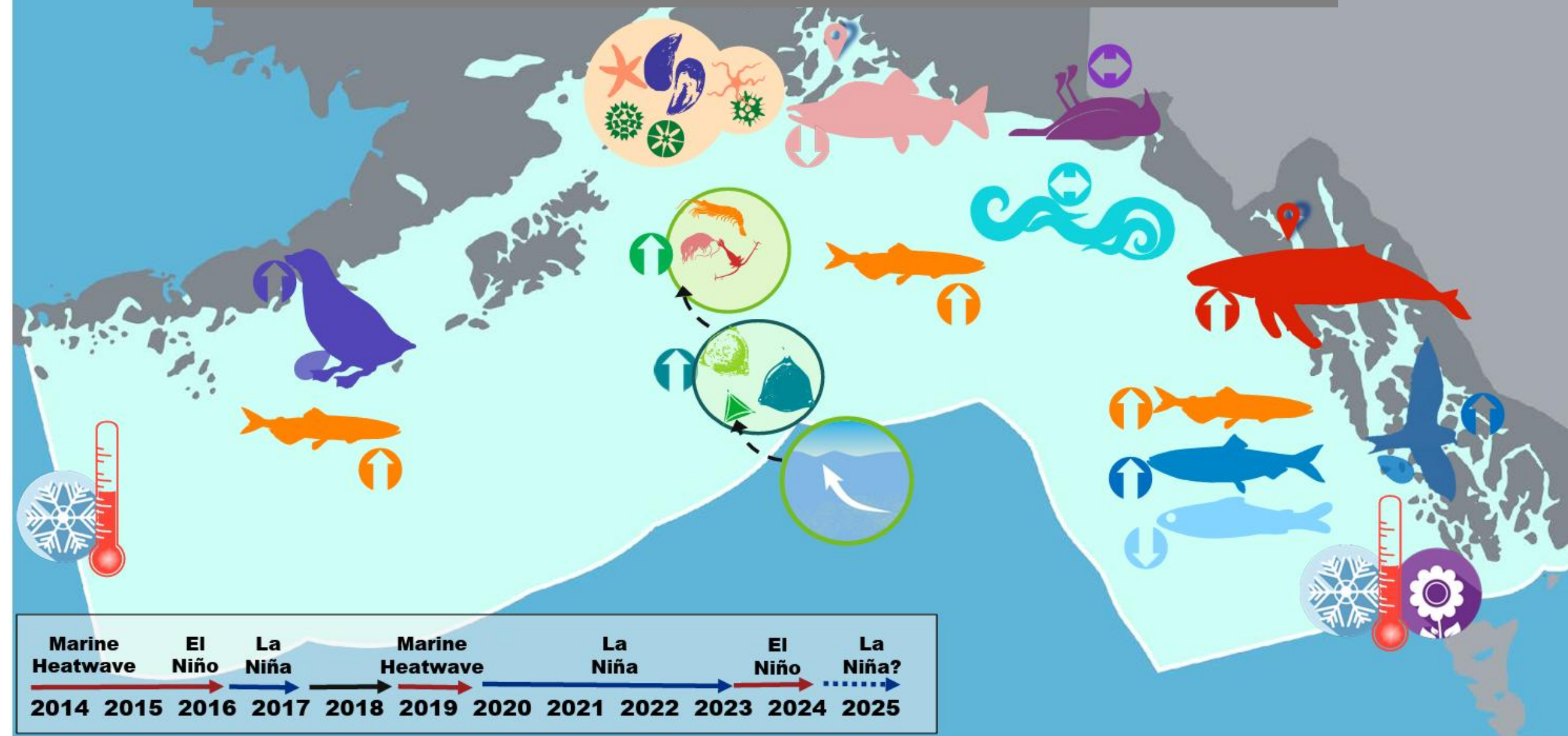
Harmful algal blooms



Favorable
Unfavorable

2024 Gulf of Alaska Ecosystem Status Report

<https://apex.psmfc.org/akfin/r/akfin/esr>



2024 Gulf of Alaska Ecosystem Status Report

<https://apex.psmfc.org/akfin/r/akfin/esr>

Increasing trends

Seabirds

Capelin

Large zooplankton

Capelin

Phytoplankton

Offshore upwelling

Juv. humpbacks

Capelin

Herring

Seabirds



2024 Gulf of Alaska Ecosystem Status Report

<https://apex.psmfc.org/akfin/r/akfin/esr>

Flat or decreasing trends

Intertidal communities

PWS Pink salmon

Dead seabirds

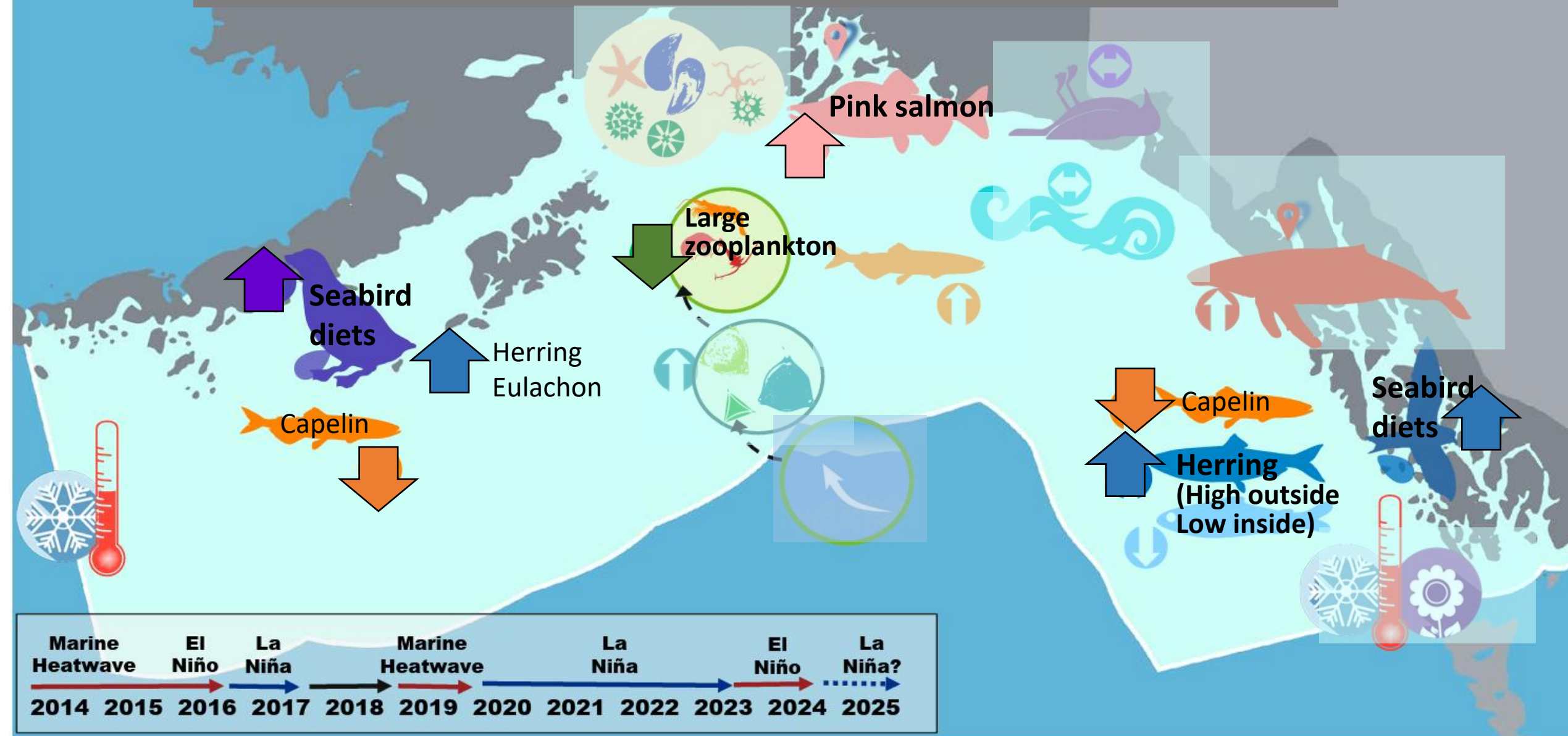
Harmful algal blooms

Juv salmon



2025 Gulf of Alaska Ecosystem Status Report

<https://apex.psmfc.org/akfin/r/akfin/esr>



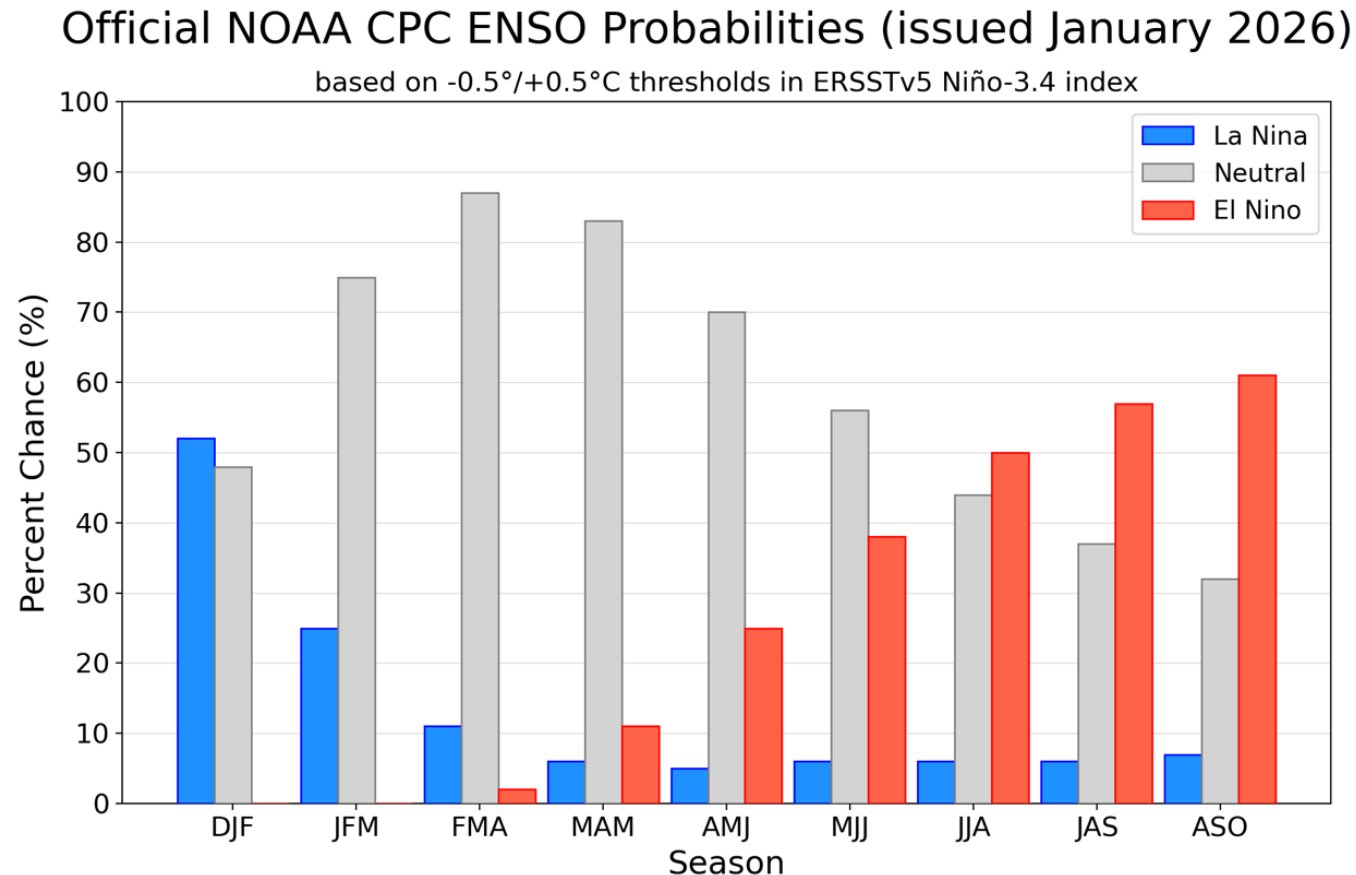
3. Forecasts

El Niño/La Niña
Seasonal terrestrial forecast
Ocean temperatures

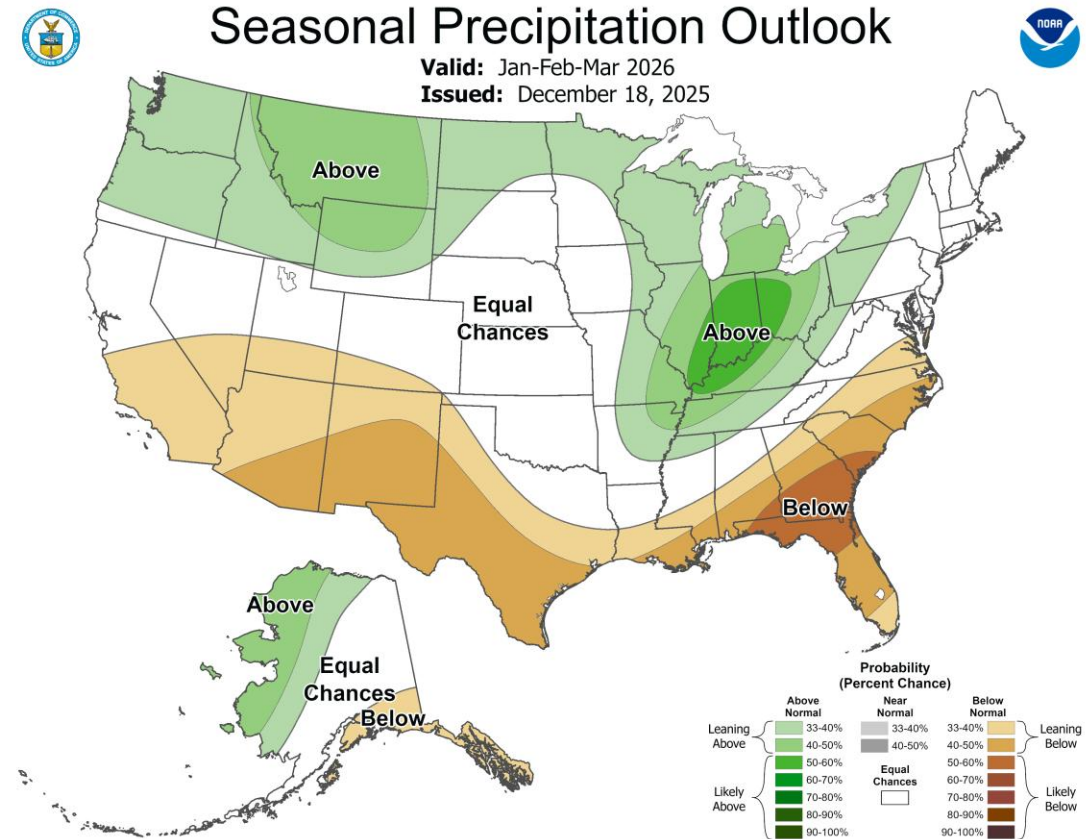
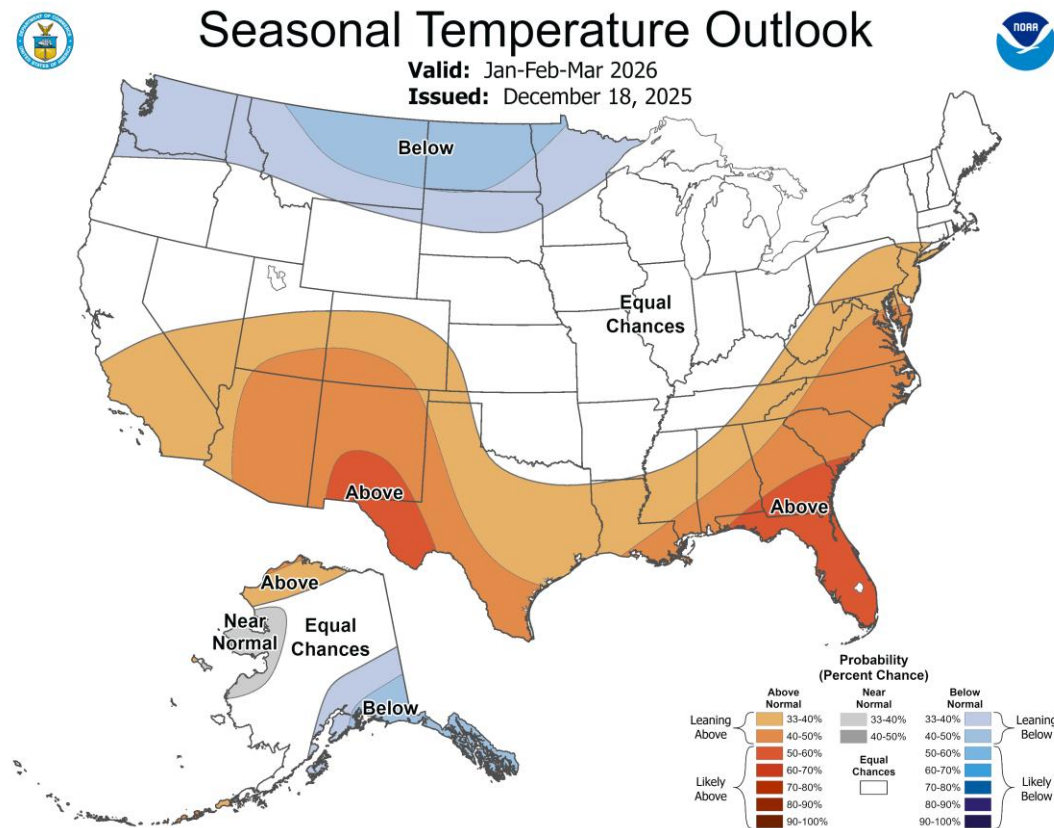
Heceta Head lighthouse, Oregon

NOAA El Niño/La Niña outlook (08 Jan 2026)

La Niña persists, followed by a 75% chance to ENSO-neutral during January-March 2026. ENSO-neutral is likely through late spring 2026.

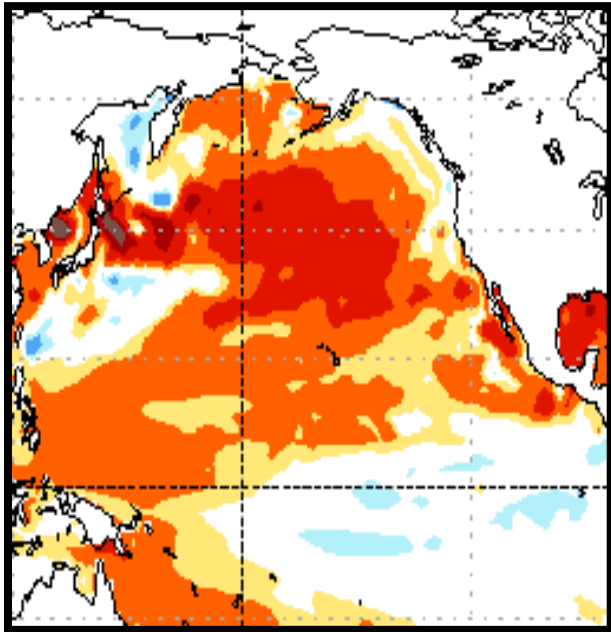


Jan-Feb-Mar outlook is classic La Niña pattern, but will it happen given elevated global temperatures?

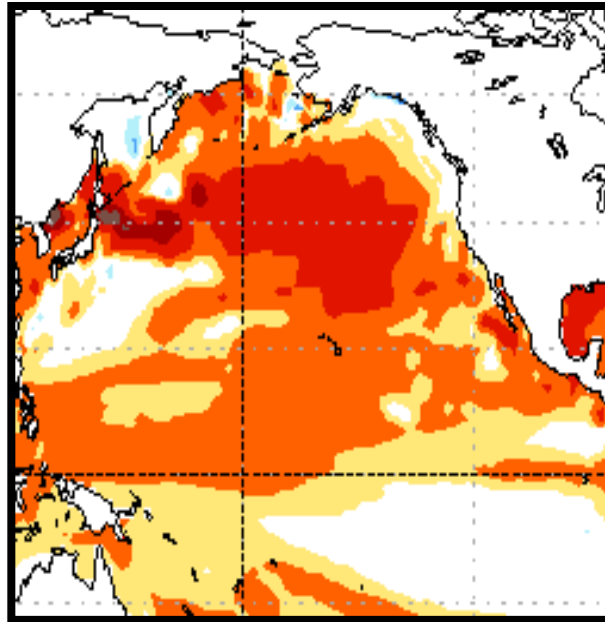


Forecast SST anomalies for 2026 suggest lots of hot water across N Pacific, but cooler along coast

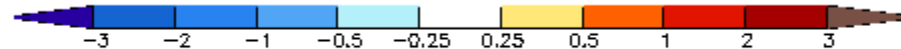
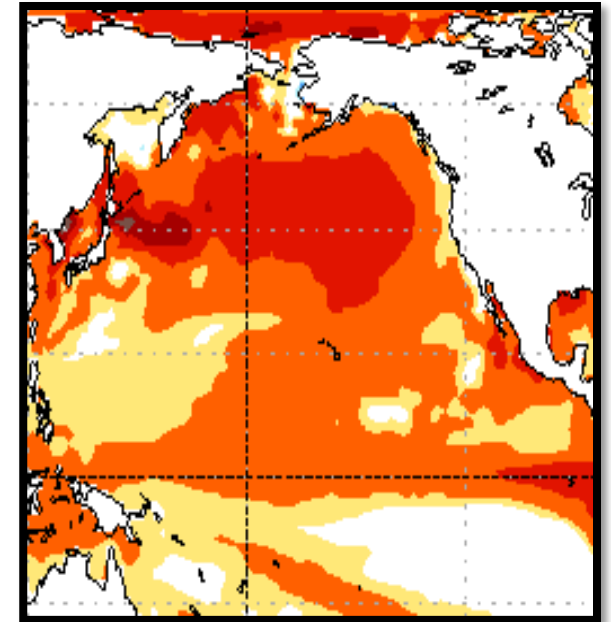
Jan-Feb-Mar



Mar-Apr-May



May-Jun-Jul



<https://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/htmls/glbSSTe2Sea.html>

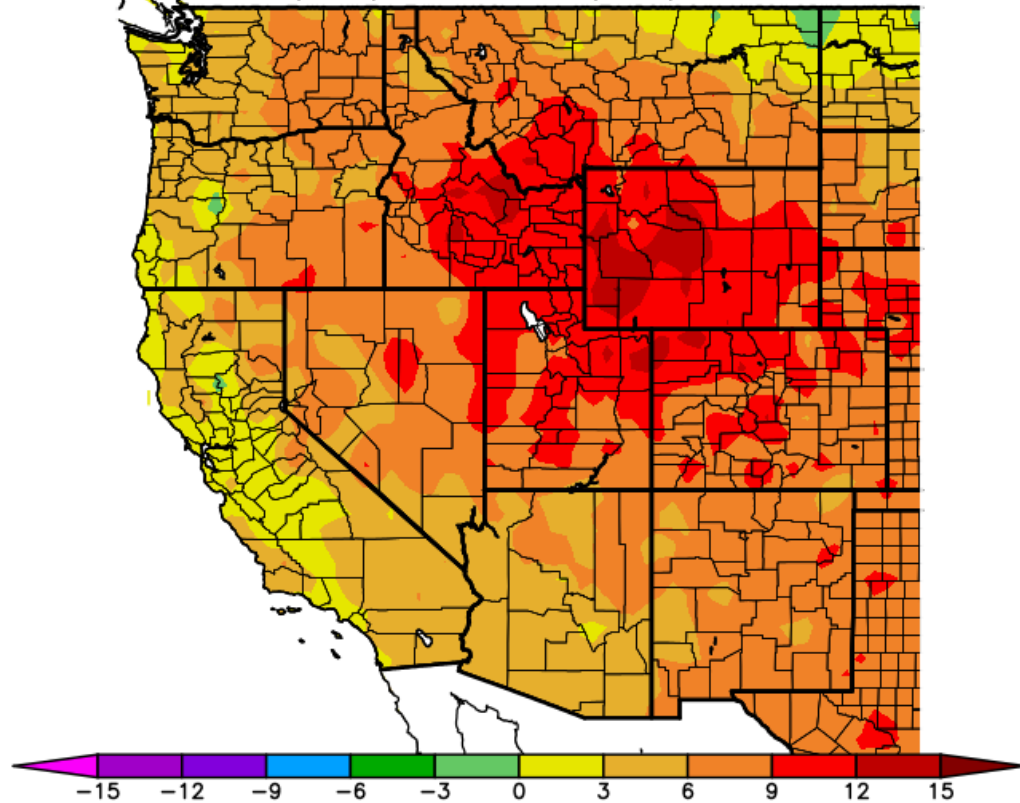
Questions?



Hot air temperatures = low snowpack

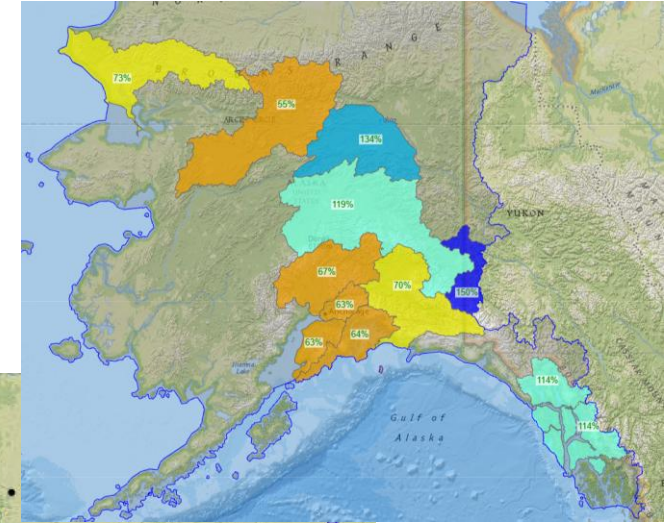
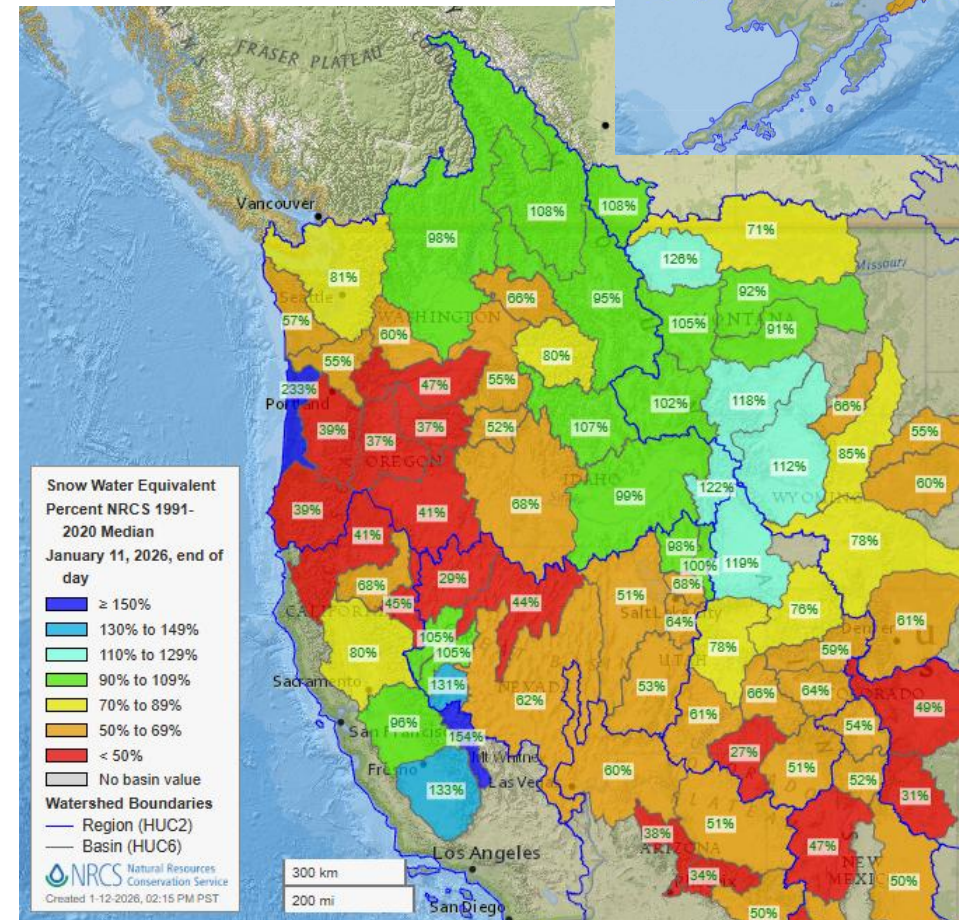
Recent floods scour redds?

Ave. Temperature dep from Ave (deg F)
11/13/2025 – 1/11/2026

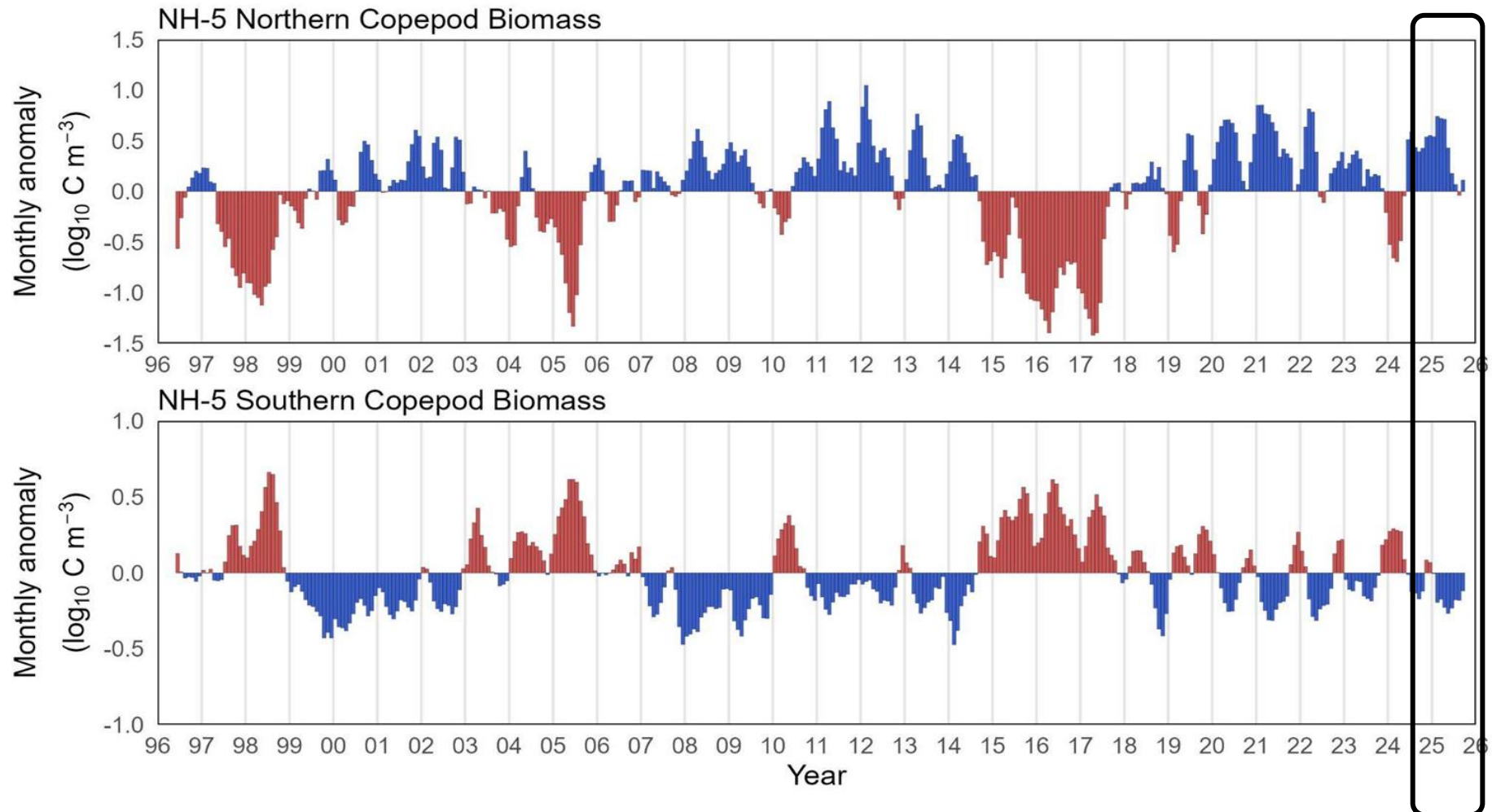


Generated 1/12/2026 at WRCC using provisional data.
NOAA Regional Climate Centers

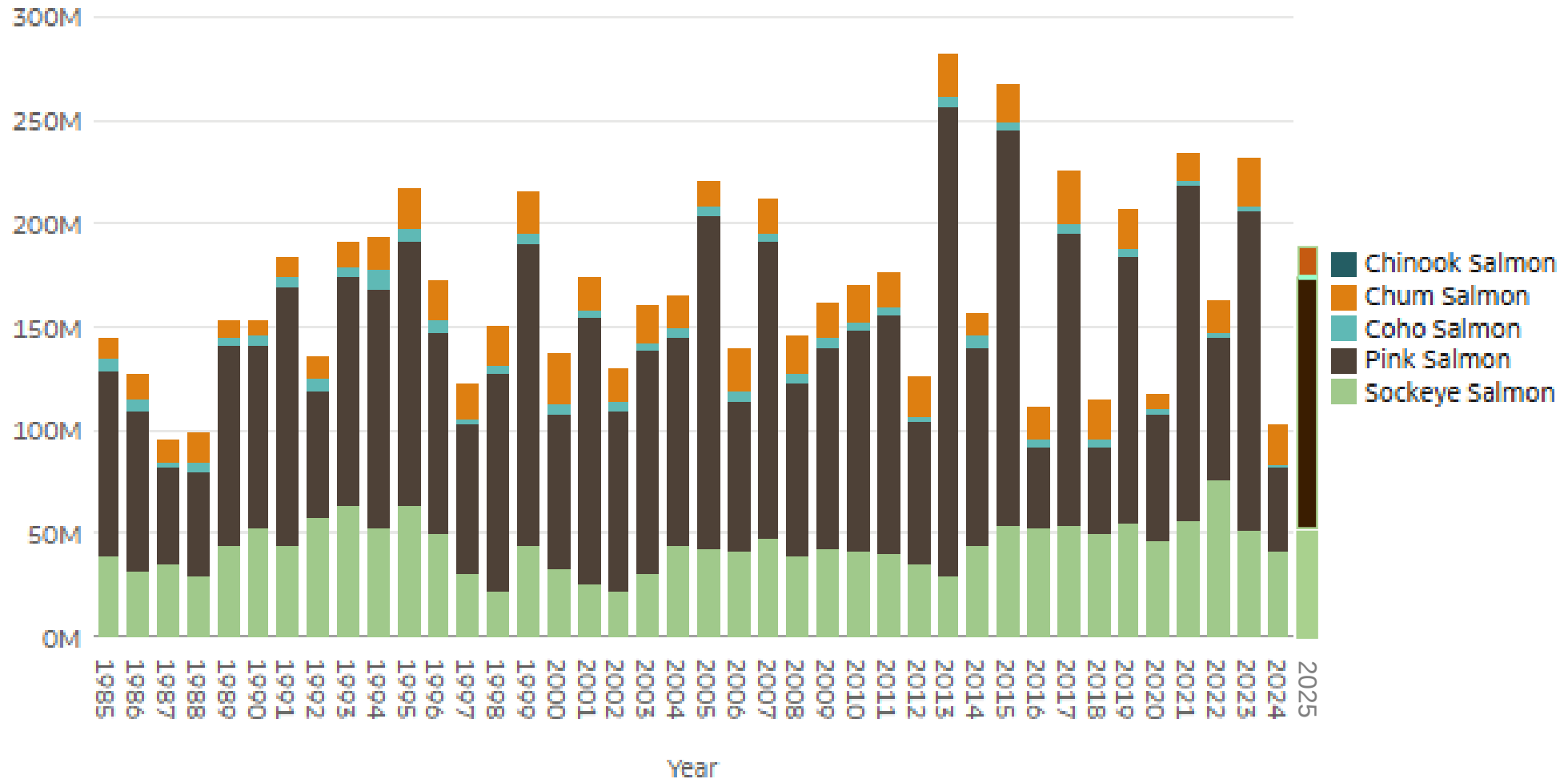
Current snowpack
(% of of median)



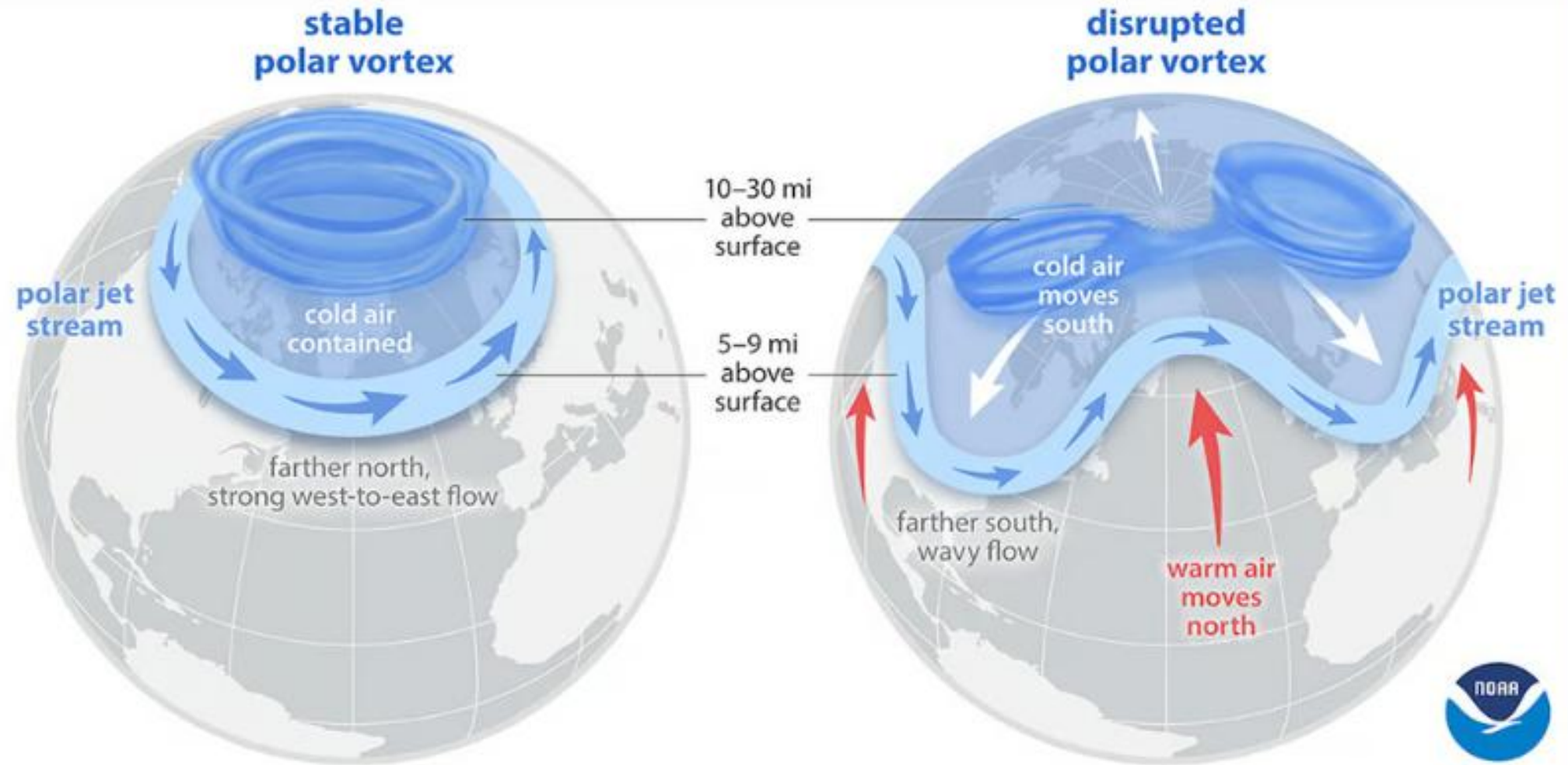
In 2025 northern copepods were high, southern copepods were low, and early biological transition (switch from winter to summer community)



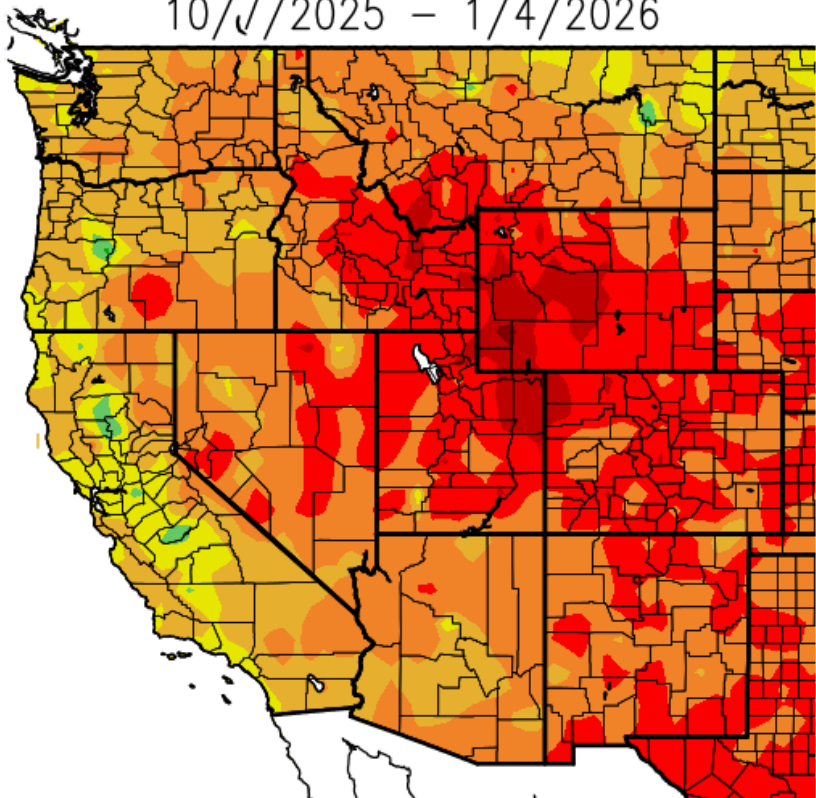
2025 Alaska state-wide commercial salmon harvests were much above 2024 due to large pink harvest



https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmon_landings

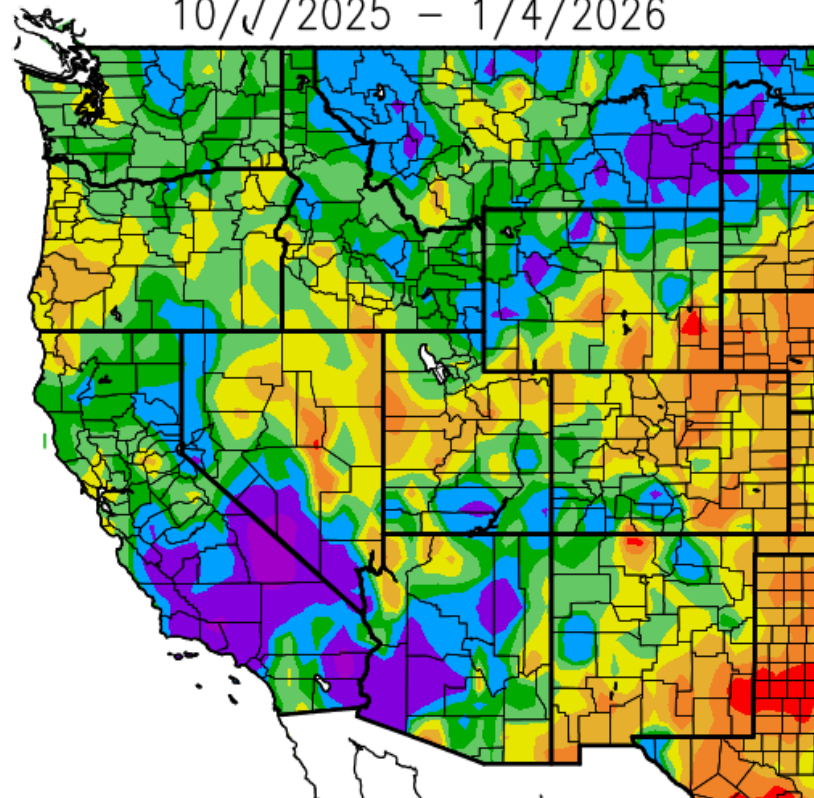


Ave. Temperature dep from Ave (deg F)
10/7/2025 – 1/4/2026



Generated 1/ 5/2026 at WRCC using provisional data.
NOAA Regional Climate Centers

Percent of Average Precipitation (%)
10/7/2025 – 1/4/2026



Generated 1/ 5/2026 at WRCC using provisional data.
NOAA Regional Climate Centers