

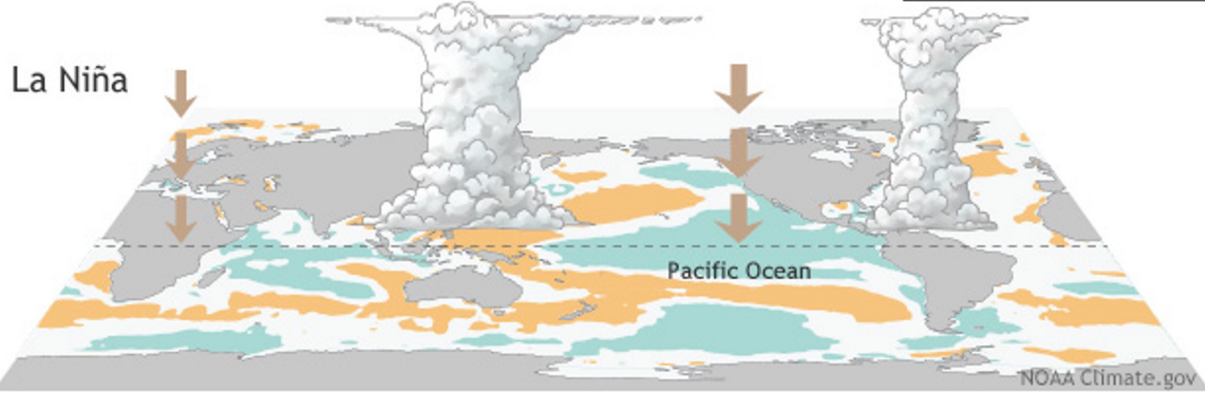
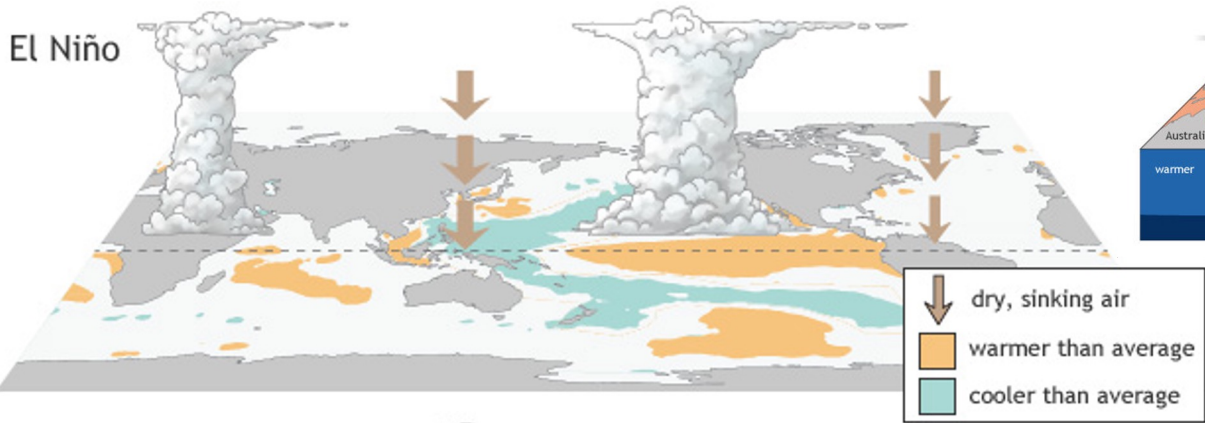


NOAA ENSO Update

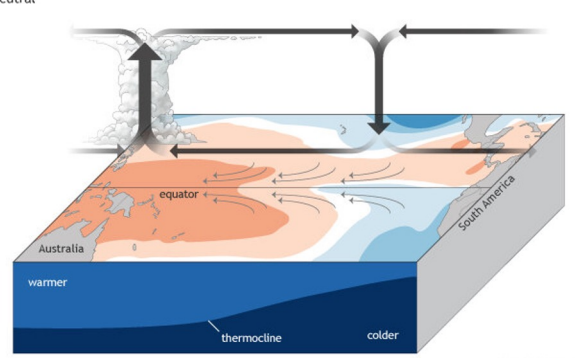
Tom Di Liberto
Climate Scientist
November 2, 2023

What is ENSO?

El Niño Southern Oscillation



Atmosphere-ocean feedbacks during El Niño-Southern Oscillation



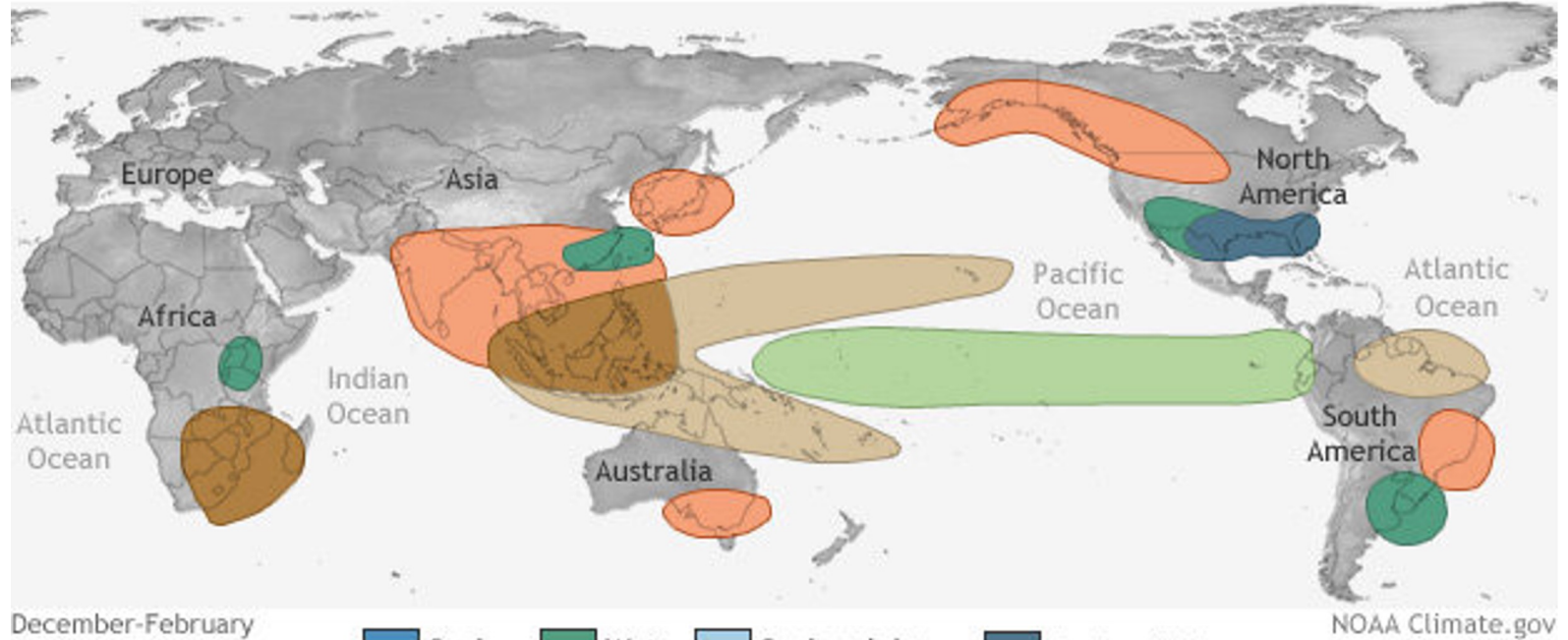
NOAA Climate.gov



A Global Pattern

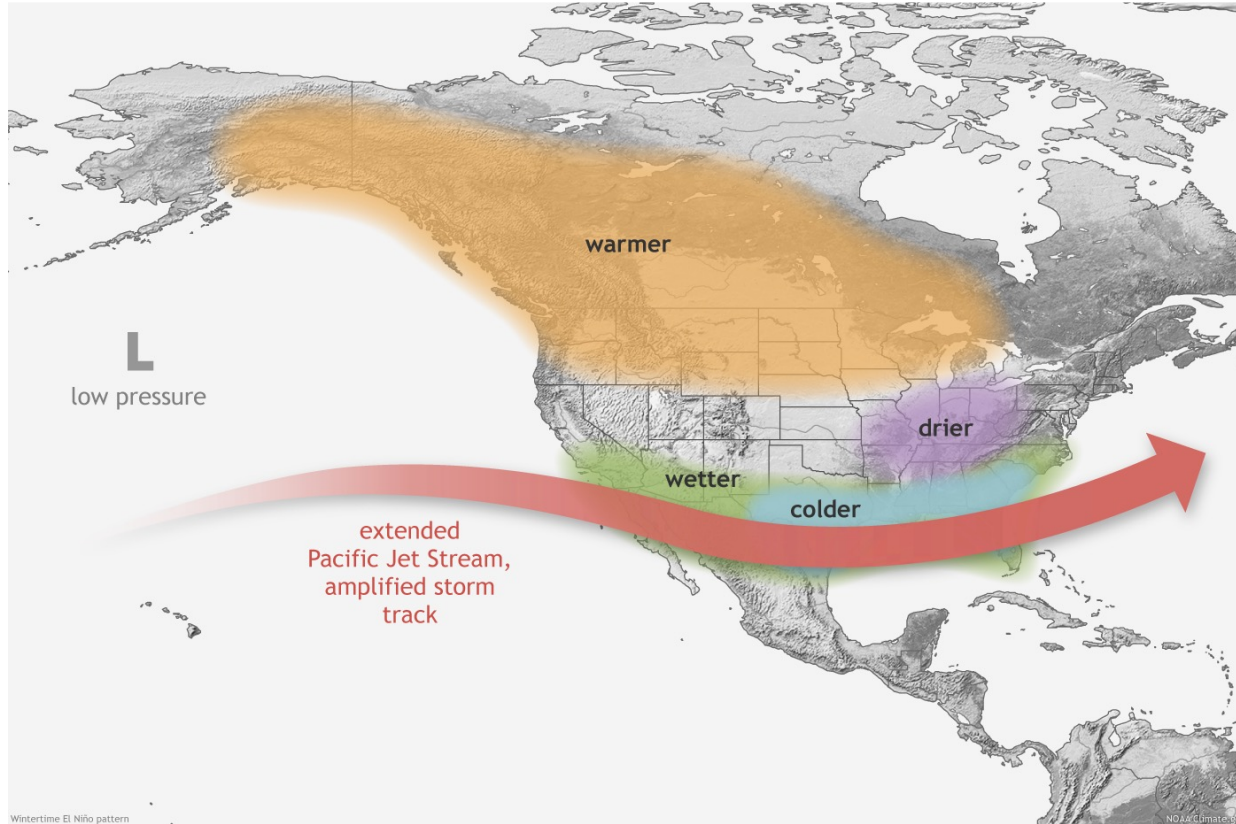


EL NIÑO WINTER IMPACTS



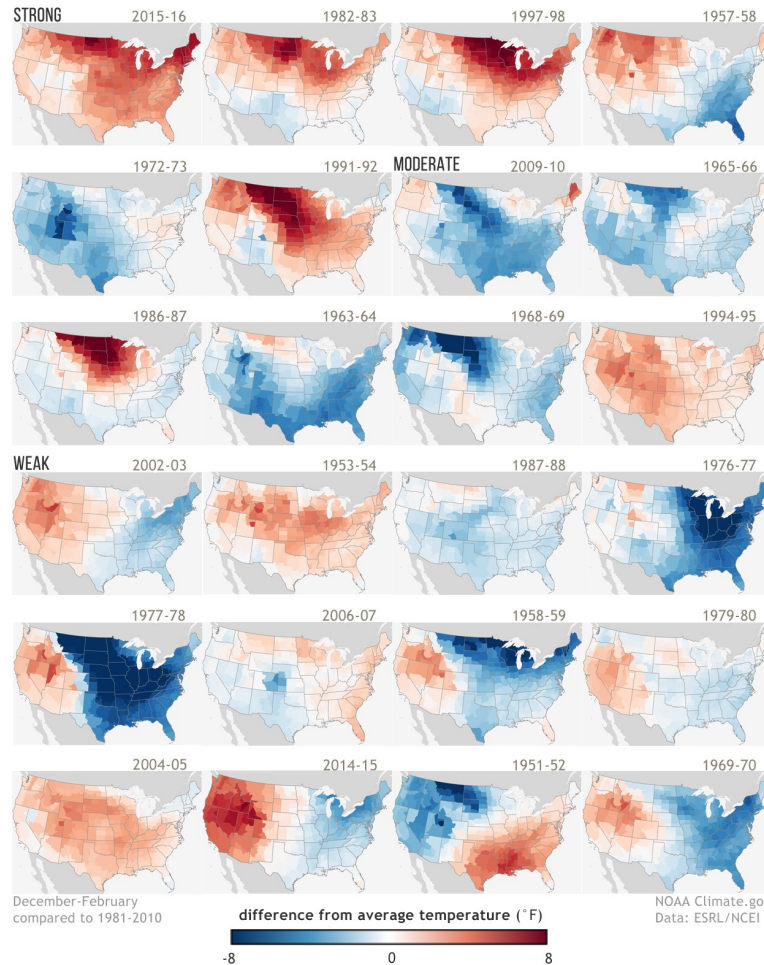


A US Pattern

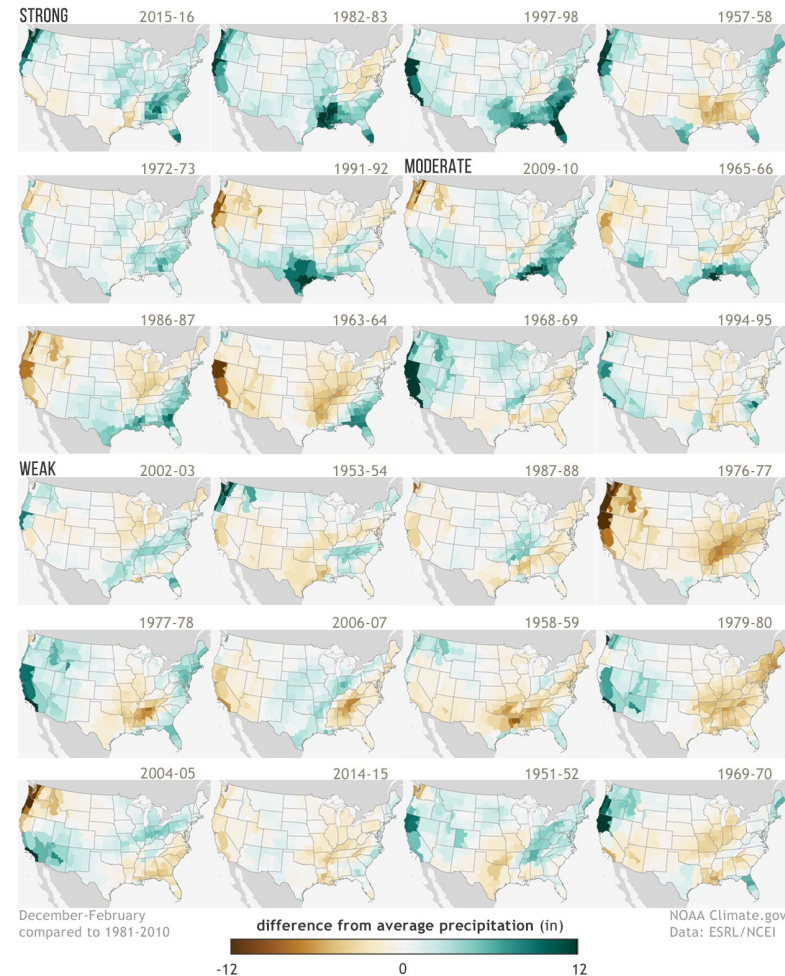


Reality

U.S. winter temperature during every El Niño since 1950



U.S. winter precipitation during every El Niño since 1950





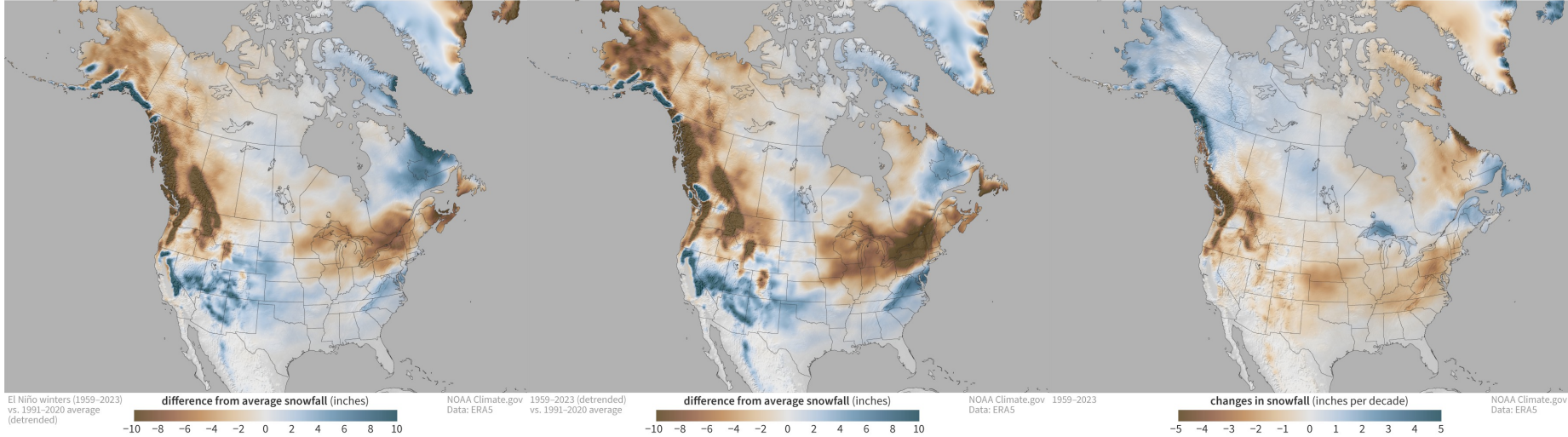
What about snow?



Snowfall during all El Niño winters (Jan-Mar)

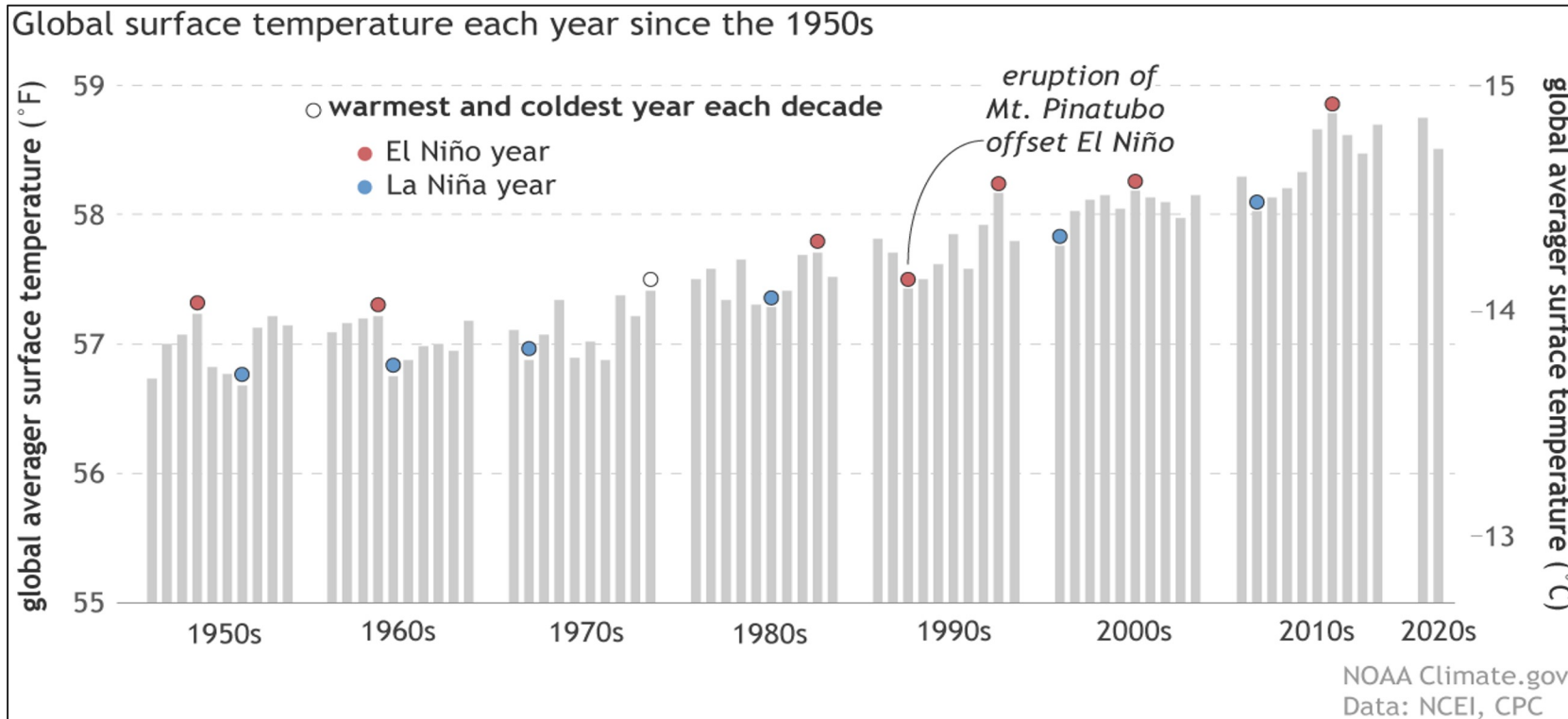
Snowfall during moderate-to-strong El Niño winters (Jan-Mar)

Widespread decline in U.S. winter (Jan-Mar) snowfall





Driving Extremes

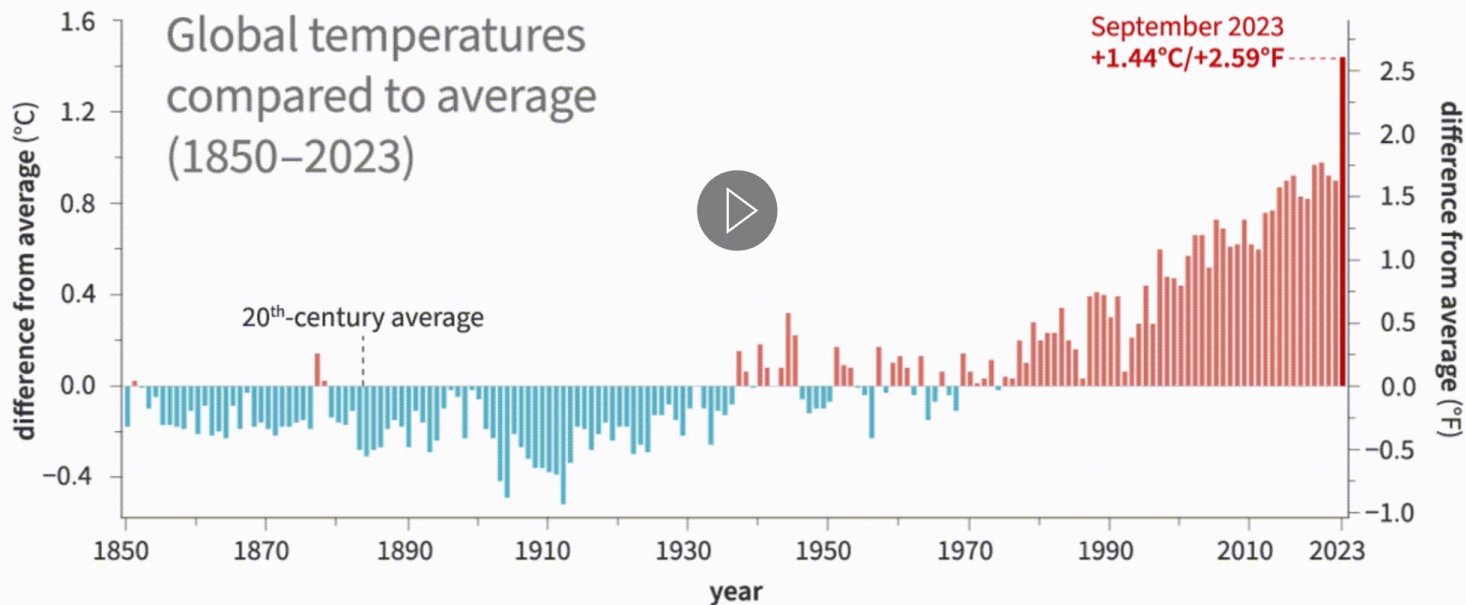




Smashing records



HOTTEST SEPTEMBER ON RECORD

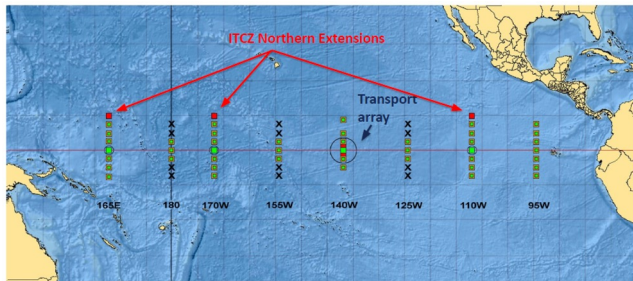


NOAA Climate.gov / Data: NCEI

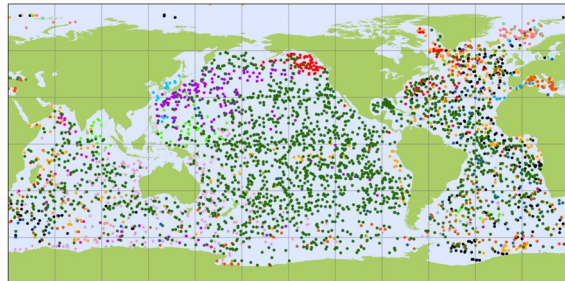


How do we forecast?

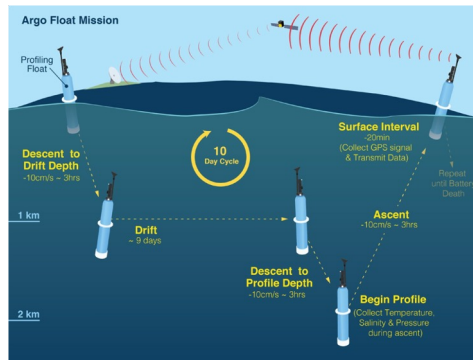
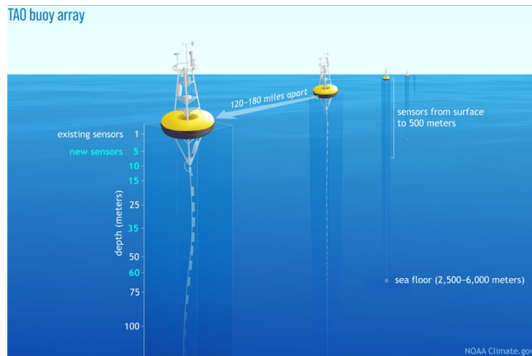
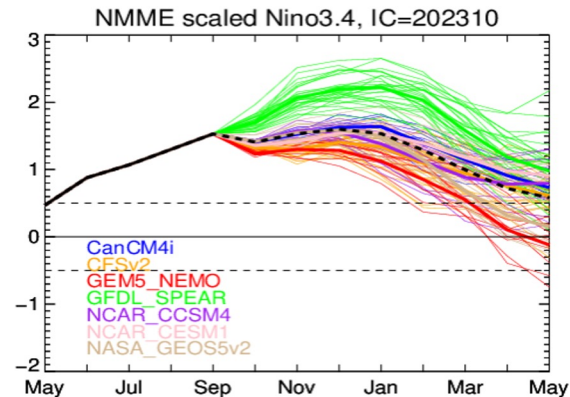
What information is collected?



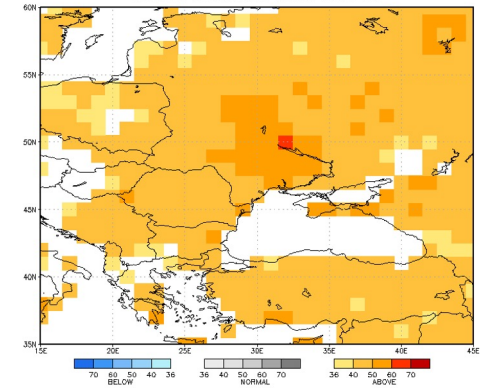
- Existing TAO Recap Enhanced Stations
- New TAO Recap Enhanced Stations
- FLUX Stations
- Omitted Stations
- ADCP Stations



- | | | | | |
|-------------------|-----------------|--------------------|---------------------------|-------------|
| • AUSTRALIA (295) | • FINLAND (5) | • IRELAND (15) | • NORWAY (47) | • UK (145) |
| • BULGARIA (7) | • FRANCE (308) | • ITALY (91) | • PERU (1) | • USA (208) |
| • CANADA (164) | • GERMANY (228) | • JAPAN (179) | • POLAND (9) | |
| • CHINA (69) | • GREECE (5) | • NETHERLANDS (37) | • KOREA, REPUBLIC OF (19) | |
| • EUROPE (85) | • INDIA (24) | • NEW ZEALAND (15) | • SPAIN (15) | |



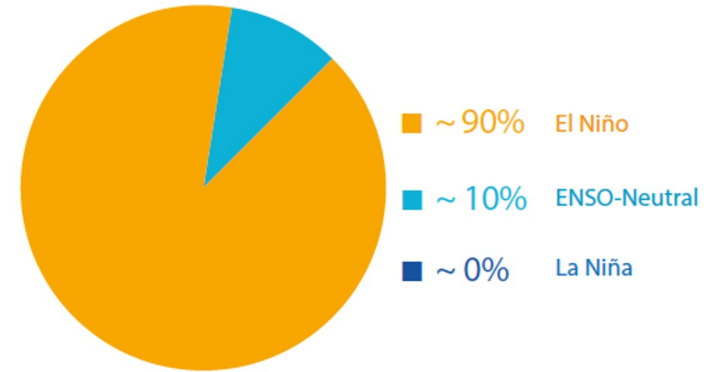
NMME 2m Air Temp Prob. De9C Mar2024-May2024 Fost



What is the US role?

- The National Weather Service's Climate Prediction Center (CPC) is the US federal lead on tracking the status of ENSO events, El Niño and La Niña.
- CPC is charged with issuing official ENSO outlooks, and declaring the start and end to El Niño/La Niña events.
- The US also contributes to the World Meteorological Organization's (WMO) ENSO outlook with partner nations

ESTIMATED ENSO PROBABILITIES
FOR JULY - SEPTEMBER 2023



WMO 2023 ENSO Outlook

<https://public.wmo.int/en/our-mandate/climate/el-ni%C3%B1o-la-ni%C3%B1a-update>



How does the science come together?



- CPC's ENSO team meets monthly to discuss current observations, model forecast, and thoughts from an extended group of ENSO experts.
- Each member of the ENSO team independently produces a probabilistic forecast for the chances of El Nino, La Nina, or ENSO-Neutral out ten overlapping 3-month seasons.
- The final ENSO outlook averages all the forecasters' probabilities.
- Forecasters also predict the sea surface temperature anomaly in the Nino3.4 region for the same time periods, which are used to determine the strength outlook for any El Nino or La Nina event.



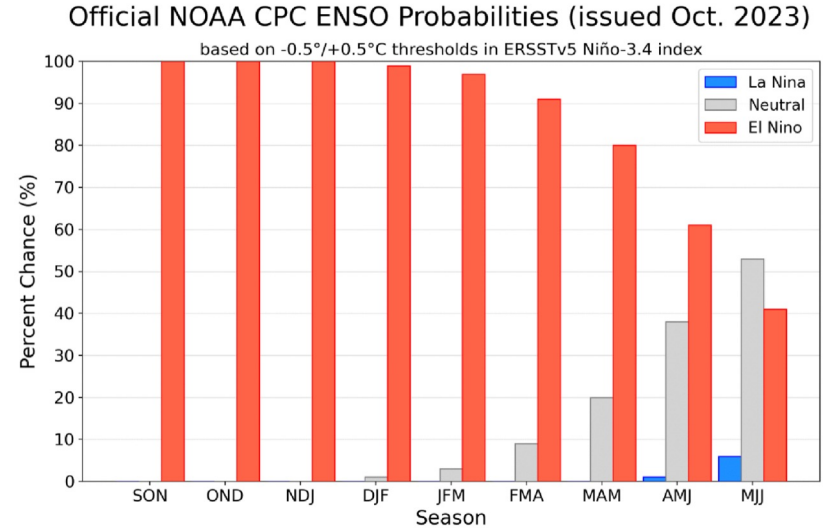
2023 ENSO Outlook



2023-2024 El Niño Advisory



- El Niño is predicted with near certainty (>99%) to persist through the Northern Hemisphere winter
- Anticipate that El Niño will continue to grow through the fall, peaking this winter with moderate-to-strong intensity
 - 97% chance of, at least, a moderate strength event
 - 75% chance of a strong El Niño
 - ~30% chance that this El Niño reaches the historically strong levels



CPC/IRI Official Probabilistic ENSO Forecast

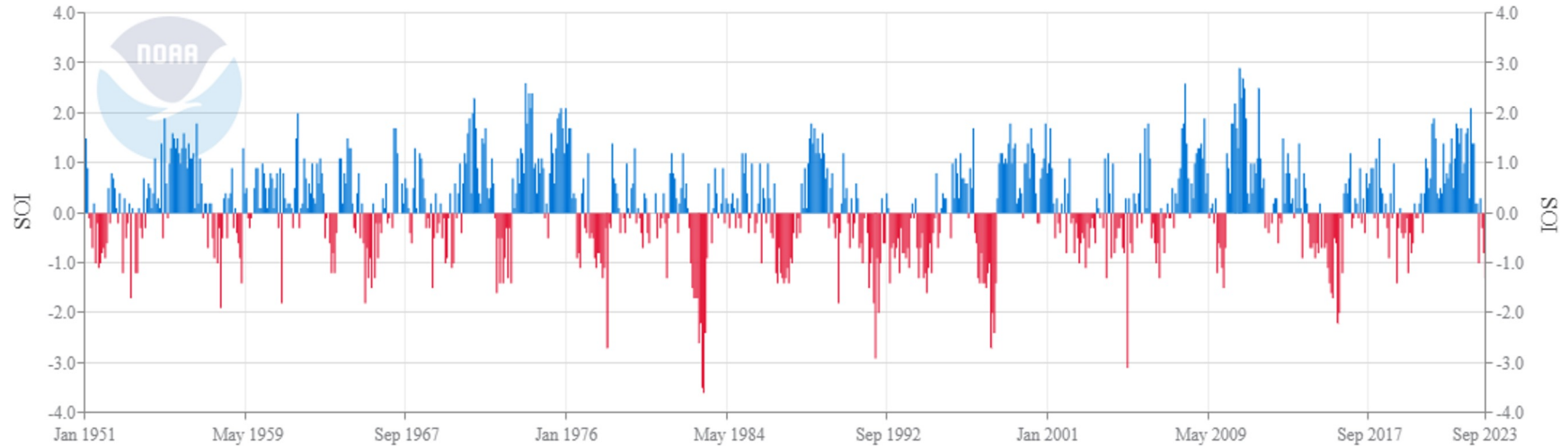




Current Regional Atmospheric Conditions



Southern Oscillation Index (SOI)

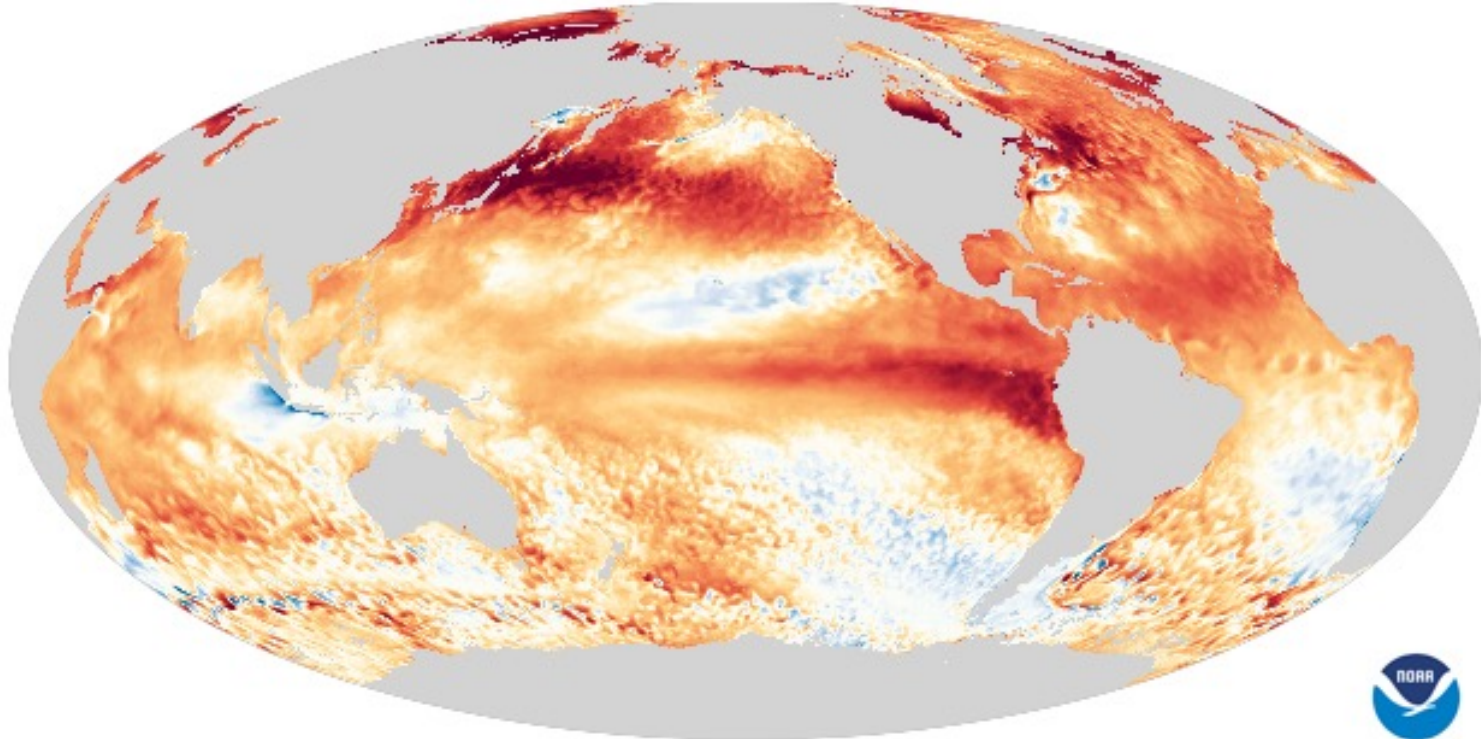


Source: <https://www.cpc.ncep.noaa.gov/data/indices/soi>



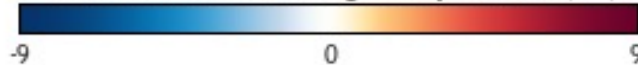


Current Regional Ocean Conditions



September 2023
Compared to 1985-1993*

Difference from average temperature (°F)



Climate.gov/NNVL
Data: Coral Reef Watch



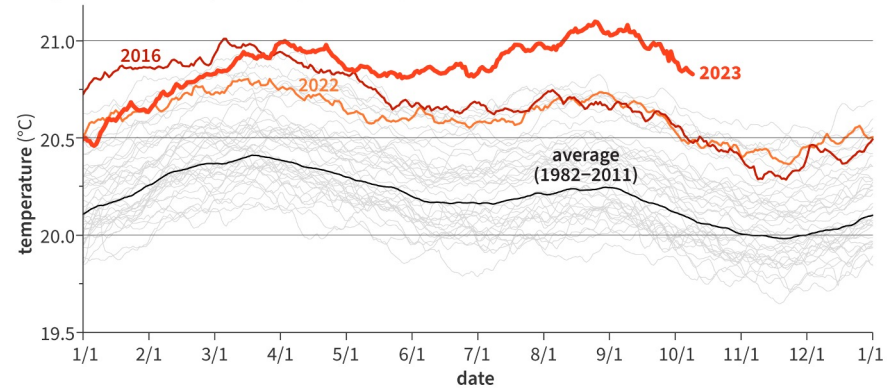
A Note About the Oceans

- Global ocean temperatures are still running way above average
- This El Niño is operating in a different world than any previous El Niño

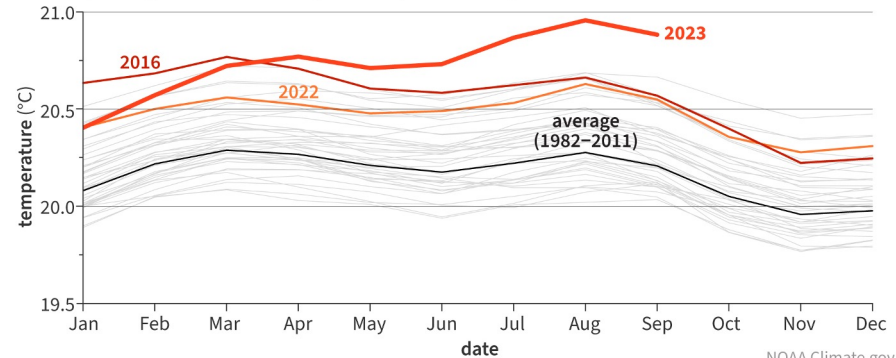


Record heat in global oceans in September 2023 (60°N–60°S)

Daily sea surface temperature (OISST data)



Monthly average sea surface temperature (ERSST data)



NOAA Climate.gov
Data: NCEI

US Impacts?

Not the only game in town

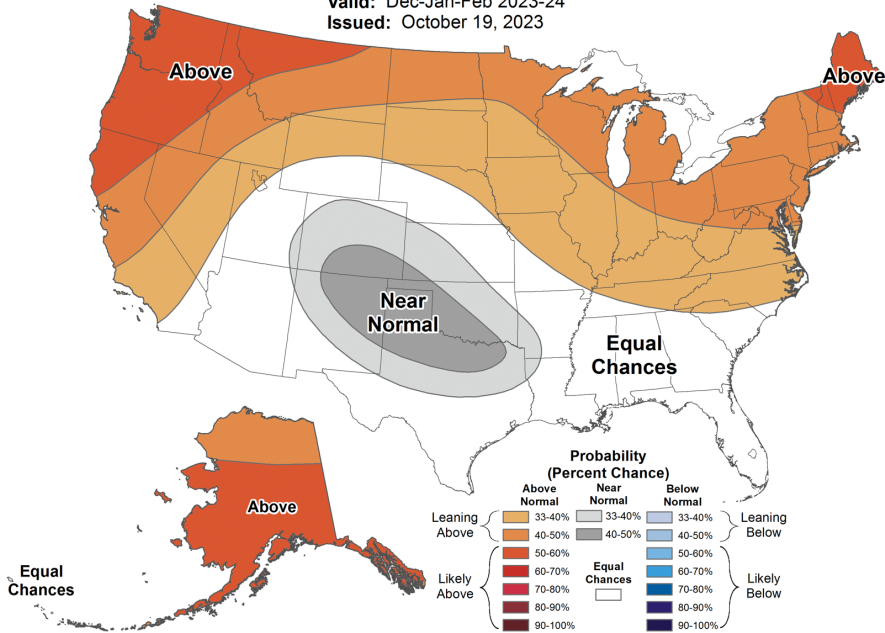
Climate Outlook



Seasonal Temperature Outlook



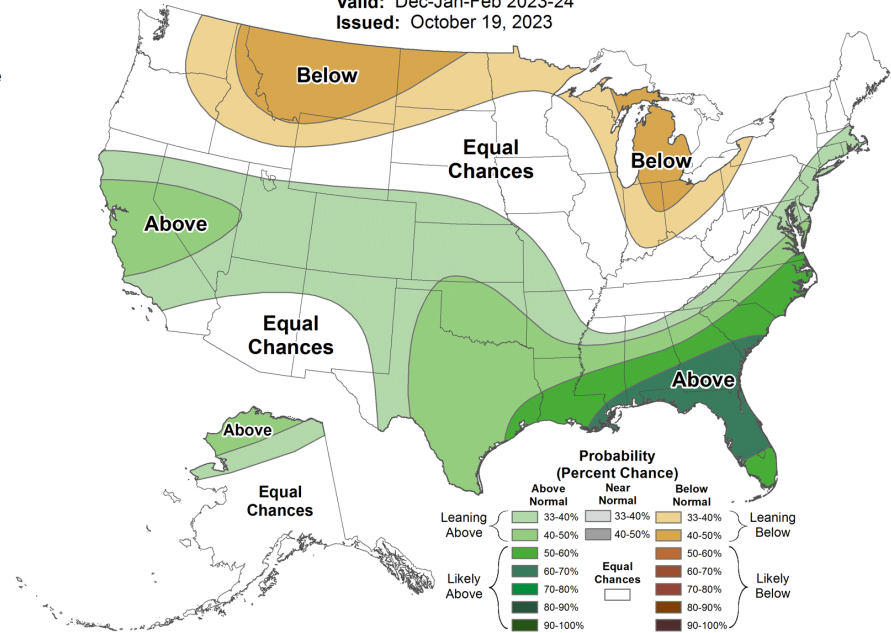
Valid: Dec-Jan-Feb 2023-24
 Issued: October 19, 2023



Seasonal Precipitation Outlook



Valid: Dec-Jan-Feb 2023-24
 Issued: October 19, 2023





El Niño and Ecosystem Impacts



- Increase the frequency of coastal ‘high tide flood’ events
- Widespread coral bleaching due to much warmer-than-average ocean temperatures across the Pacific
 - Will know if permanent after recedes
 - Could have long term fishery impacts
- Northward/shoreward shift for many subtropical species
 - Ex: Range shifts for Pacific hake→ increased salmon bycatch risk in the hake fishery
 - Ex: Purse seine and longline fleets from the Western Pacific shift eastward by up to 2,000 km

