

Climate-related changes in coastal fish communities

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Capitol Hill Ocean Week
2010-06-09

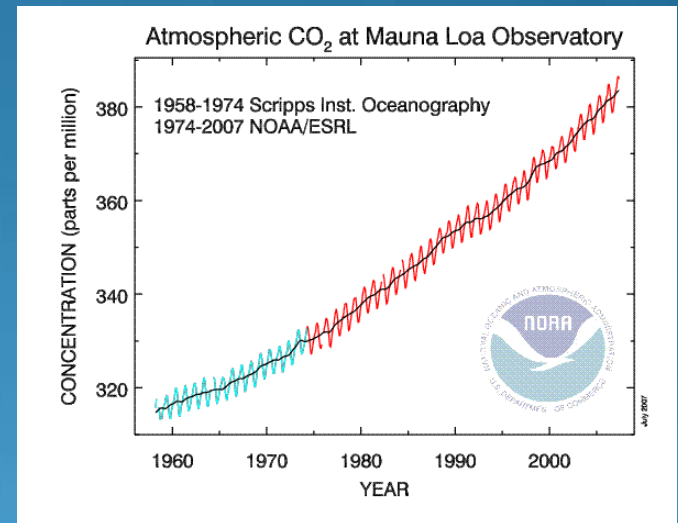
Talk outline

-Anticipated global responses of coastal fish communities to long-term climate warming

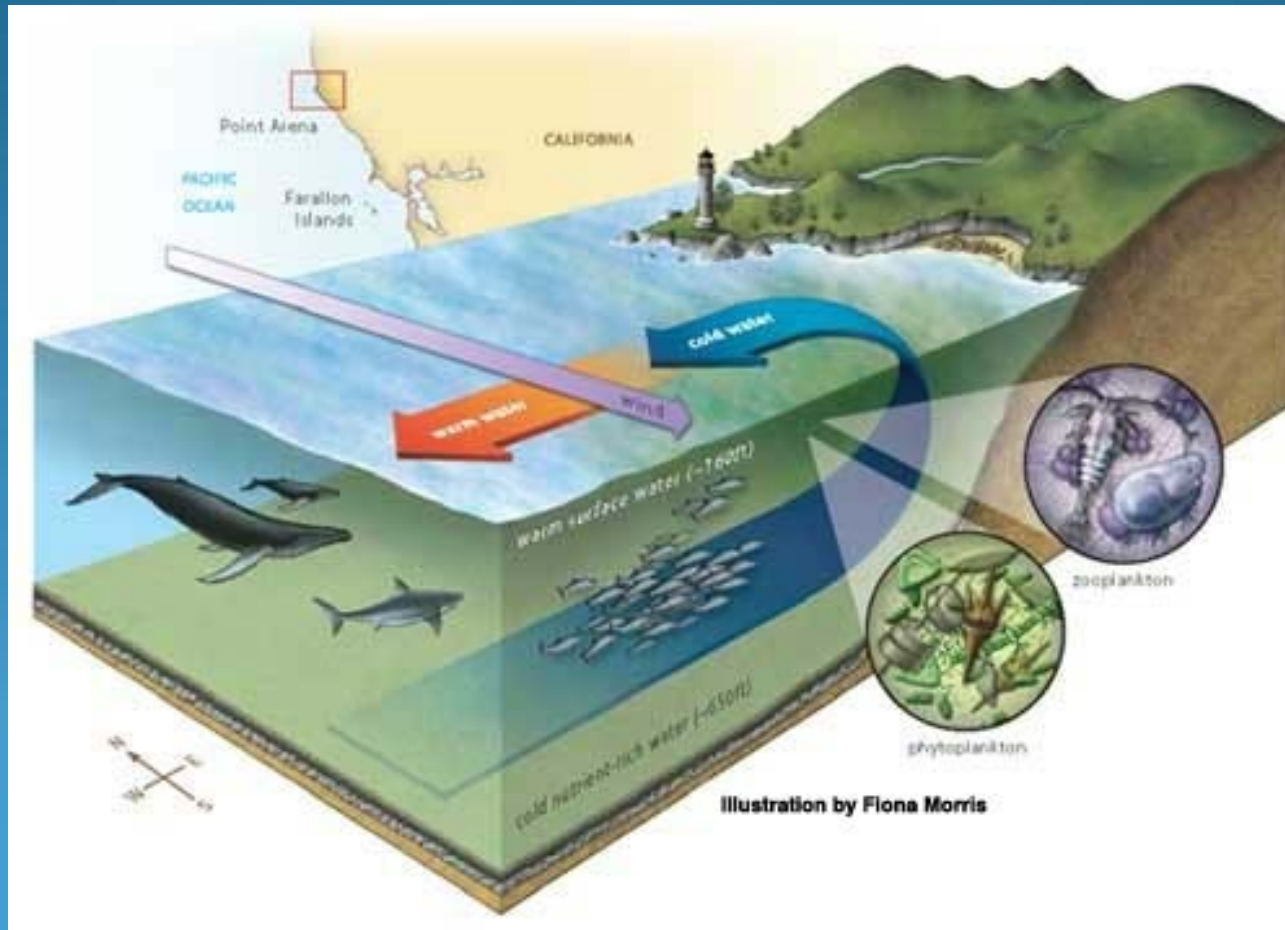
-A case study from the northern Gulf of Mexico: climate-related, decade-scale community changes

Anticipated ecological responses of coastal marine communities to climate warming

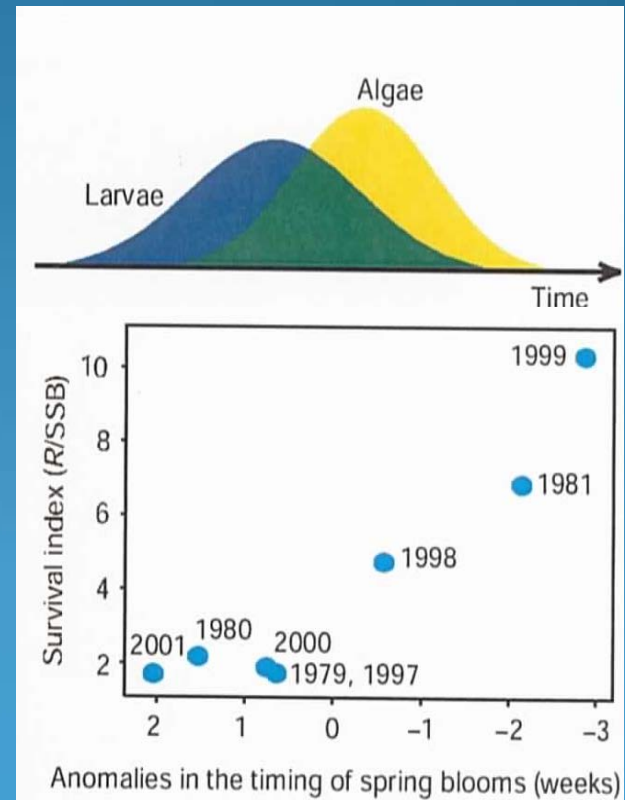
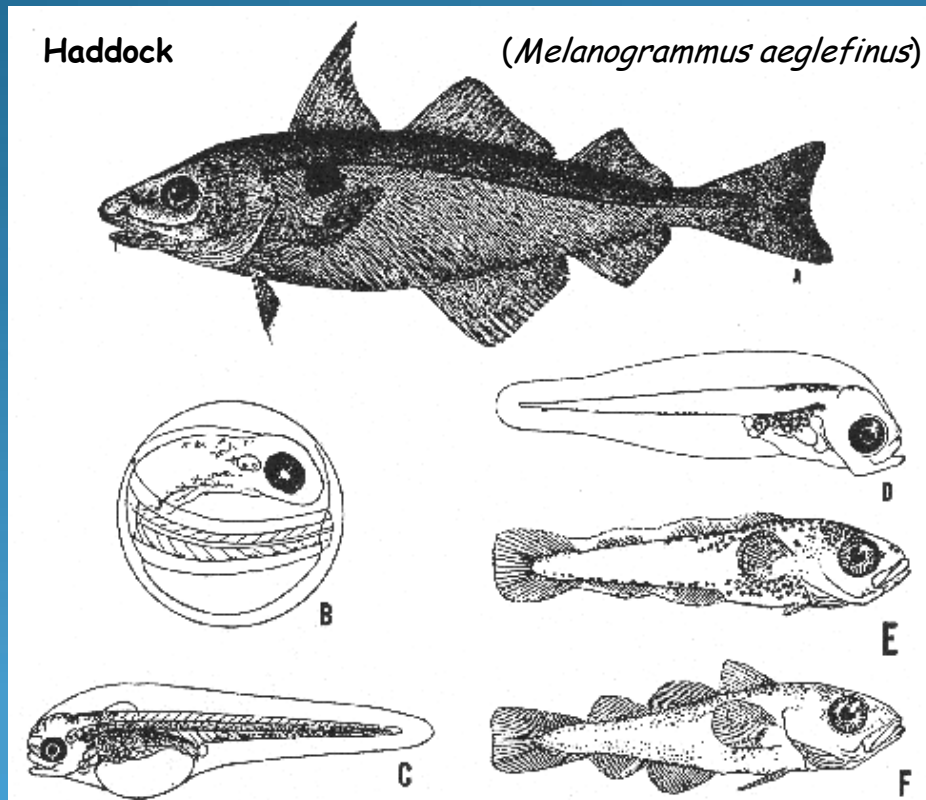
- Altered primary production due to CO_2 availability, coastal upwelling, photo stress, etc.
- Phenological changes in reproductive (flowerings, nesting), production (phytoplankton blooms) or migratory cycles
- Poleward range shifts (elevation/depth shifts also possible)



Coastal upwelling and fishery production

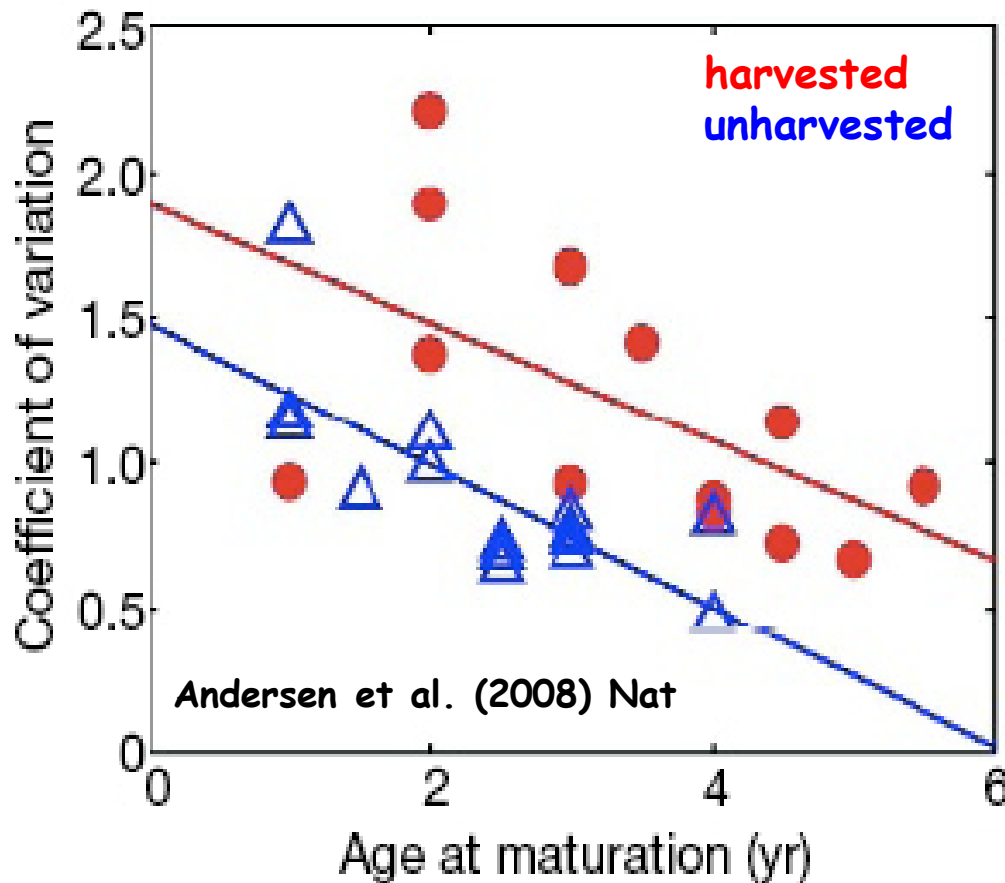


Phenology matters: spring blooms, larval production, first feeding, and the critical period for fish recruitment



Platt et al. (2005) Nat

A climate \times fishing interaction: increased temporal variability in fished stocks



Why are fished stocks more variable?

-Variable fishing pressure

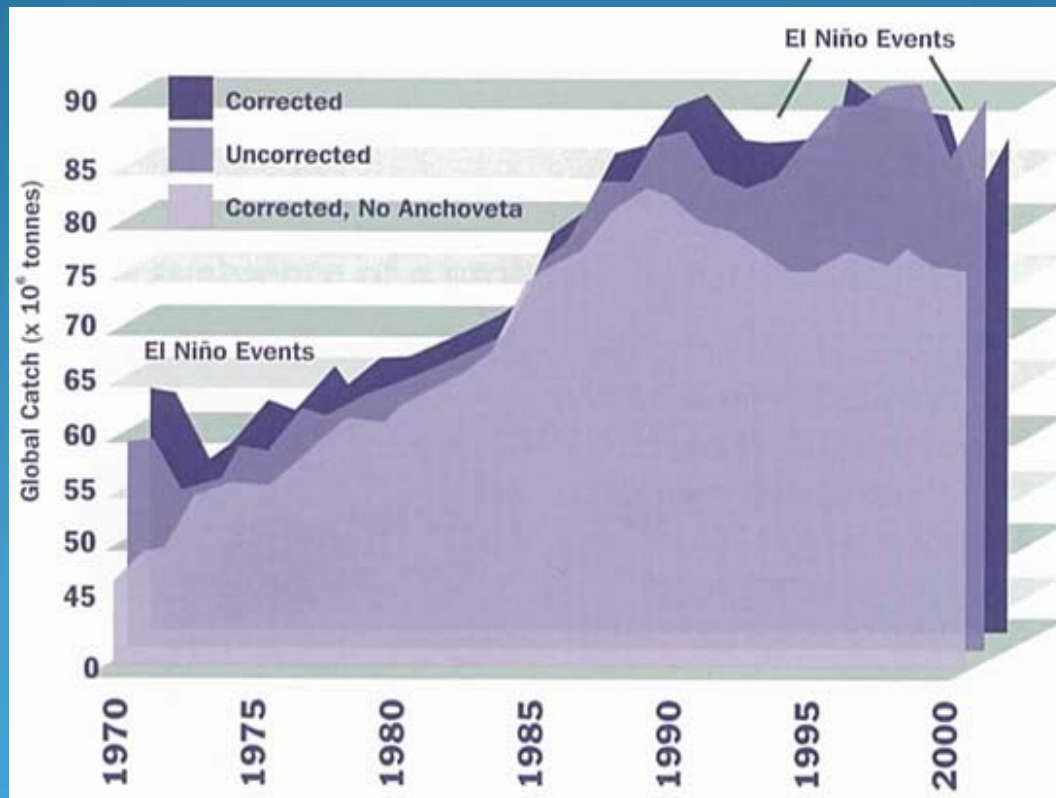
-Age truncation

-Contraction of core distribution

Thus, reduced buffering capacity of fished stocks toward environmental fluctuations

Why these changes may matter

- Overall fishery production may decrease as climate warms [sea-level rise and the alteration of estuarine habitats - 75% of harvest tied to estuaries]
- Predictability may also decline



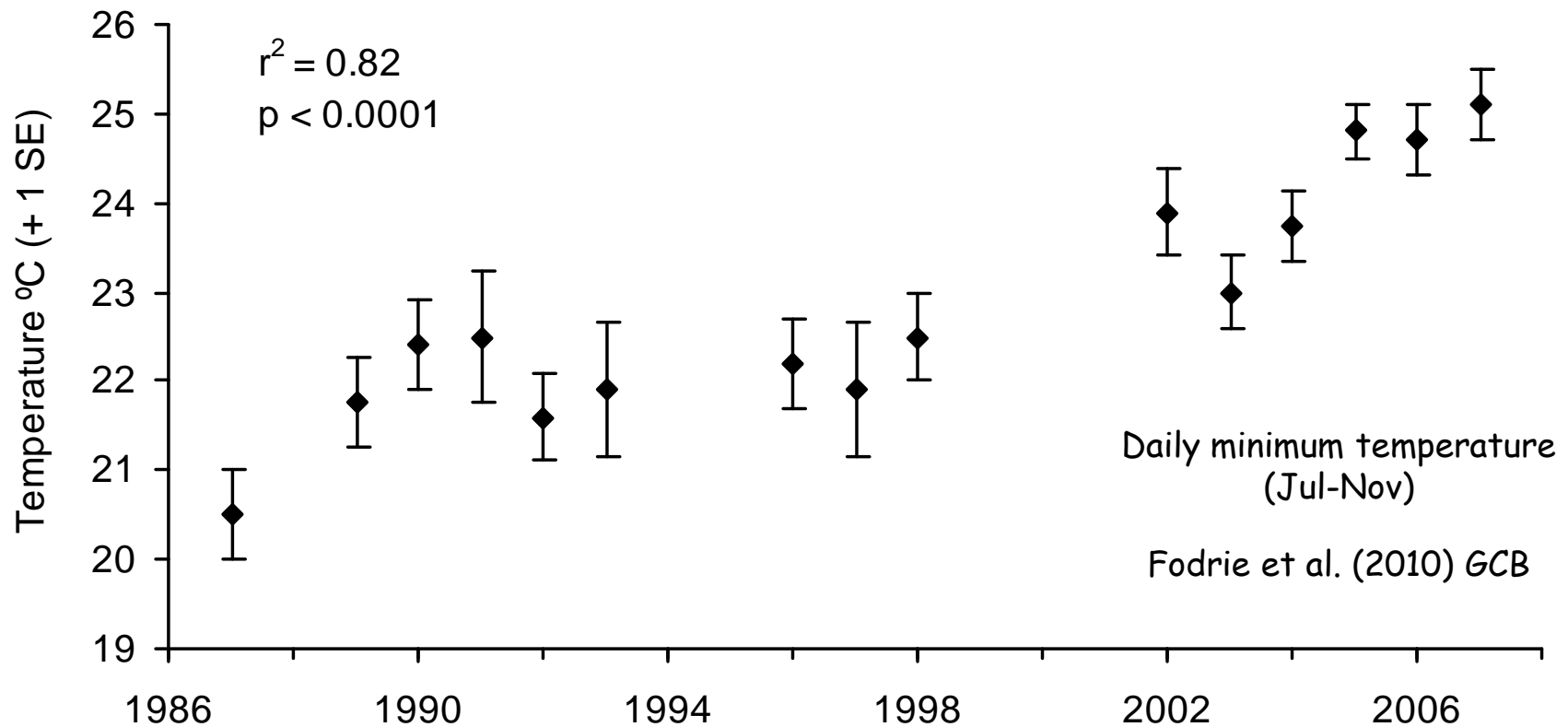
Adapted from:
Watson & Pauly
(2001) Nat

Talk outline

-Anticipated global responses of coastal fish communities to long-term climate warming

-A case study from the northern Gulf of Mexico: climate-related, decade-scale community changes

Longer and warmer summer and fall conditions in the northern, coastal GOM



Climate-related community changes

Livingston (1971-1979)



Fodrie et al.
(2006-2009)

Photos taken from:
www.fishbase.org

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image USDA Farm Service Agency
Image © 2010 DigitalGlobe
Texas Orthometry Program
25°21'39.17" N 87°38'17.82" W elev. 0 ft

©2009 Google

Eye alt: 1655.11 mi

Climate-related community changes



-Lane snapper: not collected at all in 1970s, now the 7th most abundant species

-Gag: Up ~ 200-fold

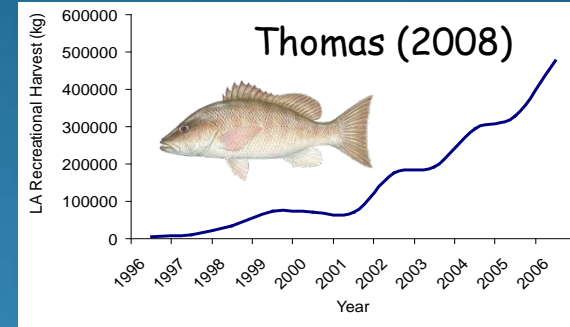
-Gray snapper: Up > 100-fold, now the 6th most abundant species

-Emerald parrotfish: Up x ~ 25-fold

Photos taken from: www.fishbase.org

Why these changes may matter

-Fishery benefits or costs (overwintering success needs to be determined, and species loss not yet evident)



-Altered trophic flows in estuarine ecosystems



-Unknown interactions between endemics and 'shifters'



Acknowledgements

-NOAA/NMFS, NOAA/MARFIN & NGI
research grants

-K. Heck, R. J. Livingston and R. Aronson

-NMSF & CHOW

-Thank you for listening!

