

Unlocking the archives...



Rescuing Climate and Ecological Data from the US Fish Commission and the Navy

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OUTLINE

- Who we are
- Historical Ecology
- Rescue of Historical Data
- User of Climate Products

NATIONAL MARINE SANCTUARY SYSTEM



- National Marine Sanctuary
- △ Marine National Monument
- ⊕ Proposed for sanctuary designation

Scale varies in this perspective.
Adapted from National Geographic maps.

- To serve as trustee for the nation's system of marine protected areas,
- To conserve, protect, and enhance their biodiversity, ecological integrity and cultural legacy.

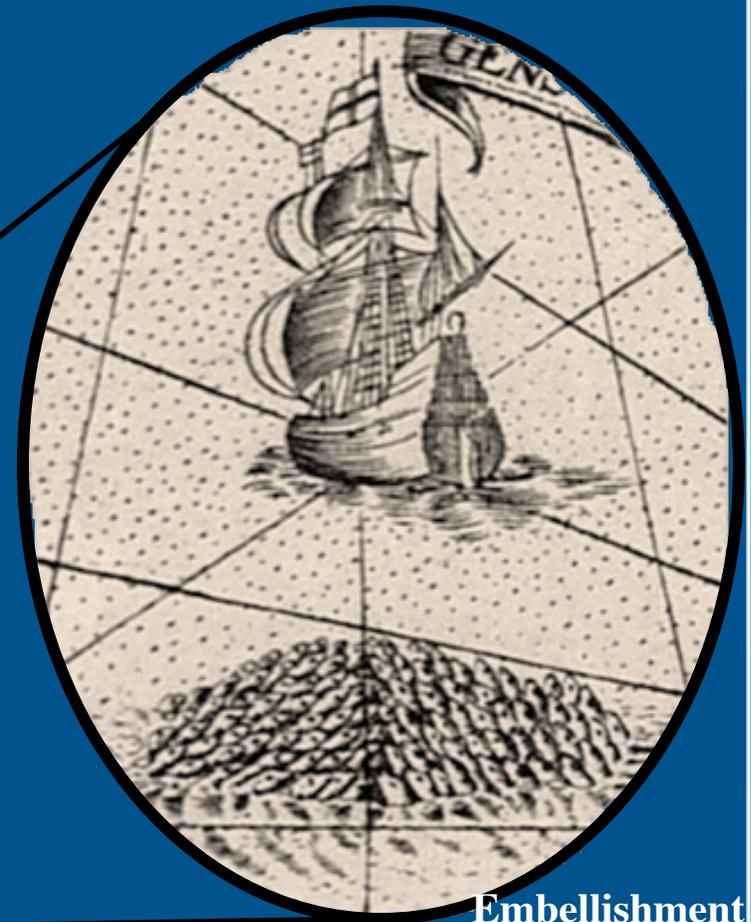
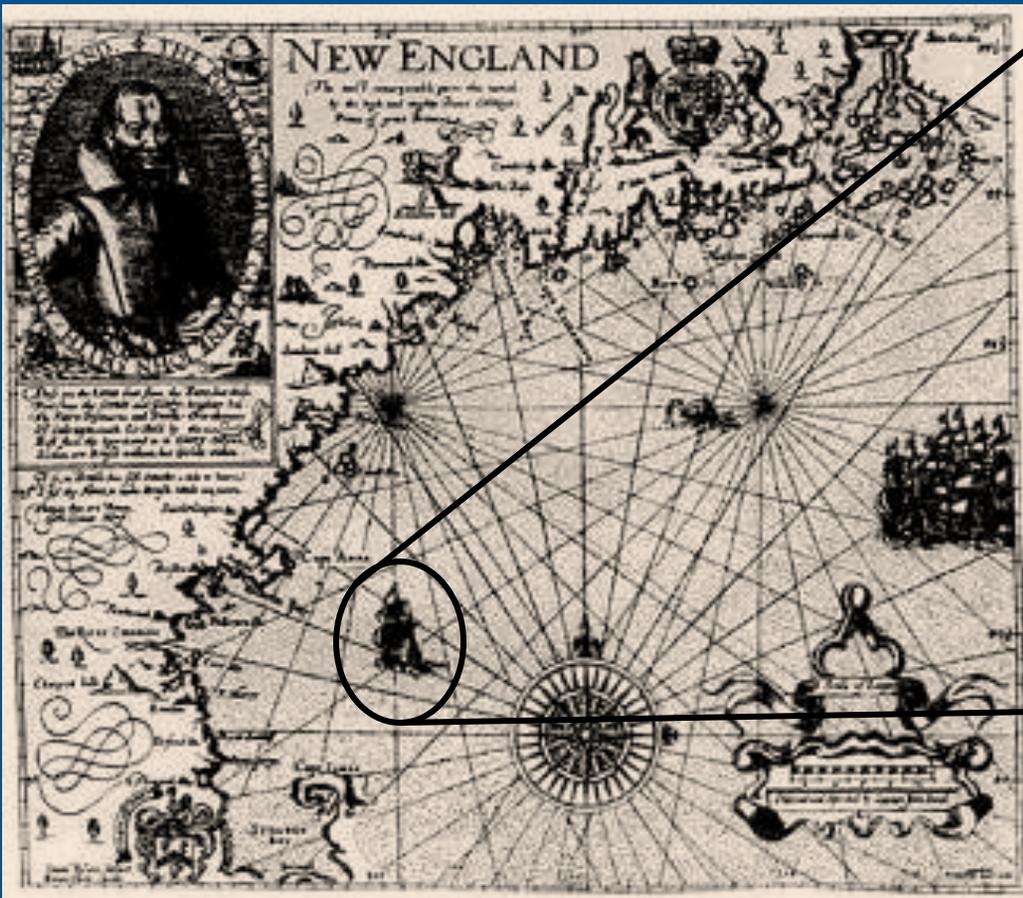


NATURAL AND MARITIME RESOURCES



PROTECTING
THE OCEANS
FOR
FUTURE
GENERATIONS

Historical Ecology



Embellishment
1635 edition

John Smith's *Map of New England*, 1616,

Documenting the Shifting- Baseline



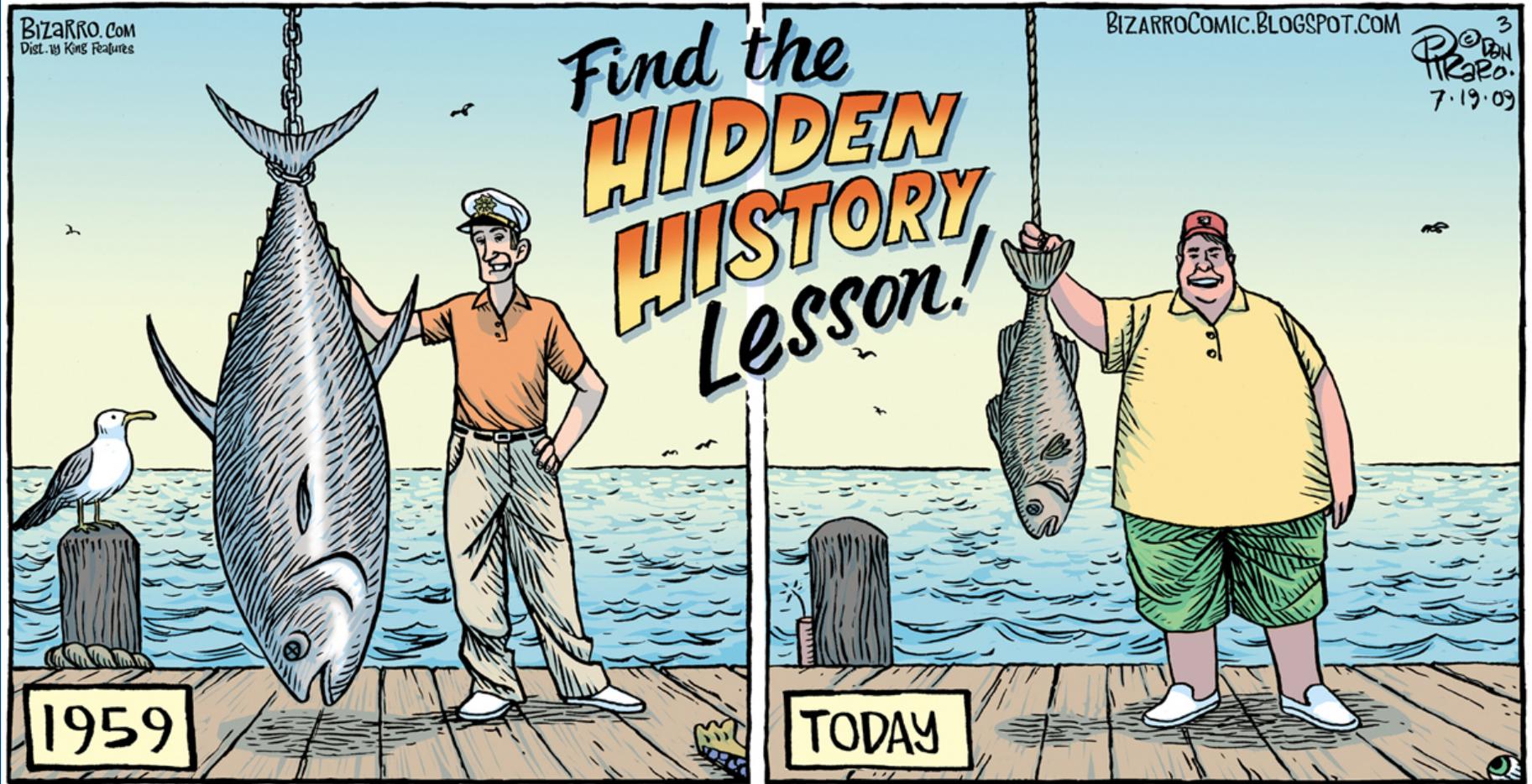
Trophy fish caught on Key West charter boats

Over last 50 years:

- 88% decline in fish weight,
- No decline in cost of fishing trips

Source: McLenachan, L. 2009. Documenting Loss of Large Trophy Fish from the Florida Keys with Historical Photographs *Conservation Biology* 23(3)

Or...



Courtesy: Dan Piraro

What is “natural”, “pristine”?

What are ecological Baselines?



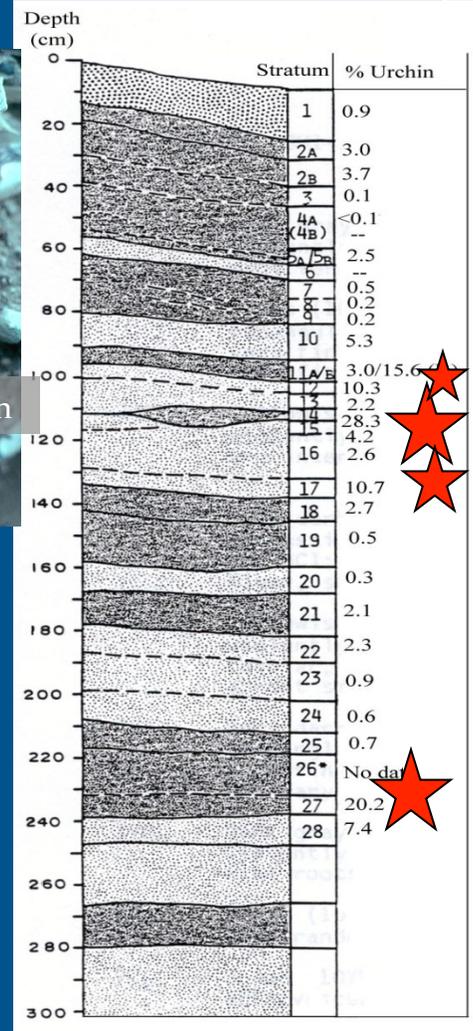
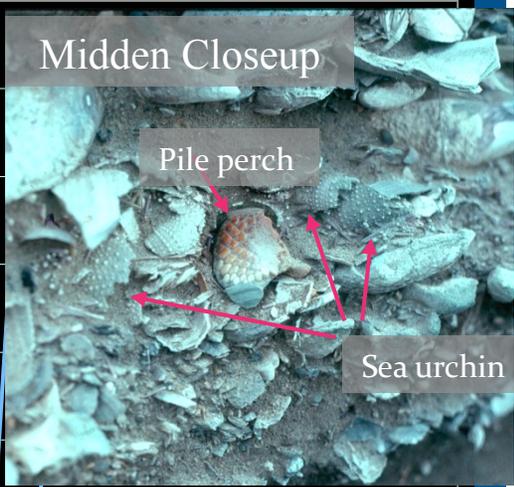
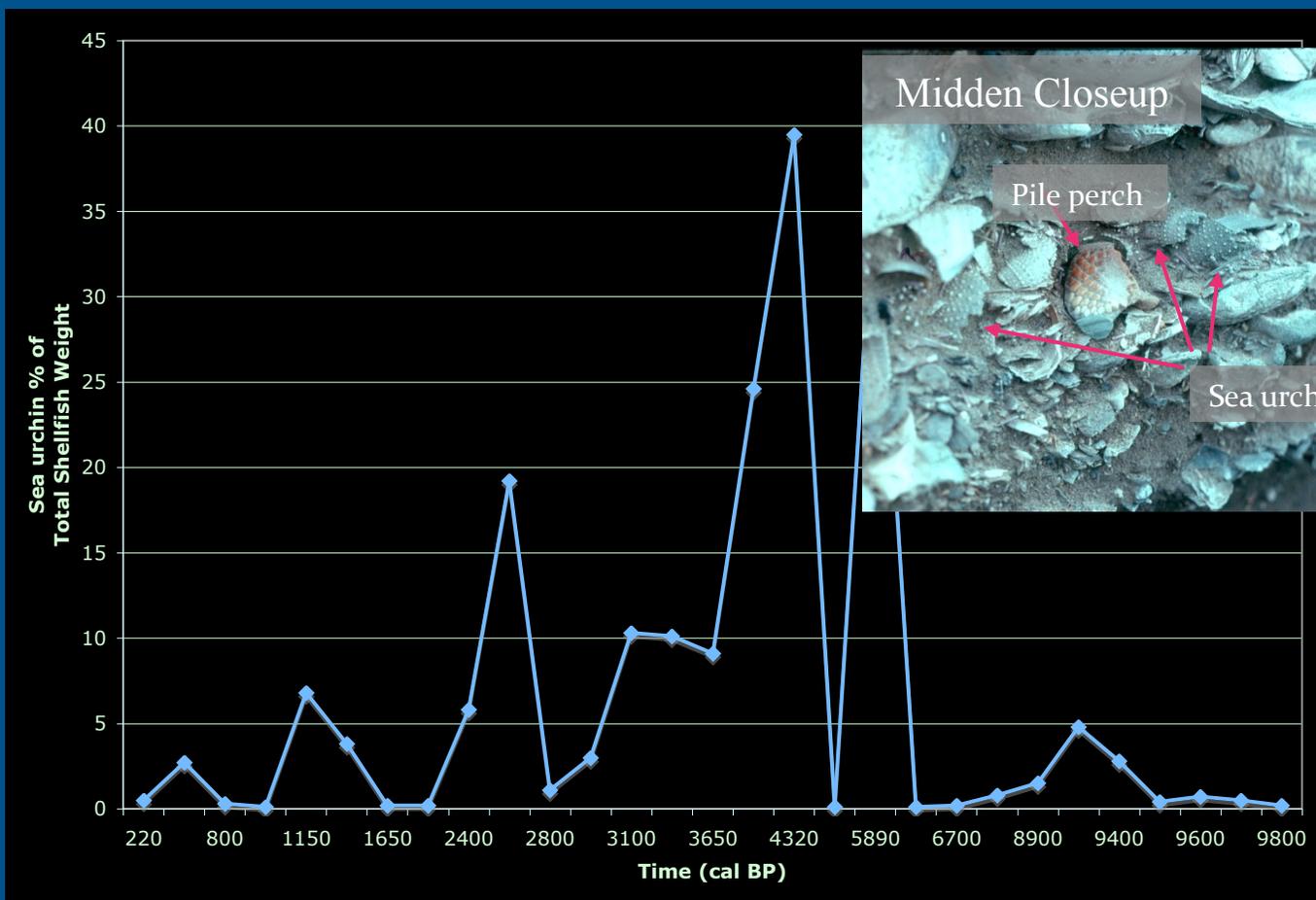
San Miguel Island

Landscape used to
be Indian
settlement 7,500
years ago



Source: Torben Rick, Smithsonian Institution

Sea Urchin Remains Through time on San Miguel Island

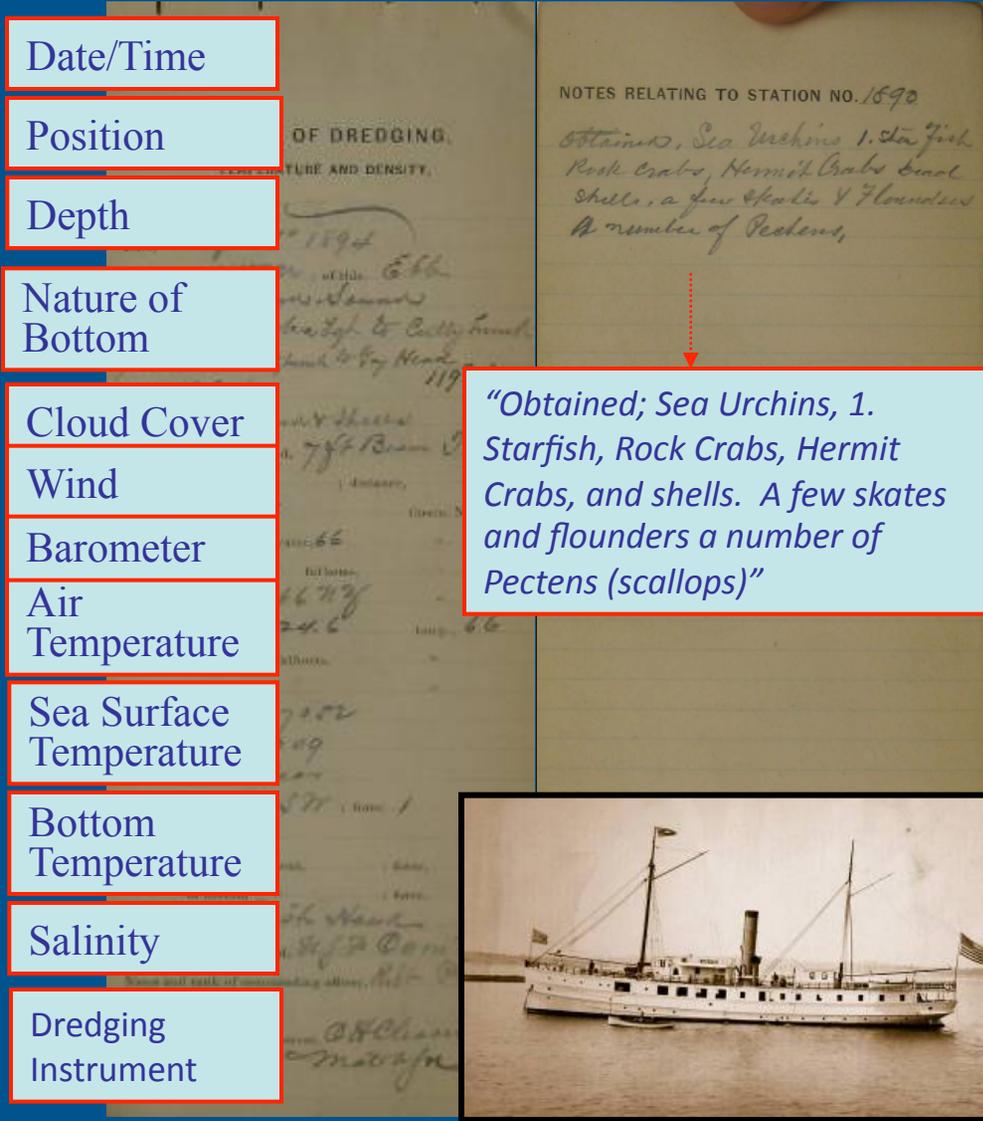


Source: Torben Rick, Smithsonian Institution

RESCUE OF HISTORICAL DATA



Scientific logs of historical US Fisheries Research Vessels



- 6 dedicated research vessels
- Covering 1880s to 1930s
- Broad geographic coverage
- One ship with 3,000 survey stations
- 15,000 weather obs.
- + soundings, + biological

The Ship logs of the US National Archives



USS Pennsylvania in the Philippines January 1945



Wilkes

- Entire collection of US Navy ship logs!
Starting 1801 to 1970s
- Early Exploration (Wilkes, Perry, Surveying, ...)
- US Coast Guards ships
- Lighthouses



US Navy Ship Logs



USS Constitution vs HMS Guerriere, 19 August 1812.

"In Action" by Michel Felice Corne (1752-1845)
U.S. Naval Academy Museum

U. S. Frigate Constitution.
Isaac Hull, Capt. Commander.
February 17, 1812

- 41 logbooks, 1803-1934
- Extensive metadata
- each day at sea: hour, ship speed (knots and fathoms) and course, direction of wind, general remarks

	H	K	F	Course	Winds	Remarks on Monday August 17th 1812
29 Guns 109 lb	1	"	4	by S. by E	by N	<p>Commenced, with fresh breeze and cloudy at 30 Minutes after observation was taken to the Southward, at 1 P.M. shot the top-sail of the Guerriere, and she steered out of the chain and began to pass at 4 P.M. shot the main-top Gallant Mast, and shot the top out of the stem they sail, at 5 P.M. got out the Flying Jib Mast at 2 P.M. Crossed the Gallant Mast, at 4 P.M. proceeded, and Sailed. B. O. 26</p> <p>When 4 P.M. a light air from the Southward and then at 5 P.M. lost the Mast, and experienced the Crew</p>
of Masts	2	"	4	South	by S. by E	
29 Masts of 109 lb	3	"	4	S. by E	North	
29 Gallies of	4	"	4	"	"	
29 Spouts of 109 lb	5	"	4	"	"	
of Masts	6	"	"	"	"	
	7	"	4	S. by E	"	
	8	"	4	S. by E	"	

Next Step: Logbook in Museums and Private Collections

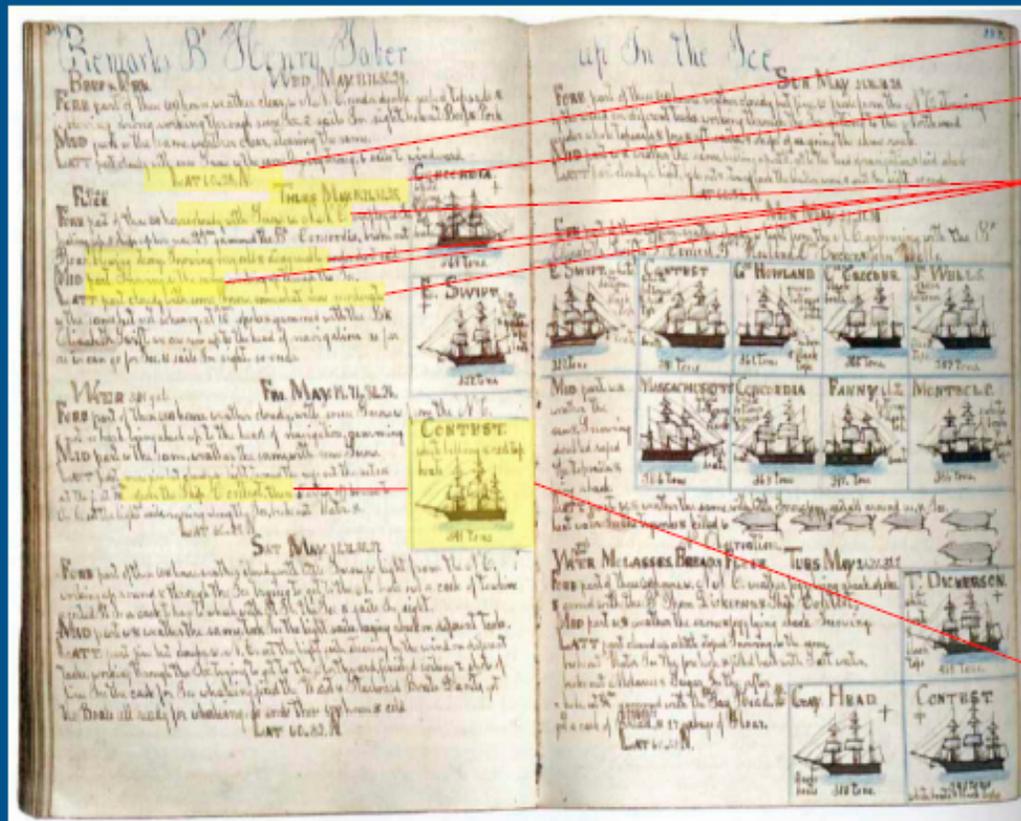
MYSTIC SEAPORT

THE MUSEUM

OF AMERICA

AND THE SEA

SAMPLE LOGBOOK PAGE



Position

Date

Weather

Observations

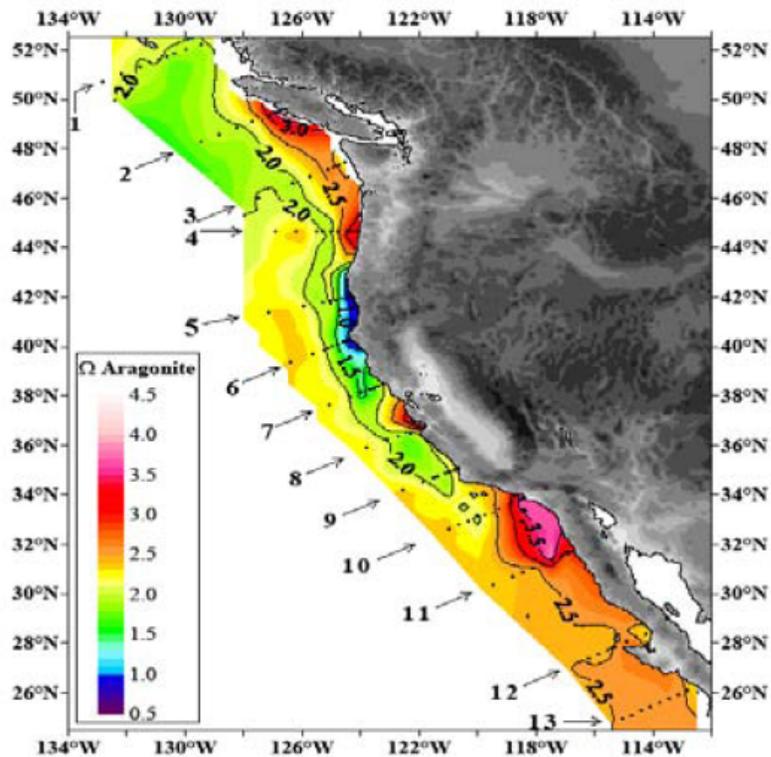
(four observations in the same daily log entry) ...

"Cloudy with snow w. NNE"
"Snowing very cold and disagreeable"
"Snowing as the same", partly cloudy with some snow, somewhat more moderate"

Potential sources for additional info and verification

Log of the HENRY TABER (within a little more than four months from these entries, she would be lost and abandoned in the ice off Wainwright)

OCEAN ACIDIFICATION

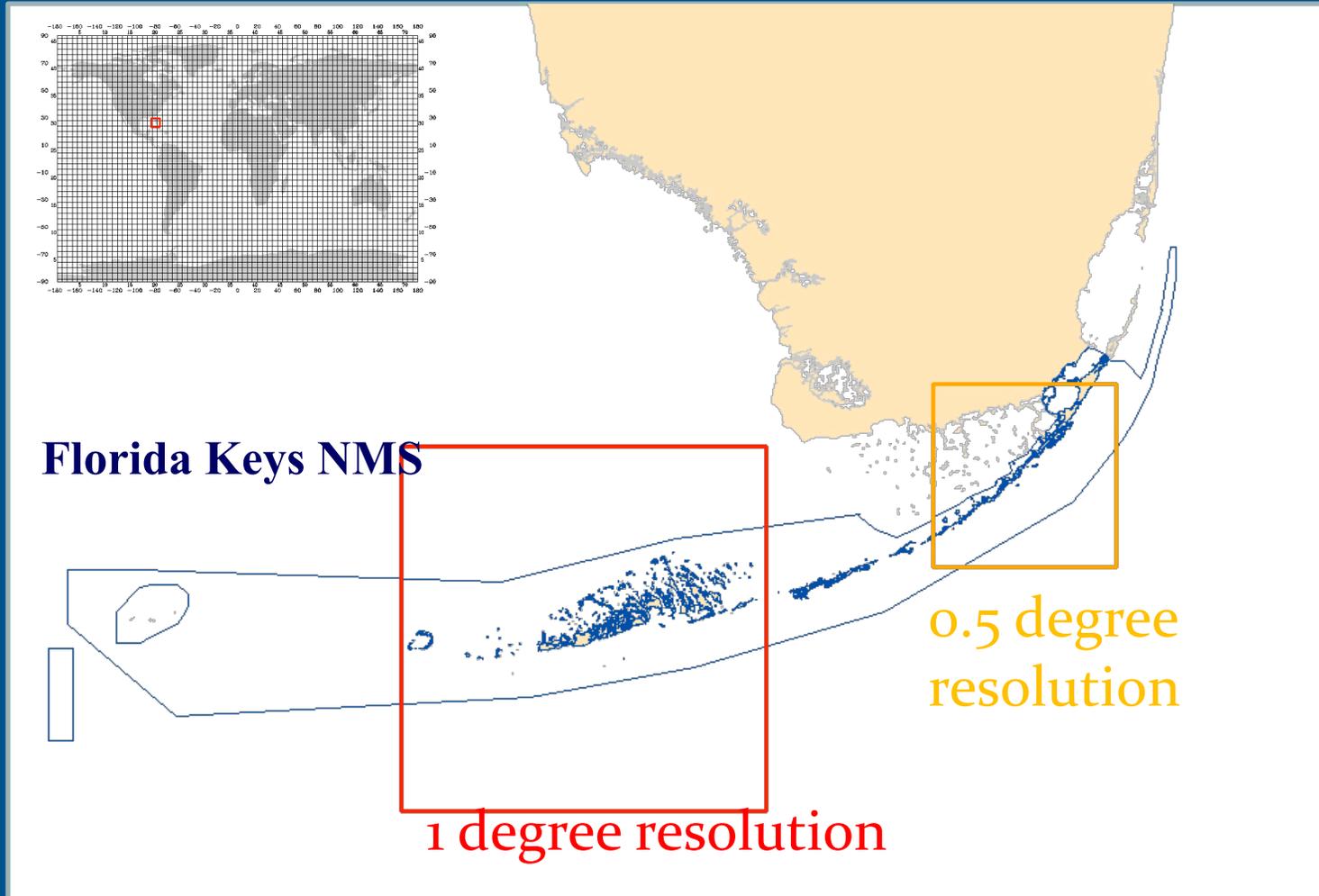


Ocean pH at Tatoosh Island (within OCNMS) as a function of date and time (2000 to 2007).

Image Credit: Wootton et al. 2008.

USERS OF CLIMATE PRODUCTS

Global Climate Models vs Resource Management



Integrated Marine Protected Area Climate Tool – IMPACT

 **INTEGRATED MARINE PROTECTED AREA CLIMATE TOOLS** 
Climate-based decision support for resource managers, scientists, and stakeholders

Entrusted with stewardship of many of the most ecologically, economically, and socially important marine resources in the U.S., managers of Federal marine protected areas (MPA), such as the NOAA National Marine Sanctuaries, need reliable, timely information to actively engage stakeholders and the public about the threats posed by climate variability and change. Most managers, however, do not possess sufficient background in atmospheric science to quickly access, interpret and apply often complex climate information to their planning and decision making processes.

WHAT IS IMPACT:
Integrated MPA Climate Tools (IMPACT) is a NOAA-wide partnership project that utilizes existing NOAA core capabilities to develop and deliver critical climate-ecosystem tools for informed MPA decision making, climate adaptation and preparedness, and environmental scenarios and forecasts. Tools will be based on scaled, integrated climatologies that help managers, scientists, and the public build and understand ecological response scenarios, as well as inform assessments of climate impacts, fully integrating existing coastal monitoring and observational networks in near-real time.

What are the tools?

- Climatologies (historical events, averages, extremes, trends) of environmental and ecological elements, integrated at the scale of an MPA.
- Conceptual and probabilistic models to build climate - ecosystem response scenarios for MPA managers at the regional, state and local level.
- MPA assessment reports on climate scenarios and system responses, including eco-climate forecasts that describe the interactions between weather/climate and changes in water quality, habitats, and resources.

WHY IMPACT IS NEEDED:
Managers need concise, interoperable climate information for decision making. Most documented coastal/marine climate impacts result from changes in environmental factors such as temperature, sea level, precipitation, chemistry, and circulation. Developing and delivering easily interoperable information on such changes and how they drive ecosystem impacts is a critical component to designing and implementing effective climate change adaptation and mitigation strategies.

IMPACT answers questions such as:

- How quickly and how much is climate changing across and within an MPA?
- Is an entire MPA being affected equally by change?
- What climate elements are the most important drivers of ecological impacts?

IMPACT addresses NOAA's Climate Adaptation and Mitigation, Resilient Coastal Communities and Economies, and Healthy Oceans strategic goals by providing integrated assessments of the climate system, identifying and understanding climate impacts on marine and coastal ecosystems, informing decisions and management at many levels, improving climate literacy, and providing sustained, reliable, and timely climate services to foster resilient ecosystems and associated communities.

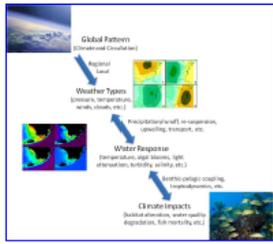
WHERE CAN IMPACT BE USED:
IMPACT is being developed as a pilot project in South Florida (Florida Keys National Marine Sanctuary, Everglades, etc), but is being designed for application to the management and decision-support of any MPA.

WHO WILL BENEFIT FROM IMPACT:

- National and regional planners who must identify and reconcile gaps in current climate/ecosystem monitoring and enhance assessment efforts.
- MPA managers who must incorporate climate change into long-range management plans, or who must be able to quickly translate climate information into ecosystem impact stress mitigation efforts.
- Scientists who need to identify and/or better quantify the relationships between climate and ecosystem at various scales.
- Stakeholders and the public who may wish more resilient ecosystems, and who will become better informed about climate impacts.

MORE INFORMATION ON IMPACT:
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NOS/ONMS NEEDS/NCDC NOS/NCOS NEEDS/NOCC OAR/AOML NOS/ONMS

<http://www.coral.noaa.gov/impact>



Developing/delivering critical climate-ecosystem tools for informed MPA decision making, climate adaptation and preparedness, and environmental scenarios and forecasts.

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Conclusion

1. Mining logs for their full environmental potential
(not just weather)
2. Access to historical records in museums/private collections
3. Outreach to *Unsophisticated/non-scientific* Users
 - How is climate change impacting resources?
 - How will it affect communities?
- 4. Challenge for ACRE**
 - **From Global to Local**
 - **From Reanalysis to Tailored Products**

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National Oceanic and Atmospheric Administration



The future
generation was
us!