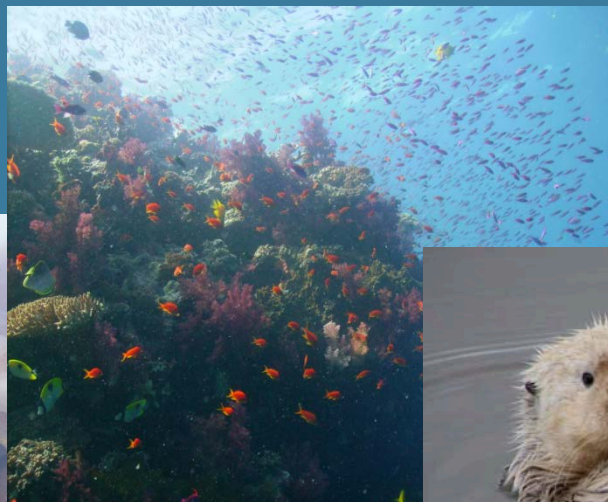


Development of the U.S. Marine Biodiversity Observation Network (BON)



Gabrielle Canonico, NOAA, U.S. IOOS
Co-Chair, IWG-OP Biodiversity Committee
May 2015

Why Biodiversity?

- Biodiversity is the variety of life, encompassing variation at levels of complexity from within species to across ecosystems.
- Foundation for production of many ecosystem services (see Worm, Palumbi, Duffy, etc.)
- **We lack “clear-cut, systematic and sustainable approaches to observing and monitoring biodiversity across different levels and at a national scale” (COML 2010).**
- Coordinated biodiversity monitoring will enhance the Nation’s “environmental intelligence” – so we can understand and mitigate threats to oceans and coastal zones and the resilience of human and animal communities.

IWG-OP Biodiversity Committee

Interagency Working Group on Ocean Partnerships (IWG-OP) Biodiversity Ad Hoc Committee

- Quarterly meetings co-chaired by NOAA (Canonico), NASA (Turner), and BOEM (Price)
- Objective to advance biodiversity science and discover opportunities for collaboration and leveraging

Special topics include:

- Marine BON
- Improving biological data management and accessibility
- Deep-sea coral ecosystems
- Microbes
- Integration of satellite data products with in situ observations.

Evolution of Marine BON

- Early 1990s: E.O. Wilson and others set the stage
- 2000-2010: Census of Marine Life
- 2006-2009: Worm et al.; Stachowicz et al.; Palumbi et al. – “Maintaining biodiversity is key to ecosystem health and continued provision of ecosystem services...”
- **May 2010: NOPP workshop “Attaining an Operational Marine Biodiversity Observation Network (BON)”**
- May 2013: BioScience, “Envisioning a marine biodiversity observation network” (Duffy et al.)
- August 2013: NOPP calls for Marine BON proposals
- June 2014: Oceanography, “A framework for a marine biodiversity observing network within changing continental shelf seascapes.” (Muller-Karger et al.)
- Fall 2014 – Marine BON demo projects launched

2010 BON Workshop Outcomes

Key conclusions :

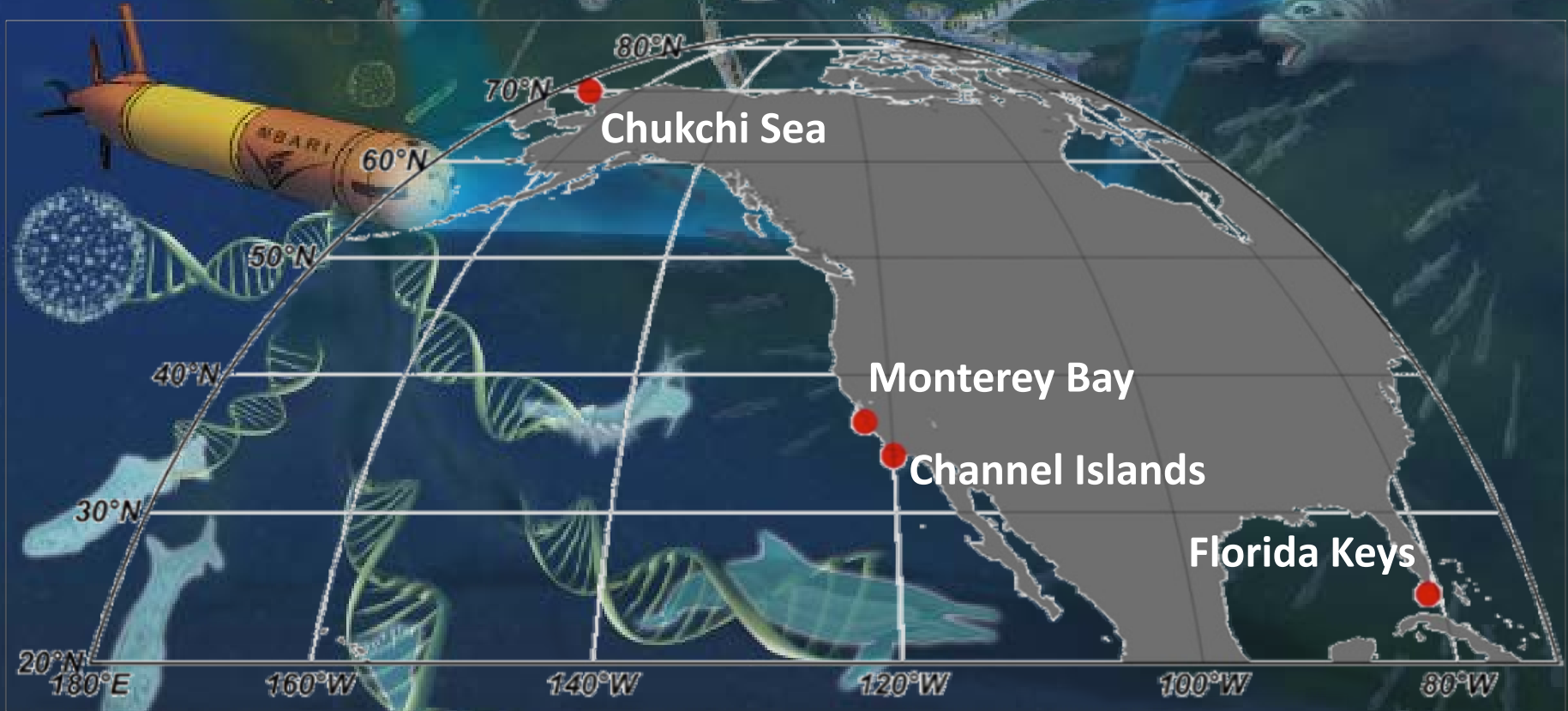
- BON will fill knowledge gaps and inform decisions, is possible with existing technology, is “critically useful” for establishing long-term species status and trends

Recommendation #7: to “Initiate an integrated marine BON demonstration project soon.”

Demo projects should:

- Integrate existing programs and methodologies with new approaches
- Address multiple scales - microbes to whales, instants to centuries, in situ to satellite.
- Consider sampling needs (automated processing, species identification, informatics), and
- Meet community data management requirements and make data accessible.

U.S. Marine BON Demonstration Projects



Marine BON Projects

Three five-year projects launched in Fall 2014; total ~\$17M from NOAA, NASA, BOEM and Shell Oil:

Arctic MBON (“AMBON” – U.S. Chukchi Sea)

- Katrin Iken, UAF: Initiating an Arctic Marine Biodiversity Observing Network (Funding: NOAA, BOEM, Shell Oil)

Sanctuaries MBON (Florida Keys, Monterey Bay, *Flower Garden Banks*)

- Frank Muller-Karger, USF: National Marine Sanctuaries as Sentinel Sites for a Demonstration Marine Biodiversity Observation Network (Funding: NOAA, NASA)

Santa Barbara Channel MBON (including Channel Islands NMS)

- Bob Miller, UCSB: Demonstrating an Effective Marine Biodiversity Observation Network in the Santa Barbara Channel (Funding: NOAA, NASA, BOEM)

AMBON Goals

1. To continue time series and close current gaps in taxonomic and spatial coverage in biodiversity observations on the Chukchi shelf.
2. To integrate and synthesize with past and ongoing research programs on the US Arctic shelf into an Arctic biodiversity observation network with publicly accessible data.
3. To demonstrate how a sustainable observing network could be developed for this and other regions and ecosystems.
4. To link with international programs on the pan-Arctic level.

Arctic biodiversity from microbes to whales



AMBON Partners

- Science partners

University of Alaska Fairbanks: Katrin Iken, Seth Danielson, Russ Hopcroft, Eric Collins, Bodil Bluhm, Franz Mueter

University of Maryland: Jacqueline Grebmeier, Lee Cooper

University of Washington: Kate Stafford

NOAA: Sue Moore

USFWS: Kathy Kuletz

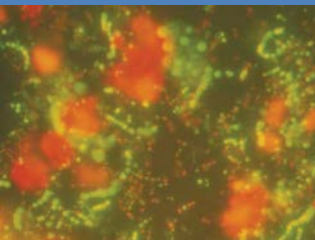
AOOS/Axiom: Rob Bochenek, Molly McCammon

- Funding partners



AMBON PI meeting, Jan 2015

Arctic biodiversity from microbes to whales



Sanctuaries BON Goals

- Implement a demonstration MBON
- Integrate, synthesize and augment information from ongoing programs
- Develop environmental DNA technology and autonomous sample collection methods for conducting biodiversity assessments
- Bring biodiversity measurements together in a relational database with links to national and international databases
- Develop a plan to transition the demonstration MBON into an operational system
- Link with international programs (GEO BON)

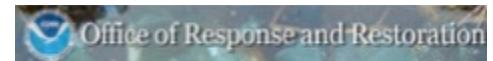
Sanctuaries BON

Leads: F. Muller-Karger
F. Chavez

University of South Florida (USF)
Monterey Bay Aquarium
Research Institute (MBARI)

Co-PI's: S. Doney, M. Kavanaugh,
E. Montes, S. Gittings

Partners: (14+ collaborating institutions)
M. Breitbart, L. Rosenfeld, M. Tartt,
K. Thompson, M. Howard, B. Kirkpatrick,
S. Donahue, A. DeVogelaere, J. Brown,
J. Field, S. Bograd, E. Hazen, A. Boehm,
K. O'Keefe, G. Graettinger, J. Lamkin,
B. Muhling, E. (Libby) Johns, M. Roffer



SANTA BARBARA CHANNEL (SBC) BON

Goals:

1. Integrate biodiversity data to enable inferences about regional biodiversity
2. Develop advanced methods in optical and acoustic imaging and genomics for monitoring biodiversity in partnership with ongoing monitoring and research programs
3. Implement a tradeoff framework that optimizes allocation of sampling effort

Principal/Associate Investigators

Marine Science Institute

Robert Miller, Andrew Rassweiler, Daniel Reed, Milton Love

Ecology Evolution and Marine Biology

Craig Carlson, Deborah Iglesias-Rodriguez, Doug McCauley

Geography

David Siegel, Phaedon Kyriakidis

Electrical and Computer Engineering

BS Manjunath

USGS

Kevin Lafferty

UCSD - SIO

John Hildebrand

NOAA – NMFS SWFSC

Andrew Thompson





SBC BON Partners



Channel Islands National Marine Sanctuary

Chris Mobley, Chris Caldow, Julie Bersek

Channel Islands National Park

Southern California Coastal Ocean Observing System (SCCOOS)

Plumes and Blooms

Southern California Coastal Water Research Project

Santa Barbara Coastal Long-Term Ecological Research Program

Gray Whales Count

San Onofre Nuclear Generating Station Mitigation Monitoring

CalCOFI



A vibrant underwater scene featuring a large school of striped fish, possibly Surge wrasse, swimming over a diverse coral reef. The water is clear and blue, and the coral is in various shades of brown, tan, and white.

Thank you!

Gabrielle.Canonico@noaa.gov
301.427.2428