



NOAA Scientific Publications Report July 27 – August 10, 2012

Contents

1. Highlighted Articles
 - a. An index to assess the health and benefits of the global ocean
2. Additional Articles
 - a. The GOES-R Proving Ground: Accelerating User Readiness for the Next Generation Geostationary Environmental Satellite System
 - b. Movements of gray whales between the western and eastern North Pacific
 - c. The stoichiometric ratio during biological removal of inorganic carbon and nutrient in the Mississippi River plume and adjacent continental shelf
3. Other reports, book chapters, and internal publications
 - a. Atlas of the Shallow-Water Benthic Habitats of Majuro Atoll, Republic of the Marshall Islands; NOAA Technical Memorandum 153

1. HIGHLIGHTED ARTICLES

1a. Title: *An index to assess the health and benefits of the global ocean*

Journal: Nature

Authors: Benjamin S. Halpern (NCEAS), Catherine Longo (NCEAS), Darren Hardy (NCEAS), Karen L. McLeod (COMPASS), **Jameal F. Samhuri** (NMFS), Steven K. Katona (Conservation International), Kristin Kleisner (*Sea Around Us* Project), Sarah E. Lester (UCSB), Jennifer O’Leary (NCEAS), Marla Ranelletti (NCEAS), Andrew A. Rosenberg (Conservation International), Courtney Scarborough (NCEAS), Elizabeth R. Selig (Conservation International), Benjamin D. Best (Duke University), Daniel R. Brumbaugh (American Museum of Natural History), F. Stuart Chapin III (University of Alaska), Larry B. Crowder (Stanford University), Kendra L. Daly (University of South Florida), Scott C. Doney (WHOI), Cristiane Elfes (UCSB), **Michael J. Fogarty** (NMFS), Steven D. Gaines (UCSB), Kelsey Jacobsen (UCSB), Leah Bunce Karrer (Conservation International), Heather M. Leslie (Brown University), Elizabeth Neeley (COMPASS), Daniel Pauly (*Sea Around Us* Project), Stephen Polasky (University of Minnesota), Bud Ris (New England Aquarium), Kevin St. Martin (Rutgers University), Gregory S. Stone (Conservation International), U. Rashid Sumaila (*Sea Around Us* Project), Dirk Zelle (*Sea Around Us* Project)

Acceptance date: July 5, 2012

Summary: The ocean plays a critical role in supporting human well-being, from providing food, livelihoods and recreational opportunities to regulating global climate. Sustainable management aimed at maintaining the flow of a broad range of benefits from the ocean requires a comprehensive and quantitative method to measure and monitor the health of coupled human-ocean systems. We created an index comprising ten diverse public goals for a healthy coupled human-ocean system and calculated the index for every coastal country. Globally, the overall index score was 60 out of 100 (range: 36-86), with developed countries generally performing better than developing countries, but with notable exceptions. Only 5% of countries scored higher than 70, while 32% scored lower than 50. The index provides a powerful tool to raise public awareness, direct resource management, improve policy and prioritize scientific research.

Important conclusions: This study represents the first quantitative assessment of the social and ecological health of the global ocean and for every coastal EEZ on the planet. It reveals the complexity of ocean health and the trade-offs inherent to the things people value in the ocean—from seafood to biodiversity, and coastal protection to clean waters.

Significance: This index provides a mechanism for decision-makers to evaluate and prioritize actions relative to particular goals for ocean health, given an awareness of potential tradeoffs within the full portfolio of goals that constitutes ocean health. It also creates an important opportunity to transform the dialogue on how we manage our interactions with the ocean and meets a need unfulfilled by tracking single-sector outcomes. Indeed, this manuscript suggests that management focused on a single aspect of ocean health could lead to inefficient or even unwanted outcomes.

Degree of controversy: High. Global assessment of ocean health, including within U.S. waters.

Press release: The lead authors will issue a press release.

Roll out plan: Web story, social media announcements.

2. ADDITIONAL ARTICLES

Top Tier Journals

2a. **Title of paper:** *The GOES-R proving ground: Accelerating user readiness for the next generation geostationary environmental satellite system*

Journal: Bulletin of the American Meteorological Society

Acceptance date: January 13, 2012

Authors: **Goodman, Steven J.** (NESDIS), **J. Gurka** (NESDIS), **M. DeMaria** (NESDIS), **T. Schmit** (NESDIS), **A. Mostek** (NWS), G. Jedlovec, C. Siewert, W. Feltz, J. Gerth, R. Brummer, S. Miller, B. Reed, and R. Reynolds

Abstract from paper: The Geostationary Operational Environmental Satellite R series (GOES-R) Proving Ground engages the National Weather Service (NWS) forecast, watch, and warning community and other agency users in preoperational demonstrations of the new and advanced capabilities to be available from GOES-R compared to the current GOES constellation. GOES-R will provide significant advances in observing capabilities but will also offer a significant challenge to ensure that users are ready to exploit the new 16-channel imager that will provide 3 times more spectral information, 4 times the spatial coverage, and 5 times the temporal resolution compared to the current imager. In addition, a geostationary lightning mapper will provide continuous and near-uniform real-time surveillance of total lightning activity throughout the Americas and adjacent oceans encompassing much of the Western Hemisphere. To ensure user readiness, forecasters and other users must have access to prototype advanced products within their operational environment well before launch. Examples of the advanced products include improved volcanic ash detection, lightning detection, 1-min-interval rapid-scan imagery, dust and aerosol detection, and synthetic cloud and moisture imagery. A key component of the GOES-R Proving Ground is the two-way interaction between the researchers who introduce new products and techniques and the forecasters who then provide feedback and ideas for improvements that can best be incorporated into NOAA's integrated observing and analysis operations. In 2012 and beyond, the GOES-R Proving Ground will test and validate display and visualization techniques, decision aids, future capabilities, training materials, and the data processing and product distribution systems to enable greater use of these products in operational settings.

Important conclusions: The GOES-R Proving Ground is a key component of mission user readiness by enabling the early transition of product development and training to operations before launch and is already having an impact with the early operational implementation of planned GOES-R capabilities.

Significance of scientific conclusions for management: We are building forecaster knowledge for using the new capabilities of GOES-R, showing users the utility of new products and decision aids to improve forecasts and warning of high impact weather, and through GOES-R proxy datasets demonstrating fused information through the integration and synergy with other satellite, radar, in situ, or model information.

Degree of controversy: Low controversy- user community endorses the GOES-R Proving Ground and finds it of great utility in preparing the user community for the next generation weather satellite system.

Link to full text paper: DOI:10.1175/BAMS-D-11-00175.1

Intermediate-Tier Journals

- 2b.** **Title:** *Movements of gray whales between the western and eastern North Pacific*
Journal: Endangered Species Research (Feature Article)
Authors: **David W. Weller** (Southwest Fisheries Science Center, NMFS), Amber Klimek, **Amanda L. Bradford** (Pacific Islands Fisheries Science Center, NMFS), John Calambokidis, **Aimee R. Lang** (Southwest Fisheries Science Center, NMFS), Brian Gisborne, Alexander M. Burdin, Wendy Szaniszlo, Jorge Urbán, Alejandro Gómez-Gallardo U., Steven Swartz, **Robert L. Brownell, Jr** (Southwest Fisheries Science Center, NMFS)
Publication Date: September 1, 2012
Summary: The western North Pacific (WNP) population of gray whales is redlisted by IUCN as Critically Endangered. As part of a long-term study on whales off Sakhalin Island, Russia, 2 photo-catalog comparisons to gray whales in the eastern North Pacific (ENP) were undertaken to assess population mixing. These comparisons involved 2 approaches: (1) a systematic comparison of the WNP “Sakhalin Catalog” to an ENP “Pacific Northwest Catalog” that consisted of images from the northwest coast of North America and (2) a non-systematic comparison of the WNP “Sakhalin Catalog” to an ENP “Laguna San Ignacio Catalog” that consisted of images from central Baja California, Mexico. As the Pacific Northwest and Laguna San Ignacio catalogs represent only a small fraction of the total number of individuals in the ENP population (~19,000), it is likely that more WNP/ENP exchange has occurred than was detected by these photo-catalog comparisons.
Significance: Photo-identification research provided new records of gray whales moving between the western and eastern North Pacific. Recent observations of gray whales off Japan and China, however, indicate that not all gray whales identified in the western North Pacific share a common wintering ground. The results reported in this paper provide novel information on the movements of gray whales that is of broad significance to understanding their migration patterns and population.
- 2c.** **Title:** *The stoichiometric ratio during biological removal of inorganic carbon and nutrient in the Mississippi River plume and adjacent continental shelf*
Journal: Biogeosciences Discussion
Acceptance date: January 2012
Authors: Huang, W.-J., W.-J. Cai, R. T. Powell, S. E. Lohrenz, Y. Wang, **L.-Q. Jiang** (NESDIS/NODC), and C. S. Hopkinson.
Abstract from paper: The stoichiometric ratios of dissolved inorganic carbon (DIC) and nutrients during biological removal have been widely assumed to follow the Redfield ratios (especially the C/N ratio) in large river plume ecosystems. However, this assumption has not been systematically examined and documented because DIC and nutrients are rarely studied simultaneously in a river plume area, a region in which they can be affected by strong river-ocean mixing as well as intense biological activity. We examined stoichiometric ratios of DIC, total alkalinity (TA), and nutrients (NO₃, PO₄³⁻ and Si(OH)₄) data during biological removal in the Mississippi River plume and adjacent continental shelf in June 2003 and August 2004 with biological removals defined as the difference between measured values and values predicted on the basis of conservative mixing determined using a multi-endmember mixing model. Despite complex physical and biogeochemical influences, relationships between DIC and nutrients were strongly dependent on salinity range and geographic location, and influenced by biological removal. Lower C/Si and N/Si ratios in

one nearshore area were attributed to a potential silicate source induced by water exchange with coastal salt marshes. When net biological uptake was separated from river-ocean mixing and the impact of marshes and bays excluded, stoichiometric ratios of C/N/Si were similar to the Redfield ratios, thus supporting the applicability of the Redfield-type C/N/Si ratios as a principle in river-plume biogeochemical models.

3. REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

3a. **Title:** *Atlas of the Shallow-Water Benthic Habitats of Majuro Atoll, Republic of the Marshall Islands; NOAA Technical Memorandum 153*

Authors: Kim Edwards, Matt Kendall, Ken Buja (NOS National Center for Coastal Ocean Science)

Publication date: July 2012

Abstract from paper: Digital maps of the shallow (<~30m deep) coral reef ecosystems of Majuro Atoll, Republic of the Marshall Islands, were created through visual interpretation of remote sensing imagery acquired between 2004 and 2006. Reef ecosystem features were digitized directly into a Geographic Information System. Benthic features were categorized according to a classification scheme with attributes including zone (location such as lagoon or forereef, etc.), structure (bottom type such as sand or patch reef, etc.) and percent hard bottom. This atlas consists of 27 detailed maps displaying reef zone and structure of coral ecosystems around Majuro. Adjacent maps in the atlas overlap slightly to ensure complete coverage. Maps and associated products can be used to support science and management activities on Majuro reef ecosystems including inventory, monitoring, conservation, and sustainable development applications. Maps are not to be used for navigation.

Important conclusions: The amount of various reef types and habitats around Majuro were quantified and their locations were accurately mapped.

Significance of scientific conclusions for management: Managers need to know the locations of reef habitats in order make decisions regarding sustainable development and conservation planning.

Degree of controversy: The degree of controversy is low for this technical memorandum because these habitat maps were produced using well-established classification methods, which have been vetted by the scientific community.