Monitoring and Research Abstracts

THE GALVESTON BAY REPORT CARD PART I: CONNECTING PEOPLE TO THEIR ESTUARY - BUT WAIT, WHAT'S AN ESTUARY?

Anja M. Borski, Galveston Bay Foundation, Webster, Texas

Erin L. Kinney, HARC, The Woodlands, Texas

The Galveston Bay Report Card is a public interest driven, scientific analysis of the health of Galveston Bay, made possible by a grant from Houston Endowment and implemented by the Houston Advanced Research Center (HARC) and the Galveston Bay Foundation (GBF). The report card will provide the public with easy to understand information that will encourage meaningful, science-based discussion about the bay, and inspire action through events, activities and management decisions that protect and preserve the bay for the future.

We believe that communities are more likely to take an active role in protecting the environment when they understand what it is they are trying to protect. The report card concept is designed to distill information about conditions in the Galveston Bay system into an easy to access format that fosters interest and understanding from the public. Instead of presenting indicators as we have in the past, based on how scientists address environmental issues, we first consulted the public to find out what they are interested in, so that we could tailor the report to categorize and prioritize topics in a way that mirrors the way our audience thinks. Through a series of surveys and presentations, we gathered input from more than 1500 community members, providing us with unique insight into the way the public interprets and understands the types of environmental data being collected, and encouraged us to carefully consider the way we talk about and categorize the report card data.

The report card products, scheduled to be released in the summer of 2015 and updated annually thereafter, will include a user-friendly and engaging Galveston Bay Report Card website, a printed summary report available for distribution by partner organizations and businesses, and a complete report available for download. A specialized, environmentally-focused communications firm has been hired to design the website and direct media relations to maximize outreach efforts throughout the Galveston Bay watershed and beyond.

Research and personal experience have shown that our public is not just interested in the status of Galveston Bay; they want to know what they can do to make it better. To encourage this interest, the report card will prominently feature "What You Can Do" calls-to-action, harnessing that enthusiasm and optimism and turning it into positive change for the bay.

Outreach metrics including publicity value of media exposure, social media interactions, survey submissions, and information and presentation requests will be used to measure project success, and ongoing community input will be used to expand report card topics and features in annual updates. Two-way communication with the public about Galveston Bay will help inform scientists and funding entities about emerging issues, attitudes, and changes in public concern.

The Galveston Bay Report Card project embodies the spirit of scientific inquiry, collaboration, and communication. From the initial process of identifying, analyzing and compiling large volumes of public data, to our extensive public outreach efforts, which will get the data into the

hands of the people whose actions can make a difference, we look forward to a bright future for Galveston Bay, inspired by an informed and enthusiastic community.

Abstract Information

1. Anja M. Borski (Primary), Report Card Coordinator, Galveston Bay Foundation, 17330 Highway 3, Webster, TX 77589, Phone: 281-332-3381 x223, Fax: 281-332-3153, aborski@galvbay.org

   Erin L. Kinney, Postdoctoral Research Scientist, Coastal Ecology, Houston Advanced Research Center, 4800 Research Forest Drive, The Woodlands, TX, 77380, Phone: 281-364-6040, Fax: 281-364-6001, ekinney@harcresearch.org

   Lisa A. Gonzalez, Vice President, Houston Advanced Research Center, 4800 Research Forest Drive, The Woodlands, TX, 77380, Phone: 281-364-6044, Fax: 281-364-6001, lgonzalez@harcresearch.org

2. Oral presentation desired
   Due to the large scope of this project, we are proposing two oral presentations (The Galveston Bay Report Card Part I and Part II), back to back. In the event that symposium timing restrictions would not allow for two separate presentations, abbreviated versions of each could be combined into a single presentation.

3. Suggested Topic Area(s): Monitoring and Research, Public Participation and Education

MACROBENTHIC COMMUNITIES OF GALVESTON BAY, 1988-2012

Linda Broach

Texas Commission on Environmental Quality, Houston, Texas

Benthic infauna are an important component of the estuarine food web and they are sensitive to disturbances in their environment. These organisms live in the sediments and are relatively sedentary so that they cannot avoid adverse environmental conditions. Because of this, macrobenthic communities are often used to evaluate the condition or health of a water body.

Soft-bottom macrobenthic communities have been collected in Galveston Bay using consistent methods since 1988 by the Texas Commission on Environmental Quality and its predecessor agencies. This data set includes over 400 samples from both fixed and randomly located stations. This analysis will compare the characteristics of the benthic community in different areas of the bay and over time. The effects of salinity, nutrients, chlorophyll a, dissolved oxygen, grain size, and freshwater inflows will be discussed. This extensive data set allows an evaluation of background conditions and variability in these communities in the Galveston Bay system.

AN UPDATE ON THE GALVESTON BAY ESTUARY PROGRAM STATUS AND TRENDS MAINTENANCE PROJECT

Stuart Carlton, Texas Sea Grant College Program, Galveston, TX

Will Mobley, Texas A&M University, College Station, TX

Helen Walters, Texas A&M University Galveston Campus, Galveston, TX

Morgan Wilson, Texas A&M University Galveston Campus, Galveston, TX

Samuel Brody, Texas A&M University Galveston Campus, Galveston, TX

Galveston Bay is surrounded by urban, suburban, industrial, and agricultural land uses, and it supports commercial and recreational fishing industries, industrial and municipal water uses, shipping and recreational activities. With so many activities depending upon a healthy ecosystem, it is important that the parameters pertaining to the system's health are monitored and analyzed on a regular basis. By analyzing the current status and past trends on specific indicators at an integrated, ecosystem level, it is possible to assess the overall health of the complex bay ecosystem. The Status and Trends Maintenance Project was created to collect, study, store, maintain, and display data so that the public can better understand the basic conditions of the Galveston Bay ecosystem. The Center for Texas Beaches and Shores at Texas A&M – Galveston recently took over the maintenance of the Status and Trends database. In this presentation, we will describe recent updates and changes we've made to database and discuss major changes in the health of Galveston Bay. We will show how the database has been integrated into a web-GIS platform, the Texas A&M Coastal Atlas, where users can visualize, query, and analyze a variety of different environmental spatial layers. Additionally, we will demonstrate the types of spatial information the database and Atlas make available to scientists, students, educators, and local decision makers. Finally, we will discuss potential future directions with the database and Atlas.

Presenter Contact Info (other co-authors will not present):
J. Stuart Carlton, Ph.D.
Healthy Coastal Ecosystems & Social Science Specialist, Texas Sea Grant College Program, Texas A&M University.
Mailing Address: PO Box 1675, Galveston, Texas, 77553.
Phone: 409-740-4983
Fax: 409-740-4429
Email: stuartcarlton@tamu.edu

Oral or Poster: Oral. We would not accept a poster presentation if oral is not available.

Topic area: Don't care, but maybe monitoring and research?

THE GALVESTON BAY REPORT CARD PART II: USING SCIENCE TO ADDRESS STAKEHOLDER CONCERNS

Erin L. Kinney, HARC, The Woodlands, Texas

Anja M. Borski, Galveston Bay Foundation, Webster, Texas

Lisa A. Gonzalez, HARC, The Woodlands, Texas

The Galveston Bay Report Card categories and indicators apply the most recent and accurate scientific research to reflect the concerns and priorities of stakeholders. Environmental indicators were chosen by the Galveston Bay Foundation (GBF) and the Houston Advanced Research Center (HARC) to specifically address the questions and concerns raised in stakeholder meetings and surveys. HARC used data collected by state and national agencies to evaluate the indicators and provide a snapshot of the current state of the Galveston Bay ecosystem. The most recent datasets were researched and compiled for analysis to highlight what data are available as well as what gaps may exist based on public interest and concerns. Results for each indicator were framed within the context of the larger landscape and community.

Six indicator categories (water quality, pollution events and sources, wildlife, habitat, human health risks, and coastal change) were chosen to span the full range of available environmental data available for Galveston Bay. The initial list of indicators represent the current issues of greatest concern to the stakeholders. Future report cards can expand the list of indicators to reflect emerging issues and/or changing public concerns. Standardizing such a wide range of ecological indicators in order to simply and concisely depict the condition of the Bay was one of the greatest challenges to this project. The way an individual defines a “healthy” bay is often related to how we value the services that the system provides us, such as seafood harvests, clean water for drinking and playing, and habitat that protects and stabilizes shorelines and nurtures the animals that bring the bay to life. We consider the Bay’s health to be a question of sustainability and resiliency – do the available data portray a system that will continue to provide habitat, food, clean water and protection from storms; or a system so impaired that it ceases to support the resources and services valued in the ecosystem?

Each indicator category was evaluated and given a “grade” that reflected the real scientific implications of the indicator as well as how it should be interpreted by the public. We also considered how other estuaries are graded and how they could be compared to Galveston Bay in the future. We tailored a grading method to each indicator to best represent the current status of the indicator within the context of Galveston Bay’s recent history. Some indicators have regional, state or nationally defined targets, and we compared the most recent data to those targets when available. In other cases, no targets were available and data collection frequency and methods differed across time and indicators. In those instances, we chose to use data from 2000 to today as our general “baseline” so as to be sure to include a decade’s worth of data.

The Galveston Bay report card represents the best scientific annual assessment of the Galveston Bay ecosystem created for the public based on their concerns and priorities. As an annual report card, it offers a unique opportunity to encourage education and inspire action in a simple yet dynamic format.

Abstract Information

1. Erin L. Kinney (Primary), Postdoctoral Research Scientist, Coastal Ecology, Houston Advanced Research Center, 4800 Research Forest Drive, The Woodlands, TX, 77380, Phone: 281-364-6040, Fax: 281-364-6001, ekinney@harcresearch.org

   Anja M. Borski, Report Card Coordinator, Galveston Bay Foundation, 17330 Highway 3, Webster, TX 77589, Phone: 281-332-3381 x223, Fax: 281-332-3153

   Lisa A. Gonzalez, Vice President, Houston Advanced Research Center, 4800 Research Forest Drive, The Woodlands, TX, 77380, Phone: 281-364-6044, Fax: 281-364-6001, lgonzalez@harcresearch.org

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3. Suggested Topic Area(s): Monitoring and Research, Public Participation and Education

CHANGES IN ECOSYSTEM SERVICES FROM GALVESTON BAY AND SURROUNDING WATERSHEDS OVER 40 YEARS

L. James Lester, President, HARC, The Woodlands, Texas

Lisa A. Gonzalez, Vice President, HARC, The Woodlands, Texas

In the early years of the 1970's, the US passed landmark environmental legislation including the Clean Water Act, formed the Environmental Protection Agency and launched the first Landsat multispectral Earth observing satellite. Thus began the current national commitment to monitoring changes in Earth's ecosystems and processes. It was not until 30 years later when the Millenium Ecosystems Assessment provided a framework that could be used to evaluate the wide variety of benefits people obtain from these ecosystems. In this presentation, I will combine 40 years of available evidence documenting a set of ecosystem services (ES).

The Bay ES that will be discussed are in the categories of a) provisioning: fisheries, minerals (shell), and fuel (oil); b) regulation: waste treatment (water and air contamination), nutrient regulation, and water regulation (flooding); c) cultural: recreation; and d) supporting: primary production. The provisioning ES have declined for shell and oil because exploitation exceeded the rate of replenishment and impacted other services. The value of provisioning from fisheries is quite variable and shows some trends for the major catch species of shrimp and oysters due to factors such as weather, fishing pressure, and regulation. The value of ES for waste treatment has increased as the volume of waste streams around the Bay has increased. The ES value of the Bay and local watersheds for regulation of nutrients and storm water has decreased over time due to the conversion of land and shoreline to developed uses. While recreational ES values are complicated and difficult to document, it appears that the value of recreational services has increased over time. This is likely related to the increasing costs of various forms of recreation rather than increased opportunity to obtain the service. Finally, the supporting ES obtained from primary production has declined across both aquatic and terrestrial habitats in and around the bay.

While the change in quantity of service can be deduced from monitoring and observational data, the value of those services is difficult to assign. Value changes as demands and markets change. Value for some services, e.g. storm water retention, can be highly location specific. The data on change in value of fisheries, waste treatment and recreation will be summarized. Based on the available data, the current economic values of services for waste treatment and recreation exceed the others for which there is data. This results in an interesting conflict between valuable uses of local ecosystems. Increasing the service for waste treatment can deteriorate the service for recreation.

1. Dr. L. James Lester, President, Houston Advanced Research Center, 4800 Research Forest, The Woodlands, Texas 77381, 281-364-6041 (office); 281-364-6070 (assistant); 281-364-6001 (FAX) jlester@harcresearch.org
   Lisa A. Gonzalez, Vice President, Houston Advanced Research Center, 4800 Research Forest, The Woodlands, Texas 77381, 281-364-6044 (office); 281-364-6070 (assistant); 281-364-6001 (FAX) lgonzalez@harcresearch.org
2. This abstract is proposed for an oral presentation. It is not appropriate for a poster presentation.
3. Suggested topic area: Economic Valuation and Impact of Estuarine Resources.

DRIFTER PROJECT COLLABORATION

Lisa A. Vanderbloemen, PhD, XI4/NASA JSC/Jacobs Technology, Houston, TX

Glenn Ellis, Science Department/Jacobs Technology, Houston, TX

William Stefanov, PhD, XI4/NASA JSC, Houston, TX

Jacobs initiated a collaboration with NASA, Armand Bayou Nature Center, and Clear Springs High School (CSHS) to build and deploy a Drifter Buoy based on a design obtained from NASA Stennis. Jacobs' staff successfully built two drifters with this design and deployed one at Armand Bayou Nature Center (ABNC). This drifter model uses a custom designed circuit board assembled with COTS components that includes GMRS cell phone technology with GPS included. The drifter measures water temperature and conductivity (used to derive salinity) and uses the cell phone technology to 'tweet' the data to a Twitter account at a user specified frequency. The original drifter continues to tweet data every 15 minutes and is readily available to the public at https://twitter.com/jscdrifter2. Students at Clear Springs High School have analyzed the temperature and salinity data from ABNC to better understand temporal and spatial variability within the Bayou.

NASA JSC's ARES Division (XI) expressed a desire to enhance the sensor suite of the existing design to include the ability to measure dissolved oxygen, turbidity, microbiological content, and potentially other variables. NASA also expressed some concerns about the Twitter based data collection and logging method. We therefore initiated a new design, Drifter 2.0, for the Drifter electronics that would provide more flexibility for sensor selection and a better data logging and storage capability. Such improvements would contribute to NASA's regional remote sensing research efforts to support JSC sustainability and climate change research, ultimately requiring construction of additional drifters. Simultaneously, our Communities in Schools partner Clear Springs High School developed their own design to encompass additional sensors and data logging.

The Jacobs Drifter 2.0 model was a proof-of-concept breadboard prototype constructed using an existing COTS small electronics CPU, USB sensors, storage devices, and power supply. The CSHS model also contained a ruggedized prototype environmental housing design and configuration for outdoor use.

The enhanced Drifter will provide data to NASA ARES critical to the success of the Climate Adaptation Science Investigator (CASI) effort at JSC. The new design may be adopted as the baseline for JSC area water measurements as part of the regional remote sensing efforts. NASA ARES has expressed a desire to have as many as 30 Drifters deployed in the local watershed for monitoring and research related to climate change.

1. Presenter(s): Lisa A. Vanderbloemen, PhD (Primary presenter)
Manager, Earth Science and Remote Sensing unit
XI4/NASA JSC/Jacobs Technology

Mailing Address:
Jacobs Technology, JETS
PO Box 58447
Houston, TX 77258-8447
Attention: Lisa A. Vanderbloemen, Mail Code XI4
(281) 244-1454, (281) 244-2387 (fax), lisa.a.vanderbloemen@nasa.gov

Glenn Ellis
Director, Science Department
Jacobs Technology

Mailing Address:
Jacobs Technology, JETS
PO Box 58447
Houston, TX 77258-8447
Attention: Glenn Ellis, Mail Code JE-4E
(281) 461-5732, glenn.ellis@jacobs.com

2. Poster presentation preferred

3. Topic Areas: Monitoring and Research, Public Participation and Education