

**EXTERNAL REVIEW
OF THE
NORTHERN GULF INSTITUTE
MISSISSIPPI STATE UNIVERSITY (LEAD), FLORIDA STATE UNIVERSITY,
DAUPHIN ISLAND SEA LAB, UNIVERSITY OF SOUTHERN MISSISSIPPI,
AND LOUISIANA STATE UNIVERSITY
STARKVILLE, MISSISSIPPI**

**SUBMITTED TO THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SCIENCE ADVISORY BOARD
ON
14 OCTOBER 2009**

SUMMARY

An external review of the research, education, and outreach programs of the Northern Gulf Institute (NGI), a NOAA cooperative institute (CI), was conducted on October 7 and 8, 2009 at Mississippi State University (MSU). Guidelines for conducting the review, previously agreed upon by the National Oceanic and Atmospheric Administration (NOAA) and NOAA's Science Advisory Board, were provided by NOAA's Office of Oceanic and Atmospheric Research's (OAR) CI program office. The review was conducted under the auspices of the NOAA Science Advisory Board (SAB) and, therefore, is subject to the requirements of the Federal Advisory Committee Act (FACA). A list of review panel members is provided in Appendix I. The review panel's on-site agenda is provided in Appendix II.

NGI has significant challenges that are not typical of NOAA Cooperative Institutes. NGI is a consortium of universities that are geographically distributed. NGI is not co-located with an OAR laboratory. To a large extent, NGI focuses on set of important problems within a region, rather than a specific set of scientific issues. NGI is also partially dependent on congressionally-directed funds. The decline in this source of funds creates a distinct vulnerability for NGI that may weaken a currently strong partnership. Despite these challenges, the review team notes that NGI has become a successful and productive enterprise. Collaboration has become a major strength. NGI addresses problems of significant importance and relevance to NOAA and the nation. The scope of the effort is appropriate for a cooperative institute. The publications that are emerging are in reputable journals, and the research covers a breadth of topics within the NGI themes.

The review team believes that the NOAA funding and the NOAA Cooperative Institute model are transforming the partnerships within the Gulf Coast region, with considerable positive impact, and that the Cooperative Institute serves the needs of NOAA. Institutional commitments to strong collaborations have fostered a good collegial atmosphere among the partners.

I. Overview of NGI

NGI was established in October of 2006 and this review is its first 5 year review. NGI was established as a regional enterprise joining Mississippi State University, University of Southern Mississippi, Louisiana State University, Florida State University, and the Dauphin Island Sea Lab (the State of Alabama's marine sciences institute) to focus on major issues affecting the northern Gulf Coast. Mississippi State University is the lead university, but NGI's program

office is located at the National Aeronautics and Space Administration's (NASA's) Stennis Space Center to be adjacent to NOAA facilities [National Data Buoy Center (NDBC), National Coastal Data Development Center (NCDDC), Gulf Coast Service Center (GCSC), and the National Marine Fisheries Service (NMFS)] in the State of Mississippi. The partner universities bring broad expertise to the NOAA partnership, although the CI focuses on four major scientific and societal issues of importance to NOAA (described below in Part II).

II. Science Plan

NGI is intended to be “a regional leader providing integrative research and education to improve the resiliency and conservation of the Northern Gulf of Mexico.” The NGI themes are (1) ecosystem-based management, (2) geospatial data/information and visualization in environmental science, (3) climate change and climate variability effects on regional ecosystems, and (4) coastal hazards and resiliency.

Finding - The projects supported by NGI cover a breadth of topics within the themes, which is indicative of the relative richness of the research capabilities of the combined set of universities and partners.

Finding - NGI is highly focused on topics of high interest to NOAA, but they are also very aware of the interests and research of other federal agencies as well as state and regional entities (Environmental Protection Agency, Sea Grant, Gulf of Mexico Alliance).

Finding - There is considerable potential for continued growth of NGI while maintaining their focused mission. The review team was briefed on a number of future projects or opportunities that would lend themselves to the strengths of the NGI partners.

Finding – The NGI has focused on creating successful partnerships and establishing a coherent research program. Because NGI has been in existence for a short period of time, there has not been significant strategic discussion beyond the first 5 years of the CI.

Recommendation - NGI would benefit from a focused strategic discussion of NGI's expected accomplishments on the time scale of a decade.

III. Science Management

NGI has established and implemented a management plan that enables collaboration, promotes quality science, and engages students.

Finding - The review team was impressed by the growth in collaboration between the member institutions and with NOAA over the last three years. NGI has established a good process to ensure that collaboration is a key criterion for funding. The NGI now consists almost exclusively of collaborative projects between NOAA and universities. There are fewer multi-university collaborations.

Finding - The review team was impressed by the management of the proposal process. The process is clear and it promotes a level of competition that helps ensure quality. More than 100 letters of intent were received for year 4 funding, with 38 selected for full proposals. Of this 38, 19 projects were supported.

Finding - NGI should be commended for including the potential for transition to operations as a specific criterion for the success of proposals. The review committee notes that it is too early to determine the impact of NGI research products on operational systems.

Finding - The review committee was also impressed by the level of collegiality among the partners.

Finding – The addition of a NOAA liaison to NGI (Julien Lartigue) in year three was cited as a major benefit in promoting linkages between NGI and NOAA, partly addressing the challenge in NGI resulting from lack of co-location with a NOAA OAR laboratory.

Finding - A search of publications reveals contributions by its members but the connections to NGI are more nebulous. Without greater consideration of branding, NGI will not have the visibility of other NOAA CIs.

Finding - NOAA partners stated that the reach of NGI into the breadth of programs within the universities could be greater in areas such as social science research (the review committee also notes that this has been a long-standing challenge in the university community and is not unique to NGI).

Recommendation - With growth in funding, NGI should work to promote growth in multi-university collaborations.

Recommendation – The NGI needs to improve its “branding” and should consider mechanisms that will increase its visibility. This may include actions such as naming post-doctoral or student scholarships as “NGI fellowships” or promoting the identification of publications with two

affiliations (NGI and the home institute) rather than just including NGI in the acknowledgements, or producing a contribution series.

IV. Science Review

The science review detailed a number of scientific accomplishments and highlights derived from base funding, including (for example) (a) integrated studies that improved knowledge of the life cycle and habitats of the gag grouper, a major commercial and game fish, (b) efforts to develop inexpensive living shoreline restoration approaches, (c) the collaborative development of a transferrable Integrated Ecosystem Assessment protocol, (d) the development and evaluation of a method for real-time nearshore coastal zone Lagrangian particle tracking of “intelligent” particles which is currently operational at NMFS, and (e) co-lead in the development and testing of the Weather In-Situ Deployment Optimization Method wind tracking research balloons, an effort to improve hurricane forecasts.

Finding - The NGI has catalyzed or facilitated a large number of research projects. NGI fellows and participants consistently stated that their research projects “wouldn’t have happened” without the NOAA funding or would have happened at a much slower pace.

Finding - The NOAA partners (NCDDC, NMFS, GCSC) provided an extremely positive assessment of the NGI, particularly noting that NGI has a clear focus, a diversity of expertise, is capable of communicating broadly, and has an attitude described as “willing to work together and to lead.” The NOAA partners appreciated the nimbleness of NGI and its responsiveness. One NOAA partner described NGI as a “phenomenal success in creating an identity.” In addition, they noted that NGI is leveraging the NOAA support (a specific example was EPA).

Finding - The review committee was unable to assess the research quality of the full spectrum of NGI projects given the time period of the review. In the research areas encompassing the specific areas of expertise of the committee, the committee’s assessment is a positive one.

Finding - NGI noted that they did not want to explore additional opportunities for broad scale collaborative funding (e.g. an NSF Science and Technology Center) until they had a proven track record for successful collaboration. The review panel viewed this decision as appropriate for a new CI.

Finding - The metrics proposed by the NGI to gauge their success are largely output metrics.

Finding – NGI has a breadth of research efforts and results. However, the identification of high impact results and the level of quality were not associated with specific metrics or criteria.

Recommendation – NGI has established a proven track record for successful collaboration and the review committee recommends that deliberate attention to other significant research opportunities (e.g. NSF Science and Technology Centers) is now warranted and should be encouraged.

Recommendation - The review panel encourages NGI to consider a broader range of metrics – ranging from input to outcome and impact metrics.

Recommendation – The review panel encourages NGI to develop clear criteria for determining the quality and impact of its research (including student numbers, the number of successful follow-on proposals, publication in high-impact journals, and national recognitions for research and for education and outreach).

V. Education and Outreach

NGI has a broad set of Educational and Outreach efforts that span NOAA goals in K-12 education, undergraduate, graduate and post-doctoral fellows and includes a minority scholars program.

Finding - The review committee was impressed by the Education and Outreach efforts of the NGI. NGI efforts are being built on programs with proven track records of success. The NGI effort to entrain NOAA research into the classroom is notable. The level of coordination between partners is also excellent. The opportunities for students extend beyond students associated with the partner institutions. The opportunity presented by base funding is a significant one, and unlike the opportunities presented to other CIs. Although the review committee commends NGI for all of their efforts, they should not exclude opportunities for innovation that arise from the NGI partnerships.

Finding - The committee notes that NGI has developed a viable minority scholars program, filling all positions in response to NOAA-directed support. However, the committee believes that promoting diversity requires a long-term effort and sustained commitment.

Finding- Although NGI has an active and successful Education and Outreach effort, this aspect of the NGI does not appear to be a criterion in the proposal process.

Recommendation - The review committee encourages NGI to include outreach, education, and student involvement as a specific factor in the proposal review process.

VI. Summary and Conclusions

The review panel finds a significant number of strengths that have resulted from the establishment of the NGI. As stated at the outset of this report, the review team believes that the NOAA funding and the NOAA Cooperative Institute model is transforming the partnerships within the Gulf Coast region, with considerable positive impact and serves the needs of NOAA. We are impressed by the strong collaborations that have developed and the breadth of research activities that have been established. Our recommendations look to the future – (a) improve the branding and promote the visibility of NGI, (b) work to create more multi-university collaborations, (c) place greater emphasis on strategic thinking on a decadal time scale, (d) seek larger scale funding opportunities that leverage the NOAA CI commitment, and (e) think more comprehensively about the metrics that demonstrate success.

Efforts to promote regional science collaborations that address specific problems of importance to NOAA are likely to become more common as the nation addresses mitigation and adaptation across a broad range of sectors and regions. Many elements of the NGI serve as a role model for these developments.

The review panel unanimously agrees that the NGI should be continued, and we rank NGI as “outstanding” based on guidelines provided by NOAA OAR’s CI program office.

Appendix 1. Northern Gulf Institute (NGI) Review Panel

[1] Dr. Eric J. Barron, Chairperson

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Dr. Eric J. Barron is the Director of the National Center for Atmospheric Research and a former dean of the Jackson School of Geosciences at The University of Texas at Austin, where he held the Jackson Chair in Earth System Science. He began a career in geology as an undergraduate at Florida State University. His interest in geology and oceanography resulted in a master's degree (1976) and a doctorate (1980) in oceanography from the University of Miami. His career turned to climate studies in 1976 with a Cray Supercomputing Fellowship from the National Center for Atmospheric Research (NCAR). Barron then joined NCAR as a postdoctoral research fellow and later became a research scientist in the global climate modeling group.

In 2006, he joined The University of Texas at Austin as dean of the recently formed Jackson School of Geosciences. Barron's research interests are in the areas of climatology, numerical modeling, and Earth history. During his career, he has worked diligently to promote the intersection of the geological sciences with the atmospheric sciences and the field of earth system science. He is currently a member of the NOAA Science Advisory Board.

[2] Dr. Bonnie Ponwith

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Dr. Bonnie Ponwith is Director of Science and Research at NOAA Fisheries Service's Southeast Fisheries Science Center (SEFSC). The SEFSC conducts research and monitoring to support stewardship of living marine resources in the Gulf of Mexico, Caribbean and South Atlantic. Dr. Ponwith spent eight years in NOAA Fisheries Service's Office of Science and Technology in Silver Spring, MD and prior to that held marine science positions within state and territorial

governments, academia and the private sector over the last 30 years. Dr. Ponwith earned her B.S. in Environmental Science from the Florida Institute of Technology and her Ph.D. in Fisheries Science from Texas A&M University.

[3] Dr. Deana Erdner

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Dr. Deana Erdner is currently an Assistant Professor at the University of Texas Marine Science Institute. Her research integrates molecular tools with traditional ecological techniques in order to understand the controls on phytoplankton growth and population structure, with an emphasis on harmful algal species. Her current projects seek to understand the response to nitrogen in the Texas Brown Tide alga (*Aureoumbra lagunensis*), develop genomic tools for the toxic dinoflagellate *Alexandrium tamarense*, and delineate the genetic structure and connectivity of local and global populations of toxic dinoflagellate species. She has also worked to develop new methods for cell identification and enumeration. She holds a B.S. in Biological Sciences from Carnegie Mellon University and a Ph.D. in Biological Oceanography from the Woods Hole Oceanographic Institution/Massachusetts Institute of Technology Joint Program. Prior to joining the faculty at the University of Texas, Dr. Erdner was a research scientist at the Woods Hole Oceanographic Institution.

[4] Dr. Robert (Bob) Diaz

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Dr. Diaz is currently a Professor of Marine Science with the Virginia Institute of Marine Science, College of William and Mary in Virginia. He received a Ph.D. in Marine Science from the University of Virginia in 1977 and in 1996 a Doctor Honoris Causa from Gothenburg University, Sweden for his contributions to benthic ecology over the years. His area of expertise and research interests center around understanding the consequences of low dissolved oxygen (hypoxia) to ecosystem functioning and organism-sediment interactions (bioturbation). In

particular, how perturbations of functions and processes influence energy flow. He has estimated the relative resource value of the various estuarine and marine benthic habitat types and how hypoxia affects energy flows. The goal is to quantify energy flow between habitats and develop environmentally sound management strategies. In addition, he is also interested in the application of the statistical and numerical methods to biological data, and broadly interested in the ecology and taxonomy of estuarine and marine invertebrates with specialization in oligochaetes.

[5] Dr. Thomas A. Schroeder (*Ex-Officio*, Cooperative Institute Representative)

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Tom Schroeder is the Director of the Joint Institute for Marine and Atmospheric Research (a NOAA cooperative institute) and the Chair of the Department of Meteorology at the University of Hawai'i. He earned a B.S. in Math and Physics from Indiana Central College and a M.S. and Ph.D in Atmospheric Sciences from Purdue University. His area of research expertise is mesometeorology including severe local storms, flash flood meteorology, and interactions of island with synoptic environments. He has focused on the weather and climate of Hawai'i and severe weather and its impacts upon society. He has served on National Research Council and National Science Foundation survey teams reviewing the impact of land-falling hurricanes in Hawai'i. He also serves on the Hawai'i Hurricane Advisory Committee and as a consultant to the State of Florida Commission on Hurricane Loss Projection Methodology.

Appendix II. Agenda for the Review

NGI SCIENCE REVIEW
WEDNESDAY, OCTOBER 7, 2009



AGENDA ITEM	TIME	LOCATION	PRESENTERS AND PANELISTS
Science Reviewers arriving Tuesday PM; will be invited to informal dinner gathering	6:30-8:30	Hilton Garden Inn, Starkville MS	Host can provide transportation if necessary
Breakfast	7:00-8:00	Hotel	Science Review Panel
Travel to HPCC	8:00-8:30	MSU to provide transportation	
Closed Session: Review Team Orientation	8:30-9:00	HPCC Rm A150	Science Review Panel (all sessions) John Cortinas
Opening Session Welcome by MSU President Review Orientation by NGI Director	9:00-9:10	same	Mark Keenum, MSU President David Shaw, NGI Director NGI Fellows, NGI Staff
NGI Program Overview Timeline & Accomplishments Responsiveness to NGI Executive and Advisory Councils	9:10-9:20	same	Mike Carron, NGI Co-Director
NGI Themes & Strengths: Ecosystem Management Geospatial Data Integration & Visualization	9:20-10:00	same	Bill Dewar, FSU Bill McAnally, MSU
Break	10:00-10:10	HPCC Hall	Internet and private rooms available
NGI Themes & Strengths continued: Coastal Hazards Climate Change and Climate Variability Effects on Regional Ecosystems	10:10-10:50	HPCC Rm A150	Robert Twilley, LSU Steve Lohrenz, USM
NOAA working with NGI – Approaches, Accomplishments and Challenges	10:50-11:10	same	Julien Lartigue, NOAA NGI Science Coordinator
NGI Post Doctoral and Student Experiences	11:10-11:50	same	Jimmy Nelson, FSU Matilda Asuzu, MSU Stephen Scyphers, DISL Kari Galvan, LSU Vince Lovko, USM
Working Lunch with presentation of NGI Science Building (planned for	11:50-1:00	HPCC Rm 30	Glade Woods, NGI

NGI SCIENCE REVIEW
WEDNESDAY, OCTOBER 7, 2009



AGENDA ITEM	TIME	LOCATION	PRESENTERS AND PANELISTS
Stennis Space Center, MS)			
NGI Projects Poster Session	1:00-2:00	HPCC Rm 20	NGI Fellows, PIs, Post Docs, Students and all
NGI Science Program Management NGI projects mapped to: NOAA Science Plan GOMA Action Plans Sea Grant GoMx Research Plan	2:00-2:20	HPCC Rm A150	Mike Carron, NGI Co-Director John Harding, NGI Chief Scientist
NGI Program Enhancement Efforts	2:20- 2:40	same	David Shaw
NGI User Groups: Gulf of Mexico Alliance Sea Grant/GoMx Research Plan EPA Gulf of Mexico Program	2:40- 3:10	same	David Shaw moderates Panel of: Bill Walker, MDMR LaDon Swann, MASGC Bryon Griffith, EPA
Mechanics of NGI Multi-institutional Regional Collaborations: Years 1-3 Initiatives Year 4 Proposal & Work Plan NGI Performance Metrics	3:10- 3:40	same	David Shaw
Break	3:40-3:50	HPCC Hall	
Review Panel – Closed Session	3:50-4:50	HPCC Rm A150	Review Panel only
Day 1 Review Panel Feedback to NGI	4:50-5:15	same	Science Review Panel, NGI Program Office, Fellows
Stroll (weather permitting) or drive to Reception	5:15-5:30	Guides will be provided	All
Reception by MSU	5:30-7:00	MSU Enology Lab	Review Panel, NGI Team, PIs, Students, NOAA, Visitors
Return to Hotel	7:00	MSU to provide transportation	Science Review Panel

NGI SCIENCE REVIEW
THURSDAY, OCTOBER 8, 2009



AGENDA ITEM	TIME	LOCATION	PRESENTERS AND PANELISTS
Working Breakfast and Recap of Previous Day	7:00-8:00	Hilton Garden Inn	Science Review Panel Only (Private Room reserved at hotel)
Travel to MSU HPCC	8:00-8:15	MSU to provide transportation	Science Review Panel
Review Responses from Day 1 Panel Feedback	8:15-8:30	HPCC Rm A150	John Cortinas and David Shaw present NGI Fellows, NGI Program Office
NGI Integrated Education and Outreach Program	8:30-9:00	same	Tina Miller-Way, DISL Jay Ritchie, NGI
Closed Session Interviews of NOAA Leadership: What works, what doesn't, how responsive is NGI, how is the work quality, how do you work with NGI?	9:00-10:00	same <i>(This session will be conducted in part by video-conference)</i>	Science Review Panel and NOAA employees Only – Closed Session Russ Beard, NOAA NCDDC Buck Sutter, NOAA NMFS Todd Davison, NOAA GCSC John Cortinas, NOAA OAR CI Julien Lartigue, NOAA NGI
Break combined with NGI Virtual Tour WISDOM Project Demonstration	10:00-10:30	HPCC "Cave"	Phil Amburn, MSU (with NGI Student)
Closed Session Interviews of NGI Fellows: What works, what doesn't, how responsive is NGI, how is the work quality, how do you work with NGI?	10:30-11:30	HPCC Rm A150	Science Review Panel, NOAA and NGI Fellows Only -- Closed Session Tina Miller-Way, DISL Eric Chassignet, FSU Robert Twilley, LSU David Shaw, MSU Steve Lohrenz, USM
Closed Session with NGI Director	11:30-11:45	same	Science Review Panel, David Shaw
Lunch at Tyler's	11:45-1:30	MSU to provide transportation	Science Review Panel, NOAA, NGI Leadership, Visitors
Closed Session for Review Panel	1:30-4:30	HPCC Rm A150	Science Review Panel Only (NGI on standby for report out)
Report out on Preliminary Findings and Recommendations	4:30-5:00	same	Science Review Panel to NGI Leadership & Program Office Staff
Adjourn and return to hotel; informal dinner gathering TBD	5:00-5:15	MSU to provide transportation	All

