Welcome and Thank You!
Google Meet

Sci Prog - Program Review Meeting
Google Meet

- Whiteboard
  - Open a Jam
- Change layout
- Full screen
- Apply visual effects
- Captions
  - Off
- Use a phone for audio
- Report a problem
- Report abuse
- Troubleshooting & help
- Settings

Change layout
Selection is saved for future meetings

- Auto
- Tiled
- Spotlight
- Sidebar

Tiles
Maximum tiles to display, depending on window size.
Group Norms

- Mute yourself when not talking.
- We encourage you to close internet tabs and mute your email and phone to give presenters your full attention.
- Please keep cameras on whenever possible.
- Use hand raise icon to signal that you have a question or comment.
- Notetakers are documenting verbal discussions and chat comments.
- Save questions for Q&A and roundtable times.
Tech Assistance

• If you have tech issues, drop a note in the chat or text me at 904-415-2105.

• We have a tech assistant standing by.

• When in doubt, hop on the phone!
  – Dial-in information is provided for all sessions.
Review Purpose

Independent and external review of the science supported by the Science Program, the application of that science to management challenges and decisions, and the strength of coordination and collaboration with other entities.

Review the Scope and Charge for eight questions on Quality, Relevance, and Performance.
Agenda Overview

• **Times:**
  - Nov 16: 9:30 am to 5 pm ET
  - Nov 17: 1 pm to 5 pm ET
  - Nov 18: 1 pm to 5 pm ET

• **What to Expect:**
  - Presentations from Science Program team
  - Presentations from project leads, managers, and other stakeholders
  - Q&A or roundtable after every session
  - Executive Sessions
  - Panel Report out
Today’s Agenda

- Welcome
- Program Overview
- Funding Competitions
- Project Management
- Break for Lunch
- 2015 Projects
- 2017 Projects
- 10-min Break
- 2019 Projects
- Wrap-up
- Executive Session I
Who Is In The Room Today

- RESTORE Science Program team
- Federal and state government
- Researchers
- Project leads
- Research teams
- Technical monitors
- End users

You have a list of all presenter names and affiliations in the most recent agenda you received.
Questions before we begin?
NOAA RESTORE Science Program Overview

Julien Lartigue
November 16, 2021
NOAA RESTORE Science Program – Review
Outline

• Mission and outcomes
• Legislative mandate
• Deepwater Horizon funding landscape
• Program structure
• General approach
  – Funding competitions and projects
  – Project management
  – Additional activities
Mission: To carry out research, observation, and monitoring to support the long-term sustainability of the ecosystem, fish stocks, fish habitat, and the recreational, commercial, and charter-fishing industry in the Gulf of Mexico.

Outcomes

• The Gulf of Mexico ecosystem is understood in an integrative, holistic manner.
• Management of, and restoration activities within, the Gulf of Mexico ecosystem is guided by this ecosystem understanding.
Legislative Mandate

- Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) was enacted in 2012.
  - Coordinate with the US Fish and Wildlife Service
  - Consult with the Gulf States Marine Fisheries Commission and Gulf of Mexico Fishery Management Council
  - Priority shall be given to integrated, long-term projects that address management needs
  - Avoid duplication of other activities and coordinate with others
  - Funds may not be used for
    - Any existing or planned research led by NOAA
    - New NOAA regulations
    - A fisheries catch share program
Deepwater Horizon Gulf Science and Restoration Initiatives

**Civil Penalties (Clean Water Act)**
- Transocean ($1B)
- Anadarko ($160M)
- BP ($5.86B)

- RESTORE Act ($5.62B)
  - Direct Component ($1.97B)
    - Centers of Excellence ($141M*)
    - Science Program ($141M*)
  - Council Component ($1.69B**)
  - Spill Impact Component ($1.69B)

**Criminal Penalties**
- BP ($2.84B)
- Transocean ($300M)

- North American Wetlands Conservation Fund ($100M)
- National Fish and Wildlife Foundation ($2.54B)
- National Academy of Sciences ($500M)

**Natural Resource Damages**
- Responsible Parties- BP, etc.
  - NRDA Trustee Council ($8.1B)

**Spill Impact Component ($1.69B)**
- Alabama ($356M)
- Florida ($356M)
- Louisiana ($1.3B)
- Mississippi ($356M)
- Texas ($356M)

**Others**
- Gulf of Mexico Research Initiative ($500M)

* 25% of the interest
** 50% of the interest
Program Structure

Executive Oversight Board

National Centers for Coastal Ocean Science (NCCOS) Director

Core Team

Engagement Coordination Team

- Technical monitors
- NOAA budget
- Grants management division
- Financial assistance legal division

Core Team

NCCOS

- Grant specialists
- Human Resources and travel specialists
- Data management specialists
- Environment compliance specialists
- Communications specialist
- Web and graphic design specialist
- IT specialists

Reporting

Advisory

Strategic Direction

Execution
# Core Team

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Type</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>Julien Lartigue</td>
<td>Federal</td>
<td>100%*</td>
</tr>
<tr>
<td>Associate Director</td>
<td>Frank Parker</td>
<td>Federal</td>
<td>100%*</td>
</tr>
<tr>
<td>Science Coordinator</td>
<td>Caitlin Young</td>
<td>Federal</td>
<td>100%*</td>
</tr>
<tr>
<td>(on detail until Jan 2022)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications and Engagement Specialist</td>
<td>Hannah Brown</td>
<td>Contractor</td>
<td>100%*</td>
</tr>
<tr>
<td>National Academies Gulf Research Program Fellow</td>
<td>Miranda Madrid</td>
<td>Fellowship</td>
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<td>(until Aug 2022)</td>
<td></td>
<td></td>
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<tr>
<td>Senior Advisor (NOAA’s Office for Coastal Management)</td>
<td>Becky Allee</td>
<td>Federal</td>
<td>25%</td>
</tr>
<tr>
<td>Senior Advisor (NCCOS)</td>
<td>Pete Key</td>
<td>Federal</td>
<td>25%</td>
</tr>
<tr>
<td>Grant Specialist (NCCOS)</td>
<td>Jennifer Hinden</td>
<td>Federal</td>
<td>&gt;15%</td>
</tr>
</tbody>
</table>

* salary covered by the Science Program
Executive Oversight Board

Functions

• Provide scientific, programmatic, and financial oversight
• Provide portfolio review of proposed investments
• Forum for proposing, discussing, and approving priorities
### Executive Oversight Board

<table>
<thead>
<tr>
<th>NOAA Line Office/Organization</th>
<th>Primary Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair</td>
<td>Cisco Werner</td>
</tr>
<tr>
<td>(NMFS, Director of Scientific Programs and Chief Science Advisor)</td>
<td></td>
</tr>
<tr>
<td>NOAA Office of Oceanic and Atmospheric Research*</td>
<td>Jon Pennock</td>
</tr>
<tr>
<td>(Director, National Sea Grant College Program)</td>
<td></td>
</tr>
<tr>
<td>NOAA National Marine Fisheries Service*</td>
<td>Clay Porch</td>
</tr>
<tr>
<td>(Director, Southeast Fisheries Science Center)</td>
<td></td>
</tr>
<tr>
<td>NOAA National Ocean Service*</td>
<td>Lisa DiPinto</td>
</tr>
<tr>
<td>(Senior Scientist, Office of Response and Restoration)</td>
<td></td>
</tr>
<tr>
<td>NOAA National Environmental Satellite, Data, and Information Services</td>
<td>Eric Kihn</td>
</tr>
<tr>
<td>(Director, Center for Coasts, Oceans, and Geophysics)</td>
<td></td>
</tr>
<tr>
<td>NOAA National Weather Service</td>
<td>Hendrik Tolman</td>
</tr>
<tr>
<td>(Senior Advisor for Advancing Modeling Systems)</td>
<td></td>
</tr>
<tr>
<td>US Fish and Wildlife Service</td>
<td>Michelle Eversen</td>
</tr>
<tr>
<td>Assistant Regional Director for Gulf Restoration</td>
<td></td>
</tr>
<tr>
<td>NOAA Office of the Chief Financial Officer <em>(ex officio)</em></td>
<td>Suzanne Plympton</td>
</tr>
<tr>
<td>Budget Analyst, NOAA Budget Execution</td>
<td></td>
</tr>
</tbody>
</table>

* Chair rotation
Our Approach

• Emphasize connections within the ecosystem
• Prioritize application
• Build and strengthen relationships
  – A community of researchers and resource managers committed to working together
Our Approach

• How...
  – So far, competitively awarded projects

• Who...
  – So far, institutions of higher education; non-profit institutions; federal, territorial, state, local, and tribal governments; and for-profit organizations

• Where...
  – Gulf of Mexico or on a process, habitat, or species with a direct, significant, and quantifiable impact on the Gulf of Mexico
Our Funding Competitions

• Driven by resource manager needs and capacity of research community
• Link to management is key
• Review panels that include resource managers and researchers
Science Plan and Long-term Priorities

**Research**
- Coupled social and ecological systems
- Freshwater, sediment, and nutrient impacts
- Living coastal and marine resources, food webs, and habitats
- Climate change and weather effects

**Application**
- Management-ready ecosystem models
- Long-term trends on ecosystem status
- Environmental and socioeconomic indicators
- Decision-support tools

**Monitoring**
- Integrating data and information
- Advanced technologies
Managing Our Awards

• Technical monitors
• Reporting on science and application
• Engagement with additional stakeholders
Projects

• 2015 – Assessing indicators, modeling, and observing
  – Seven project teams ($2.6M)

• 2017 – Living coastal and marine resources
  – Nine project teams ($12.9M) conducting research
  – Six project teams ($4.5M) developing decision support tools

• 2019 – Trends in living coastal and marine resources and the processes driving them
  – Four project teams ($15.6M)

• 2021 – Planning for actionable science
  – Twenty project teams ($2.3M)
What else are we doing

• Co-production of science
  – Pilot workshop
  – Webinar series
  – Conference sessions
• Synthesis initiative
  – Partnership
  – $3.5M over 5 years
• Communication and engagement
• Coordination and collaboration
Backup
Science Plan

• Highlights the areas of investment for the Program
• Long-term priorities
• Describes competitive program approach
• Identifies partners with which the Science Program will leverage future opportunities
Funding Competitions - Development

Julien Lartigue
November 16, 2021
NOAA RESTORE Science Program – Review
Analysis of funding gaps relative to Science Program priorities

Executive Oversight Board approval of broad priorities and concept

Structured conversations with community/experts
Analysis of funding gaps relative to Science Program priorities

Executive Oversight Board approval of broad priorities and concept

Structured conversations with community/experts

Executive Oversight Board approval of prospectus

Expert panel and NCCOS Director review of prospectus

Science Program develops prospectus

Finalize full funding announcement

Legal and grants management review

Competition published on grants.gov
Analysis of funding gaps relative to Science Program priorities

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Executive Oversight Board approval of prospectus → Expert panel and NCCOS Director review of prospectus → Science Program develops prospectus

Finalize full funding announcement → Legal and grants management review → Competition published on grants.gov

This process takes about a year.
Funding Competitions

• Federal funding opportunities (FFOs)
  – Past
    • FFO-2015
    • FFO-2017
    • FFO-2019
    • FFO-2021
  – Future
    • FFO-2023
• Synthesis initiative
All competitions have some link to the needs of resource managers.

Most competitions ask for some description of the transfer and application process.

Broad definition of resource managers and management:
- Individuals or groups of individuals with authority to make decisions regarding the human use of or interaction with natural resources.
- It takes many forms, including wildlife and fishery management, state and federal rulemaking and permitting, conservation practices by public or private landowners, place-based management, and restoration planning.
<table>
<thead>
<tr>
<th>FFO</th>
<th>Link to management language from FFOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>“synthesize current scientific understanding and management needs”</td>
</tr>
</tbody>
</table>
| 2017 - Research | “further develop the scientific foundation for living coastal and marine resource management”  
• Priority will be given to projects that “describe how the research will be applied, relate to a challenge(s) facing resource managers, and detail a path for communicating their research results to the management community” |
| 2017 - Tools | “provide resource managers with decision-support tools”  
• “should inform a current or near-term management decision or challenge”  
• “clear path for the adoption and use of the tool by a resource manager” |
| 2019 | “relates to one or more issues facing resource managers”  
• describe “how the research findings or products will be applied”, including “process for the transfer to and use…by the management community.” |
| 2021 | “informs a specific Gulf of Mexico natural resource management decision”  
• Requires a resource manager to be on the team |
Eligibility

• Eligible entities
  – Academic institutions
  – Non-profit organizations
  – For-profit companies
  – Local, state, and tribal governments
  – U.S. territorial and federal agencies
    • No support for salaries of permanent federal employees

• Investigators are not required to be Gulf-based, but collaboration with Gulf-based eligible entities is (strongly) encouraged

• Lead applicant must be from US-based institution
Open competitions

• All competitions have been open to all eligible institutions
• Institutions are all in one applicant pool
Engagement with Applicants

• Rollout of the competition
  – Grants.gov posting
  – Subscriber announcement
  – Website content
    • Overview of competition and Frequently Asked Questions
  – Webinars
  – Additional outreach

• Letter of intent/pre-proposal feedback webinars and one-on-one meetings with project teams

We aim to be accessible to applicants.
Funding Competitions – Project Selection

Frank Parker
November 16, 2021
NOAA RESTORE Science Program – Review
Overview and Timeline

- **Pre-Proposals**
  - Publish competition
  - Pre-proposal deadlines (~7 weeks)

- **Full Proposals**
  - Pre-proposal responses (~4 weeks)
  - Administrative review (~2 weeks)
  - Mail review (~5 weeks)

- **Negotiations**
  - Negotiations (~8 weeks)

- **Agreements**
  - Grants management review (~8 weeks)
  - Projects start (~54 weeks)

- **Activities**
  - Identify reviewers (~3 weeks)
  - Panel Review (~4 weeks)
  - Finalize and submit proposals (~2 weeks)
  - Approve agreements (~4 weeks)
Pre-Proposals

• Required
• 3-4 reviews per by NOAA and FWS personnel
• Evaluated for alignment with funding competition priorities
• Written feedback provided within ~4 weeks:
  – Encouraged
  – Encouraged with modifications
  – Discouraged without major modifications
  – Discouraged
Pre-Proposals

• Required
• 3-4 reviews per by NOAA and FWS personnel
• Evaluated for alignment with funding competition priorities
• Written feedback provided within ~4 weeks:
  – Encouraged
  – Encouraged with modifications
  – Discouraged without major modifications
  – Discouraged
• Response letters included specific written feedback for areas of misalignment with funding competition priorities
• Responses non-binding; no bearing on full proposal review
• Webinars and one-on-one meetings with project teams
Full Proposal Review

1. **Administrative Review** for completeness, eligibility, *etc.*

2. **Independent Peer “Mail” Review** (if needed)
   - Each proposal reviewed by three or four technical experts
   - Comments required for every criterion and should reflect the score
   - Advance to panel based on relative score and the number of proposals
Full Proposal Review

1. **Administrative Review** for completeness, eligibility, *etc.*
2. **Independent Peer “Mail” Review** (if needed)
   - Each proposal reviewed by three or four technical experts
   - Comments required for every criterion and should reflect the score
   - Advance to panel based on relative score and the number of proposals
3. **Independent Review Panel**
   - Panel composition driven by breadth of science and management topics
   - Each proposal reviewed by three experts
   - ~40-50 proposals is ideal
   - Evaluation criteria reviewed in detail with panel
   - Each proposal discussed for ~15 min, scored simultaneously by panelists assigned to that proposal who then write a panel summary
   - Summary discussion to assess relative ranks, tie scores, and recommendations
FFO-2019 Evaluation Criteria

1. **Importance / Applicability (25%)**
   ✓ Does it advance understanding and address key management and end user needs? How impactful is it?

2. **Technical / Scientific Merit (30%)**
   ✓ Does the research plan seem clear and well organized?

3. **Applicant Qualifications (15%)**
   ✓ Is the team comprised of the right people from planning to execution to application?

4. **Project Costs (10%)**
   ✓ What is the return on investment? Is this worth 10 years of continuous investment and support?

5. **End Users and Transferability (20%)**
   ✓ Is there a clear plan for transfer and use of the outputs by the identified end users and management community? How would it be used?
Panel Scoring Scale

1. **Poor**: bottom 10%, significant deficiencies
2. **Fair**: lowest 33%, not supportable without significant modifications
3. **Good**: middle 33%, may be worthy of support with minor modifications
4. **Very Good**: top 33%, should be supported
5. **Excellent**: top 10%, highest priority, outstanding
Review Panel Scores

Number of Proposals

Average Panel Scores

- **Awarded**
- **Not Awarded**

All panels combined (n = 182)
1. Create ranking based on scores, selection factors, available funding

2. Solicit portfolio-level input from our Executive Oversight Board

3. Submit funding recommendations to selecting official
   – Director, National Centers for Coastal Ocean Science

4. Provide anonymous written reviews and panel summaries to all applicants

5. Initiate negotiations with selected projects
Negotiations

- Written responses to reviewer and Science Program comments
- Changes in scope, design, or budget (if needed)
- Duplication and background checks
  1. Executive Oversight Board review
  2. Review by senior managers of specific NOAA & FWS programs
  3. Review against projects posted on the DWH Project Tracker
  4. Discussions with programs on the Gulf of Mexico Restoration and Science Programs Coordination Forum
  5. Discussions with programs that previously funded the project lead
- Data management plan review
- Environmental compliance
Environmental Compliance

• NEPA: requires federal agencies to complete environmental analysis for all major federal actions, including grants
Environmental Compliance

• NEPA: requires federal agencies to complete environmental analysis for all major federal actions, including grants

• Type of activities determine the level of review
  – Desktop projects (2015 and 2021 projects) are categorically excluded since they would not significantly affect environment
  – Field and laboratory activities require analysis against laws and rules
    • Endangered Species Act analysis
    • Marine Mammal Protection Act analysis
    • Migratory bird regulations
    • Highly Migratory Species, Essential Fish Habitat
    • Protected areas - National Marine Sanctuaries Act
    • Coastal Zone Management Act
Environmental Compliance

• NEPA: requires federal agencies to complete environmental analysis for all major federal actions, including grants
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    • Marine Mammal Protection Act analysis
    • Migratory bird regulations
    • Highly Migratory Species, Essential Fish Habitat
    • Protected areas - National Marine Sanctuaries Act
    • Coastal Zone Management Act
• Consultations with NMFS and USFWS
  – Categorical exclusion memo – common
  – Environmental assessment – rare, two to date
Final Review and Agreements

Non-federal Lead:
• Finalize all forms in each proposal package
  – Funds for federal partners are managed separately (see below)
• Submit to NOAA’s Grants Management Division
  – 60 days for review
  – Special award conditions
• Final cooperative agreement sent to institution for approval

Federal Lead:
• Finalize all forms in each proposal package
• Develop agreements
  – Interagency agreement: non-NOAA federal lead
  – Intra-agency agreement: NOAA lead
Questions and Answers
Funded Projects: Oversight and Management

Frank Parker
November 16, 2021
NOAA RESTORE Science Program – Review
Overview

Oversight of funded projects is a team effort:

– Federal program officer
– Technical monitor(s)
– Science Program liaisons
– Grants specialists, grants officer
– Data management, publication, metric tracking
– Environmental compliance
– Financial assistance counsel
Overview

Oversight of funded projects is a team effort:

– Federal program officer
– Technical monitor(s)
– Science Program liaisons
– Grants specialists, grants officer
– Data management, publication, metric tracking
– Environmental compliance
– Financial assistance counsel

By leveraging support from across NOAA, NCCOS, and other federal agencies we increase the reach of the Science Program and its projects

– This leveraging model allows for lean program staffing and a diverse portfolio of projects
Technical Monitors

Identified from other federal programs that would benefit from a project’s outputs

- NOAA, USFWS, USGS, MMC, GMFMC, USBR, BSEE
- Supervisor approval required (< 5% FTE)

Roles and Responsibilities:

1. Track progress of the project
2. Provide oversight of the science and its application through a cooperative agreement
3. Focus on applying a project’s outputs for management, which includes facilitating engagement with end users
Tracking Progress

- Active engagement with project teams and activities
- Designed semi-annual progress and final report templates that include performance metrics (pages 107, 113)
- Milestone Gantt charts to track project tasks and schedule (page 110)
- End user tables that track the specifics of each interaction
- Annual project team meetings ("site visits") for technical monitors and others
- Data management plan (next slide)
- SOP and evaluation forms for reviewing progress reports and final reports (pages 100, 111, 116)
- If needed (rare), *Corrective Action Plan*
Purpose: To ensure that scientific data, derived products, and publications created with Science Program funding are properly documented, discoverable, accessible, and preserved for future use

• Describes a comprehensive, “end-to-end” data management approach, including data management planning, metadata, data access, and archiving

• Includes all appropriate policies and procedures for alignment with the OSTP directive and NOAA policy on public access to research results
Roundtable Discussion

Technical Monitors:
- Becky Allee, NOAA
- Cheryl Morrison, USGS
- Jeff Gleason, USFWS
- Melissa Carle, NOAA
Break for Lunch until 12:50 pm ET
2015 Funding Competition Overview: Assessing Indicators, Modeling, and Observing Systems

Julien Lartigue
November 16, 2021
NOAA RESTORE Science Program – Review
Funding Competition Overview

- Three short-term priorities
  - Identification of current **indicators**
  - Inventory and assess ecosystem **modeling**
  - Assessment of **monitoring and observing** needs and recommendations for building a Gulf-wide network
- In three topical areas
  - Ecosystem and living marine resource management, including fisheries
  - Climate change and extreme weather impacts on the sustainability of restoration
  - Integrations of social, behavioral, and economic science into restoration and management
- Link to management
- Short-term (1-2 year) projects
- No new data collection
Link to Management

• Address critical management needs
• Support a holistic ecosystem-based approach to habitat and living resources management
• Support resource trustee agencies’ development of adaptive management given climate change and extreme events
# Funding

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<th></th>
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<tr>
<td>Number of awards</td>
<td>3-7</td>
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<tr>
<td>Amount available</td>
<td>~$2-2.5M</td>
<td>$2.7M</td>
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<tr>
<td>Minimum award</td>
<td>~$200K</td>
<td>$309K</td>
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<tr>
<td>Maximum award</td>
<td>~$400K</td>
<td>$400K</td>
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<tr>
<td>Length of awards</td>
<td>1-2 years</td>
<td>3-4 years (includes no cost extensions)</td>
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<tr>
<td>Start date</td>
<td>Sep 2015</td>
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## Review Process

<table>
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<tr>
<th>Stage</th>
<th>Letters of Intent (2 page limit)</th>
<th>Full applications</th>
<th>Awards</th>
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<tbody>
<tr>
<td>Total count</td>
<td>102</td>
<td>37</td>
<td>7</td>
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<tr>
<td>Encouraged</td>
<td>47</td>
<td>31 (77.5%)</td>
<td>6</td>
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<tr>
<td>Encouraged with modifications</td>
<td>20</td>
<td>3 (15.0%)</td>
<td>1</td>
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<tr>
<td>Discouraged</td>
<td>35</td>
<td>1 (2.8%)</td>
<td>0</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>2 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>Success rate (%)</td>
<td>---</td>
<td>---</td>
<td>18.9%</td>
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</table>
Awards by the Numbers

- 7 lead institutions (FL – 1, MS – 1, LA – 1, TX, 3)
- 31 investigators (28 Gulf of Mexico-based)

Organization Type

- **Academic**: 50.0%
- **State**: 12.5%
- **Non-NOAA...**: 12.5%
- **NOAA**: 6.3%
- **NGO**: 12.5%
- **Private**: 6.3%
Awards by the Numbers

FFO-2015 Funding by State

- Non-Gulf: 13.5%
- FL: 32.5%
- TX: 27.8%
- LA: 12.3%
- MS: 13.8%
## Projects

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<tr>
<th>Short Title</th>
<th>Lead (Institution)</th>
<th>$K</th>
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<tbody>
<tr>
<td>Indicators for ecosystem health and services</td>
<td>Larry McKinney (Texas A&amp;M University Corpus Christi)</td>
<td>$398</td>
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<tr>
<td>Ecosystem indicators inventory</td>
<td>Kathy Goodin (NatureServe)</td>
<td>$400</td>
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<tr>
<td>Assessing ecosystem modeling</td>
<td>Jim Simons (Texas A&amp;M University Corpus Christi)</td>
<td>$395</td>
</tr>
<tr>
<td>Impact of Mississippi River</td>
<td>Alex Kolker (Louisiana Universities Marine Consortium)</td>
<td>$309</td>
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<tr>
<td>Identifying ecological hotspots</td>
<td>Bob Arnone (University of Southern Mississippi)</td>
<td>$367</td>
</tr>
<tr>
<td>Ocean observing systems and ecosystem management</td>
<td>Matthieu Le Henaff (University of Miami)</td>
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<td>Brad Erisman (University of Texas at Austin)</td>
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Accomplishments

• Indicators
  – Tested indicator framework for managing rookery islands in Texas
  – Comprehensive set of indicators for salt marsh, mangrove, seagrass, oyster, and coral ecosystems

• Modeling
  – Review paper summarizing status of ecosystem modeling for Gulf of Mexico and needs to address ecosystem-based fisheries management
  – Improved diet matrix for West Florida Shelf model

• Monitoring and observing
  – Characterized export of shelf waters to the national marine sanctuaries in the Gulf and designed two monitoring tools
Recommendations

• Indicators
  – Apply existing frameworks

• Modeling
  – Gather additional data is needed for model calibration and validation
  – Integrate resource managers into the development process

• Monitoring and observing
  – Use satellite and ocean circulation model outputs to identify anomalous conditions
  – Roadmap to gather important information on spawning aggregations and integrate it into stock assessments
2015 Project:

Cooperative monitoring program for spawning aggregations in the Gulf of Mexico: an assessment of existing information, data gaps and research priorities

Presenter: Brad Erisman (PI)
Participants: Will Heyman (Co-PI), Scott Hickman (Industry Collaborator)

November 16, 2021
NOAA RESTORE Science Program – Review
Our Team

Support provided by:
Julien Lartigue (NOAA RESTORE)
Scott Hickman (CFA) & Roy Williams
Todd Kellison (NOAA SEFSC – Beaufort)
Martin Russell (SCRFA)
Chris Koenig (FSU)

Frank Parker (NOAA RESTORE)
Chris Taylor (NOS/NCOS/CCFHR)
John Froeschke (GMFMC)
NOAA Southeast Regional Office
Shane Cantrell (CFA)

Caitlin Young (NOAA RESTORE)
Don DeMaria
Wayne Werner
Keith Guindon
Derek Bolser
Fish Spawning Aggregations

Temporary, large gatherings of fish that form for reproduction, are predictable in time and space, and involve densities higher than non-reproductive periods. Essential Fish Habitat (EFH) critical to the reproductive success and population stability of exploited and protected species.
Regional Challenge

Exploited and protected fishes in the Gulf of Mexico exhibit a wide range of life history and spawning behavior traits...built upon a wealth of scientific information and regional knowledge...but spawning behavior is not fully integrated into fisheries monitoring, assessments, and management...and it is one of the world’s least studied areas for the biology and fisheries of FSAs
Project Goal

Compile and evaluate existing information on fish spawning aggregations in the Gulf of Mexico as the basis to design a long-term, cooperative, regional research and management program.

Objectives

1. **Identify** existing literature, datasets, and monitoring programs in the GOM that could inform regional monitoring of fish spawning aggregations.

2. **Compile** existing biological and fisheries information on GOM species known or likely to form spawning aggregations in the region.

3. **Synthesize** information and convene a workshop to prioritize species, habitats, monitoring methods, and research areas.

4. **Engage** in a comprehensive outreach and data-sharing program to ensure all data and project outputs are available to inform management.
Welcome
This data portal offers the best available data and information relevant to the biology, fisheries, monitoring and management of spawning aggregations for important fish species in the Gulf of Mexico and serves as the basis for a cooperative, Gulf-wide conservation and monitoring program.

The site was funded by the NOAA RESTORE Act Science Program.
Assessed 28 Commercially and Recreationally Important Fish Species

- Almaco Jack
- Black Drum
- Black Grouper
- Cubera Snapper
- Gag
- Goliath Grouper
- Gray Triggerfish
- Greater Amberjack
- Hogfish
- King Mackerel
- Mutton Snapper
- Nassau Grouper
- Red Drum
- Red Grouper
- Red Snapper
- Scamp
- Sheepshead
- Snowy Grouper
- Southern Flounder
- Spanish Mackerel
- Speckled Hind
- Spotted Seatrout
- Tilefish
- Vermilion Snapper
- Warsaw Grouper
- Yellowedge Grouper
- Yellowfin Grouper
- Yellowmouth Grouper
## References

as of December 2017

(Click here to download the full dataset in Excel file)

Citation for Data set (Excel file)

Data Table (It will show different entries based on filters. Click a bar chart to filter data)

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Summary of Life History and Spawning Behavior Parameters

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Species Profiles

Sheepshead

**Archosargus probatocephalus**

**Habitat and Distribution**
This species occurs along coasts and in estuaries and brackish water in the western Atlantic from Nova Scotia to Brazil, including the entire Gulf of Mexico.

**Spawning season in the Gulf of Mexico**
In the GOM, this species is reported to spawn from late February through April with peak spawning in March and early April.

**Spawning Patterns**
Sheepshead migrate to form transient spawning aggregations of hundreds to tens of thousands of individuals at the mouths of channel passes and offshore reefs and oil platforms. Sheephead are broadcast spawners with external fertilization.

**Fishing Patterns in Relation to Spawning**
This species is caught commercially, recreationally, and incidentally throughout the Gulf of Mexico. In the Gulf, Sheephead rank among the most important inshore recreational fisheries, and landings peak from February to April when fish aggregate to spawn at jetties, channel passes, and offshore oil platforms. Average monthly commercial and recreational landings are greater during spawning months than non-spawning months.

**Management of Spawning Aggregations**
Sheephead are managed independently by state regulatory commissions in the US Gulf of Mexico. Currently, no management measures exist in the US Gulf of Mexico that specifically target the protection of spawning. However, current fishery regulations for the species include minimum size limits, daily catch (bag) limits, and gear restrictions (e.g., bans on use of Gill nets). In Mexico in the southern Gulf, no species-specific management regulations exist for commercial fisheries targeting Sheephead.

**Research and Management Priorities**
While numerous studies have been conducted on the reproductive biology and life history of Sheephead in the Gulf of Mexico and elsewhere, very little information is available on the behavioral dynamics of spawning or the potential impacts of targeted fishing of Sheephead.
Spawning Seasonality

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(Click [here](#) to download the full dataset in Excel file with notes, metadata, and references included)

Suggested Citation for Data set

Spawning-Fishing Interactions

King Mackerel

- Spawning Months
- % Annual Landings (95% CI)

Sheepshead (recreational)

- Spawning Months
- % Annual Landings (95% CI)
# Existing Protections for Spawning Fish

(Click here to download the full dataset in Excel file with notes, metadata, and references included)

Citation for Data set (Excel file)

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<td>4</td>
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<tr>
<td>Hogfish</td>
<td>Reef Fish</td>
<td>Lachnolaimus maximus</td>
<td>3</td>
<td>4</td>
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<td>3</td>
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<tr>
<td>King Mackerel</td>
<td>Coastal Migratory Pelagics</td>
<td>Scomberomorus cavalla</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Mutton Snapper</td>
<td>Reef Fish</td>
<td>Lutjanus analis</td>
<td>3</td>
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<td>4</td>
<td>2</td>
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<tr>
<td>Nassau Grouper</td>
<td>Reef Fish</td>
<td>Epinephelus striatus</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
Map of Validated Spawning Aggregation Sites in GOM
Cooperative monitoring, assessment, and management of fish spawning aggregations and associated fisheries in the U.S. Gulf of Mexico

William D. Heyman\textsuperscript{a,}, Arnaud Griss\textsuperscript{b}, Christopher R. Biggs\textsuperscript{c}, Shin'ichi Kobara\textsuperscript{d}, Nicholas A. Farmer\textsuperscript{e}, Mandy Karnauskas\textsuperscript{e}, Sue Lowerre-Barbieri\textsuperscript{e}, Brad Erisman\textsuperscript{e}

Table 2
Documented fish spawning aggregations in the U.S. Gulf of Mexico. Sites are mapped by number in Fig. 1.

<table>
<thead>
<tr>
<th>Site Number (Fig. 1)</th>
<th>Site Name</th>
<th>Shelf position</th>
<th>Management Status</th>
<th>Characterization Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Corpus Christi Pass, TX</td>
<td>C 3</td>
<td>Coastal</td>
<td>1 Site closed all year</td>
</tr>
<tr>
<td>2</td>
<td>Port Aransas</td>
<td>C 3</td>
<td>Coastal</td>
<td>2 Site closed part of the year</td>
</tr>
<tr>
<td>3</td>
<td>Galveston Channel, TX</td>
<td>C 3</td>
<td>Coastal</td>
<td>3 No spatial closure</td>
</tr>
<tr>
<td>4</td>
<td>Bucaneer Rig, TX</td>
<td>MS 3</td>
<td>Mid Shelf</td>
<td>1 Site well mapped and characterized</td>
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<tr>
<td>5</td>
<td>Barataria Pass, LA</td>
<td>C 3</td>
<td>Coastal</td>
<td>2 Site closed part of the year</td>
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<tr>
<td>6</td>
<td>East Timbalier Pass, LA</td>
<td>C 3</td>
<td>Coastal</td>
<td>3 No spatial closure</td>
</tr>
<tr>
<td>7</td>
<td>Caminada Pass, LA</td>
<td>C 3</td>
<td>Coastal</td>
<td>1 Site closed all year</td>
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<tr>
<td>8</td>
<td>Mobile Point, AL</td>
<td>C 3</td>
<td>Coastal</td>
<td>2 Site closed part of the year</td>
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<tr>
<td>9</td>
<td>Tampa Bay, FL</td>
<td>C 3</td>
<td>Coastal</td>
<td>3 No spatial closure</td>
</tr>
<tr>
<td>10</td>
<td>Wayne’s Lumps</td>
<td>SE 3</td>
<td>Shelf Edge</td>
<td>1 Site well mapped and characterized</td>
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<tr>
<td>11</td>
<td>Madison Swanson</td>
<td>SE 1</td>
<td>Shelf Edge</td>
<td>2 Site closed part of the year</td>
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<tr>
<td>12</td>
<td>Fantastico wreck</td>
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<td>Mid Shelf</td>
<td>3 No spatial closure</td>
</tr>
<tr>
<td>13</td>
<td>Stoney ferry boat wreck</td>
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<td>Mid Shelf</td>
<td>1 Site well mapped and characterized</td>
</tr>
<tr>
<td>14</td>
<td>Patrol boat wreck</td>
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<td>Mid Shelf</td>
<td>2 Site closed part of the year</td>
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<tr>
<td>15</td>
<td>Shrimp boat wreck</td>
<td>MS 3</td>
<td>Mid Shelf</td>
<td>3 No spatial closure</td>
</tr>
<tr>
<td>16</td>
<td>Tower</td>
<td>MS 3</td>
<td>Mid Shelf</td>
<td>1 Site well mapped and characterized</td>
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<tr>
<td>17</td>
<td>Californian wreck</td>
<td>MS 3</td>
<td>Mid Shelf</td>
<td>2 Site closed part of the year</td>
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<tr>
<td>18</td>
<td>Western Dry Rocks, FL</td>
<td>SE 3</td>
<td>Shelf Edge</td>
<td>3 No spatial closure</td>
</tr>
<tr>
<td>19</td>
<td>Warsaw Hole</td>
<td>SE 1</td>
<td>Shelf Edge</td>
<td>1 Site well mapped and characterized</td>
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<tr>
<td>20</td>
<td>Tortugas Banks</td>
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<td>Shelf Edge</td>
<td>2 Site closed part of the year</td>
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<td>21</td>
<td>Riley’s Hump</td>
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<td>3 No spatial closure</td>
</tr>
<tr>
<td>22</td>
<td>Shrimp boat wreck</td>
<td>MS 3</td>
<td>Mid Shelf</td>
<td>1 Site well mapped and characterized</td>
</tr>
</tbody>
</table>

Legend

- **Shelf position**
  - C = Coastal
  - MS = Mid Shelf
  - SE = Shelf Edge

- **Management Status (1-3)**
  - 1 Site closed all year
  - 2 Site closed part of the year
  - 3 No spatial closure

- **Characterization status (1-3)**
  - 1 Site well mapped and characterized
  - 2 Some recent mapping or characterization
  - 3 Poor or outdated map or characterization

Documented FSA
Identified Priority Areas for Surveys, Monitoring, and Management

HOTSPOTS!

1. Channel passes - coastal species
2. Shelf edges – groupers and snappers
3. Western GOM
Monitoring Protocol

Cooperative Research and Monitoring Protocols for Fish Spawning Aggregations in the Wider Gulf of Mexico

©Walt Stearns
The importance of spawning behavior in understanding the vulnerability of exploited marine fishes in the U.S. Gulf of Mexico

Christopher R. Biggs, William D. Heyman, Nicholas A. Farmer, Shin’ichi Kobara, Derek G. Bolser, Jan Robinson, Susan K. Lowerre-Barbieri and Brad E. Erisman
Opportunities to Inform Management

- Provides a roadmap and toolkit for monitoring, assessing, and managing spawning aggregations in the GOM.

- Research guided by Stakeholders (fishers) with widespread buy-in by resource managers at state and federal levels.

- Provides guidance for stock assessment process: (1) identifies priority species; (2) pathway to consider spawning parameters in assessments.

- Provides guidance for EBFM related to EFH and HAPC designations (30x30 mandate).

- Informs new regulations for the Flower Gardens National Marine Sanctuary.
Questions and Answers
2017 Funding Competition: Living Coastal and Marine Resources and their Habitats

Frank Parker
November 16, 2021
NOAA RESTORE Science Program – Review
Funding Opportunity Overview

Living coastal marine resources and their habitats

1. **Research** in six specific topics
   - ~$12M for 5-10 projects over 1-3 years

2. **Decision-support tools**
   - ~$5M for 5-10 projects over 1-3 years
Funding Opportunity Overview

Living coastal marine resources and their habitats

1. **Research** in six specific topics
   - ~$12M for 5-10 projects over 1-3 years

2. **Decision-support tools**
   - ~$5M for 5-10 projects over 1-3 years

Link to management was key

Amount requested should have been driven by the question or problem being addressed

Open competition; letter of intent required
To have received funding, projects must have proposed a strong collaboration with *identified* end users that:

1. Addressed an existing or near-term management need or challenge
2. Integrated resource managers into project
3. Identified specific steps for transferring research findings or products (*i.e.*, decision-support tool) to end users
Research Priorities

1. Movement between and among habitats
2. Habitat use measurements
3. Recruitment of juvenile fish to fisheries
4. Food web structure and dynamics, trophic linkages, or predator-prey relationships
5. Impact of multiple stressors on food web structure and dynamics or habitat quality and quantity
6. Connections between restored habitat and surrounding habitats
Decision-Support Tool Priority

Proposals should have:

1. Addressed a current or near-term management decision

2. Described how a resource manager would adopt and continue to use the tool
   - How would they collaborate with and train users?
   - How would the decision-support tool be supported for operations and maintenance after the project ends?

Improvement of an existing tool with an active user community was given priority
## Review Process

<table>
<thead>
<tr>
<th>Research</th>
<th>Letters of intent</th>
<th>Full applications</th>
<th>Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total count</td>
<td>186</td>
<td>93</td>
<td>9</td>
</tr>
<tr>
<td>Encouraged</td>
<td>37</td>
<td>33 (89%)</td>
<td>3</td>
</tr>
<tr>
<td>Encouraged with modifications</td>
<td>93</td>
<td>59 (63%)</td>
<td>6</td>
</tr>
<tr>
<td>Discouraged</td>
<td>56</td>
<td>1 (2%)</td>
<td>0</td>
</tr>
<tr>
<td>Success rate (%)</td>
<td>---</td>
<td>---</td>
<td>9.7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decision-Support Tools Tools</th>
<th>Letters of intent</th>
<th>Full applications</th>
<th>Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total count</td>
<td>82</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>Encouraged</td>
<td>19</td>
<td>18 (95%)</td>
<td>3</td>
</tr>
<tr>
<td>Encouraged with modifications</td>
<td>40</td>
<td>22 (55%)</td>
<td>3</td>
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<tr>
<td>Discouraged</td>
<td>23</td>
<td>0 (0%)</td>
<td>0</td>
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<tr>
<td>Success rate (%)</td>
<td>---</td>
<td>---</td>
<td>15%</td>
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## Funding

<table>
<thead>
<tr>
<th></th>
<th>Research</th>
<th>Decision-Support Tools</th>
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<tbody>
<tr>
<td>Number of awards</td>
<td>9</td>
<td>6</td>
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<tr>
<td>Amount provided</td>
<td>$12.4M</td>
<td>$4.5M</td>
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<tr>
<td>Award range</td>
<td>$0.23 - $2.31M</td>
<td>$0.52 – $1.17M</td>
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<tr>
<td>Average award</td>
<td>$1.37M</td>
<td>$0.75M</td>
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<tr>
<td>Length of awards*</td>
<td>4 to ≥5 years</td>
<td>3 to 5 years</td>
</tr>
</tbody>
</table>

*Includes no-cost extensions
FFO-2017 Funding by State

- FL: 38.6%
- MS: 19.8%
- LA: 8.9%
- TX: 2.5%
- Non-Gulf: 22.3%
- AL: 8.0%
Funding

Organization Type

- NGO: 8.1%
- State: 8.1%
- Non-NOAA Federal: 5.4%
- NOAA: 8.1%
- Academic: 70.3%

26
## Research Projects

<table>
<thead>
<tr>
<th>Short title</th>
<th>Lead (institution)</th>
<th>Topical Areas</th>
<th>Geography</th>
<th>$K</th>
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<tbody>
<tr>
<td><em>Sargassum</em></td>
<td>F. Hernandez (USM)</td>
<td>Habitat use</td>
<td>Gulf-wide (open)</td>
<td>$1,771</td>
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<td></td>
<td></td>
<td>Recruitment</td>
<td></td>
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<td></td>
<td></td>
<td>Food webs</td>
<td></td>
<td></td>
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<tr>
<td>Dolphin tags</td>
<td>B. Balmer (NMMF)</td>
<td>Movement</td>
<td>Northern Gulf (coastal)</td>
<td>$407</td>
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<td>Bluefin tuna larvae</td>
<td>T. Gerard (NOAA NMFS)</td>
<td>Food webs</td>
<td>Gulf-wide (open)</td>
<td>$1,613</td>
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<td>Marsh food webs</td>
<td>M. Polito (LSU)</td>
<td>Food web Connections</td>
<td>LA (coastal)</td>
<td>$2,058</td>
</tr>
<tr>
<td>Turtlegrass</td>
<td>K. Darnell (USM)</td>
<td>Habitat use</td>
<td>FL, LA, TX (coastal)</td>
<td>$992</td>
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<tr>
<td>Migratory birds</td>
<td>T.J. Zenzal (USM/USGS)</td>
<td>Habitat use</td>
<td>Gulf-wide (coastal)</td>
<td>$1,492</td>
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<td>Rice’s whales</td>
<td>L. Garrison (NOAA NMFS)</td>
<td>Food webs</td>
<td>Northern Gulf (open)</td>
<td>$2,312</td>
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<td>Deepwater corals</td>
<td>S. Herrera (Lehigh U)</td>
<td>Movement</td>
<td>Northern Gulf (open)</td>
<td>$1,338</td>
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<td></td>
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<td>Connections</td>
<td></td>
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<tr>
<td>Oyster contaminants</td>
<td>R. Carmichael (DISL)</td>
<td>Multiple stressors</td>
<td>Northern Gulf (coastal)</td>
<td>$232</td>
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</tbody>
</table>

### Projects per research topical area

![Bar chart showing projects per topical area](chart.png)
## Decision-Support Tool Projects

<table>
<thead>
<tr>
<th>Short title</th>
<th>Lead (institution)</th>
<th>Type</th>
<th>Geography</th>
<th>$K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal flooding adaptation tool</td>
<td>P. Sheng (UF)</td>
<td>New</td>
<td>FL (coastal)</td>
<td>$995</td>
</tr>
<tr>
<td>Living shorelines tools</td>
<td>C. Boyd (Troy U)</td>
<td>Improved</td>
<td>FL, LA, AL, TX (coastal)</td>
<td>$520</td>
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<tr>
<td>Red snapper management tool</td>
<td>Y. Zhang (FIU)</td>
<td>New</td>
<td>Gulf-wide (open)</td>
<td>$529</td>
</tr>
<tr>
<td>Oyster portfolio assessment tool</td>
<td>D. Petrolia (MSU)</td>
<td>New</td>
<td>MS (coastal)</td>
<td>$590</td>
</tr>
<tr>
<td>Alabama Real-time Coastal Observing System (ARCOS)</td>
<td>B. Dzwonkowski (DISL)</td>
<td>Improved</td>
<td>AL (coastal)</td>
<td>$720</td>
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<tr>
<td>Fisheries ecosystem models</td>
<td>D. Chagaris (UF)</td>
<td>Improved</td>
<td>Gulf-wide (open)</td>
<td>$1,168</td>
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</table>
Next Steps

• Review final reports for six completed projects and complete closeout activities
• Continue to track and support development and dissemination of project products
• Continue to facilitate connections with end users and other stakeholders
• Update project webpages with findings
2017 Project: Effects of Nitrogen Sources and Plankton Food-Web Dynamics on Habitat Quality for the larvae of Atlantic Bluefin Tuna in the Gulf of Mexico

Michael Stukel Ph.D. (Presenter/Co-PI)- Florida State University
Lead PI: Trika Gerard Ph.D. Southeast Fisheries Science Center
Co-PI: Michael Landry Ph.D. Scripps Institute of Oceanography, UC San Diego
Co-PI: Angela Knapp Ph.D. Florida State University
Co-PI: Karen Selph Ph.D. University of Hawaii

November 16, 2021
NOAA RESTORE Science Program – Review
Project Objectives

Motivation:

• Atlantic Bluefin Tuna (ABT) is a high value fishery
• Management of ABT depends on understanding larval survival rates and the stock-recruitment relationship in their spawning grounds.
• Stock Assessments require a broadened consideration of environmental factors impacting recruitment... and how they might change in the future

Objective:

• Improve western ABT stock assessment by elucidating the mechanisms that link variability in nitrogen sources and food-web dynamics in the GoM to habitat quality, feeding, growth and survival for ABT larvae.
  — Nutrients ➔ phytoplankton ➔ zooplankton ➔ ABT larvae
  — Integrated field and modeling program
2017 & 2018 Surveys

The BLOOFINZ-GoM Cruises

- Biogeochemistry
  - Nutrients
  - Nutrient isotopes
  - Nutrient uptake
  - Sediment traps
- Phytoplankton
  - Microscopy
  - Flow cytometry
  - Primary productivity
  - Growth rates
- Zooplankton
  - Abundance
  - Biomass
  - Grazing Rates
  - Isotopic composition
- Larval bluefin tuna
  - Abundance
  - Size
  - Isotopes
  - Gut contents

N Sources & Fluxes

Feeding & Growth

Food-web Dynamics

Mean Source N Trophic Position

CSIA-AA
Compound-Specific Isotopic Analysis of Amino Acids
Finding 1: Source of Nitrogen

• Hypothesis 1: Ecosystem is supported by upwelled nitrate
  — Alternate Hypothesis 1a: Ecosystem is supported by N\textsubscript{2} fixation
  — Alternate Hypothesis 1b: Ecosystem is supported by lateral advection of organic matter
Finding 1: Source of Nitrogen

**Hypothesis 1:** Ecosystem is supported by upwelled nitrate

---

**Alternate Hypothesis 1a:** Ecosystem is supported by N$_2$-fixation

---

**Alternate Hypothesis 1b:** Ecosystem is supported by lateral advection of organic matter

---

Kelly et al. (2021, Nat. Comm.)
Finding 1: Source of Nitrogen

- Hypothesis 1: Ecosystem is supported by upwelled nitrate
  - Alternate Hypothesis 1a: Ecosystem is supported by $\text{N}_2$ fixation
  - Alternate Hypothesis 1b: Ecosystem is supported by lateral advection of organic matter – and that lateral advection creates ideal habitat for ABT larvae

Date = 01/01/2000

Shropshire et al. (2020, L&O)
Shropshire et al. (2021, JPR)

Constrained with data from:
SEAMAP Surveys
Gerard et al. (in press)
Kelly et al. (2021)
Knapp et al. (2021)
Landry & Swalethorp (2021)
Landry et al. (2021)
Malca et al. (in prep)
Selph et al. (2021)
Shiroza et al. (2021)
Stukel et al. (2021)
Yingling et al. (2021)
Product 1: ABT Model

- Predicts time-varying:
  - Food limitation maps
  - Indices of larval survival

Shropshire et al. (2020, L&O)
Shropshire et al. (2021, JPR)

Constrained with data from:
SEAMAP Surveys
Gerard et al. (in press)
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Stukel et al. (2021)
Yingling et al. (2021)
Product 1: ABT Model

- Predicts time-varying:
  - Food limitation maps
  - Indices of larval survival

Food limitation index recently validated using otolith-based growth measurements (Malca et al., in prep.)

Shropshire et al. (2020, L&O)
Shropshire et al. (2021, JPR)
Constrained with data from:
SEAMAP Surveys
Gerard et al. (in press)
Kelly et al. (2021)
Knapp et al. (2021)
Landry & Swalethorp (2021)
Landry et al. (2021)
Malca et al. (in prep)
Selph et al. (2021)
Shiroza et al. (2021)
Stukel et al. (2021)
Yingling et al. (2021)
Finding 2: Larvae mortality

- Starvation is dominant mortality term for first week post hatch (and in deepwater areas)
- Predation is dominant mortality term thereafter (and in coastal areas)

Shropshire et al. (2020, L&O)
Shropshire et al. (2021, JPR)

Constrained with data from:
- SEAMAP Surveys
- Gerard et al. (in press)
- Kelly et al. (2021)
- Knapp et al. (2021)
- Landry & Swalethorp (2021)
- Landry et al. (2021)
- Malca et al. (in prep)
- Selph et al. (2021)
- Shiroza et al. (2021)
- Stukel et al. (2021)
- Yingling et al. (2021)
Finding 3: Prey field

- Hypothesis 1: Larvae feed preferentially on appendicularians (short pathway from cyanobacteria to larvae)
  - Alternate Hypothesis 1a: Larvae feed preferentially on zooplankton that consume large phytoplankton
  - Alternate Hypothesis 1b: Larvae are not selective feeders
**Finding 3: Prey field**

- **Hypothesis 1:** Larvae feed preferentially on appendicularians (short pathway from cyanobacteria to larvae)
  - Alternate Hypothesis 1a: Larvae feed preferentially on zooplankton that consume large phytoplankton (especially podonid cladocerans)
  - Alternate Hypothesis 1b: Larvae are not selective feeders

- Dietary composition shifts from small to larger prey during larval development.
- Postflexion larvae are highly selective for cladocerans (up to 82% of ingested C).
- Diet and prey selection is broader (generalist feeding) when preferred taxa (notably cladocerans) are rare, but narrows sharply, implying active prey selection, when preferred prey are more abundant.

Shiroza et al. (2021, JPR)
Finding 4: Growth Rates

• Hypothesis 1: Larvae feed preferentially on appendicularians (short pathway from cyanobacteria to larvae)
  — Alternate Hypothesis 1a: Larvae feed preferentially on zooplankton that consume large phytoplankton (especially podonid cladocerans)
  — Alternate Hypothesis 1b: Larvae are not selective feeders

• Mean larval growth ranged from 0.40 to 1.40 mm d\(^{-1}\) for newly hatched to postflexion larvae with up to 16 daily increments.
• Ingestion of preferred prey (copepod nauplii and Podonid cladocerans) explained growth rates better than total ingestion

Malca et al. (in prep.)
Product 2: Foodweb Model
Outputs


- At least 3 more currently in preparation
Outcomes

• ICCAT – Planned presentations in 2020 postponed due to COVID
  — Larval ABT model with food-limitation maps for next year survival
  — Food web model to enable ecosystem-based management
  — Cross-shore flux should be used as a predictor of future larval survival
  — Preferred prey (podonid cladoceran) abundance is key metric

• NSF-funded Southern Bluefin Tuna cruise (BLOOFINZ-IO) in the Indian Ocean
  — January – March 2022
  — R/V Roger Revelle, 37 scientists
2017 Project: Trophic Interactions and Habitat Requirements of Gulf of Mexico Rice’s Whales

Dr. Lance P. Garrison
November 16, 2021
NOAA RESTORE Science Program – Review
Rice’s Whale Status

- Only resident baleen whale in Gulf of Mexico
- Best estimate of abundance (from 2017-2018) is \( N=51.3 \) \( CV=0.50 \)
- Potential threats include vessel traffic, fishery interactions, noise, exposure to DWH and other oil spills
- Project objective: Characterize the physical and biological habitat of Rice’s whales to inform conservation planning
Trophic Ecology Project

Large Vessel Surveys in Core Rice’s Whale Habitat

- Along-shelf visual and passive acoustics surveys, night time cross-shelf acoustic transects
- Small boat close approaches for tagging, photo-id, eDNA collection, and UAS work
- Underway acoustic backscatter, trawl sampling of prey during summer 2019
Habitat Modeling

Model developed using SEFSC survey data collected between 2003-2019

High predicted occurrence over inner shelf break, low bottom temperatures associated with upwelling, and intermediate surface chlorophyll
Acoustic Backscatter

- Strong vertically migrating layer that is well dispersed in the upper water column at night
- Aggregates and migrates downward in early morning
- Persistent near bottom during the day with varying intensity
- Formation of patchy, intense aggregations, which are often associated with feeding whales
- Seasonal and spatial variation in the numbers and size of these patches
Acoustic Backscatter

- Strong associations between whales and Swim-Bladdered Fish backscatter centered along the 220m isobath
- Seasonal differences, with lower backscatter and further south during the November 2018 survey
- Spatial variability within summer 2019 with shifting backscatter distribution
**Kinematic Tag: Dive Behavior**

- Daytime deep dives to near bottom depths
- Moving upward in water column near dusk
- Near surface during the evening
## Kinematic Tag: Foraging Behavior

- Typically 1-2 lunges at depth
- Some surface activity at night and possible feeding
- Unusual activity at day-night transition
- Breath rates and swimming speeds in different phases inform energetics
19 trawl stations, targeted on aggregations observed in the EK80 data. Generally near or just above the bottom.
• Probable prey inferred from stable isotope mixing models
• Sensitive to inferences about trophic enrichment levels – used Fin Whales as a model
• Inferred diet dominated by Ariomma bondi (Silver Rag Drift-fish)
Prey Distribution

Data source: Small pelagics trawl data 2003-2013: NMFS, Southeast Fisheries Science Center
Ecosystem Connectivity

- West Florida Shelf is dynamic and complex
- Influenced by both local wind transport and deep effects of Loop current features
- Creates nutrient inputs from both surface and bottom waters on the outer shelf

Sea Surface Height Anomaly, June 2018, NOAA AOML
Sightings and Effort in Core Habitat Area 2003-2019

Distance Analysis Detection Function:
Included 91 on-effort sightings

• Line transect Distance Analysis based abundance estimate
• Sightings from 2018-2019 surveys integrated into detection function
• Updated abundance estimates incorporated into MMPA mandated stock assessment reports
Applications: PAM Studies

- Sonobuoy data collected during 2018-2019 surveys used to validate Rice’s whale calls
- Western Gulf PAM studies identified variation in call types
- PAM studies planned to evaluate habitat use and occurrence throughout the Gulf
Applications: Aquaculture

- Habitat information used to inform scoping for Aquaculture Opportunity Areas

- Spatial planning effort to evaluate possible areas for aquaculture siting
- Evaluate potential impacts to protected species based on spatial information
- Core habitat provided to Aquamapper spatial planning tool
Applications: Critical Habitat

- Project outcomes are key information for identifying physical and biological features for critical habitat designation.
Applications: Recovery Planning

- Understanding of prey resources and habitat information important to identifying potential recovery actions
- Photo-id data to identify individuals, understand demographics, track health
- Series of workshops underway to provide input on recovery actions
- Several presentations from project members.
Workshop participants from NMFS, BOEM, Navy, MMC, NRDC, FWRI

Technical Monitors: Vicki Cornish (MMC) and Barb Zoodsma (SERO)

Melissa Soldevilla, Anthony Martinez, Patricia Rosel, Keith Mullin, Ruth Ewing, Laura Dias, Kevin Barry, Debra Abercrombie, Lynsey Wilcox (SEFSC)

John Hildebrand, Annebelle Kok (SIO)

Jeremy Kiszka, Kevin Boswell, Nick Tucker, Mike Heithaus (FIU)

Beth Josephson, Grace Conger (NEFSC)
Roundtable Discussion

2017 Research Projects:

- Trika Gerard, NOAA
- Michael Stukel, FSU
- Barb Muhling, UCSC
- John Walter, NOAA
- Lance Garrison, NOAA
- Laura Engleby, NOAA
2017 Project: Expansion of www.mymobilebay.com for coastal resource management

B. Dzwonkowski, R. Collini, L. Hu, H. King, G. Lockridge, D. Marchant, and J. Goff

November 16, 2021

NOAA RESTORE Science Program – Review

Grant number: NA17NOS4510101
Challenge

• Environmental conditions are critical to understanding changes and dynamics of coastal ecosystems

• Accurate, robust, accessible environmental data promotes improved:
  - Management
  - Conservation
  - Restoration

• Objective: Augment a decide-support tool that provides system-wide information necessary for accurate guidance in event response, restoration, conservation, and fisheries management

• TOOL: Alabama Real-time Coastal Observing System (ARCOS)
Approach

- Expand the capacity of existing observing network addressing stakeholder needs of coastal Alabama
  - Weather and water quality data

- Key goals:
  - Continue existing data collection and real-time delivery
  - Expand measurement parameters
  - Expand real-time data delivery capacity
  - Expand stakeholder interest and use

https://arcos.disl.org/
Product and Publicization

Alabama’s Real-Time Coastal Observing System (ARCOS)

Data Sharing Partners
- Gulf of Mexico Coastal Observing System (GCOOS)
- NOAA National Buoy Data Center (NBDC)
- NOAA NCEI – annual data dumps

Weather and water quality data

Select a station from the list.

Or click a station location below to view current reported conditions.

: Operated by DISL. : Operated by partners.
Endusers

NOAA National Weather Service Mobile/Pensacola Weather Forecast Office

Jeffrey M. Medlin, Meteorologist-in-Charge: “These data undoubtedly save lives by assisting in routine marine forecasts, marine forecast updates, and Special Marine Warnings.... These data also greatly assist that industry (shipping) because it is used in the forecast which directly affects operations for the Port of Mobile.”

NOAA National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS)

Patrick Burke (Oceanographic Division Chief): “Specifically, we operate and maintain a hydrodynamic model in Mobile Bay to support safe navigation in the region... Observations from Alabama Real-time Coastal Observing System (ARCOS) will continue to be invaluable in validating these forecast products... ensure that we provide high-quality environmental forecasts for the Mobile Bay’s navigation and recreational boating communities.”
Endusers

Additional Examples

Alabama Department of Conservation and Natural Resources (ADCNR) – Marine Resources Division (MRD) – Water quality issues

Alabama Department of Environmental Management (ADEM) - Water quality issues

Amy Corps of Engineers (ACE) – Mobile District - Impact of ship channel widening

Mobile Bar Pilots, LLC – Aid to navigation

Navy Cove Oysters Company – Farm management

Moffatt & Nichol – Ecological modeling

The Nature Conservancy (Mobile Office) – Monitoring

Alabama Coastal Fishermen's Association (ACFA) – Environmental conditions

University of South Alabama/Dauphin Island Sea Lab – Research and Education
Advancing GoMx understanding

Expanding applications through science

- **Hypoxia** – New understanding of connection between shelf and bay dissolved oxygen
  Coogan et al. (2021), Coogan et al. (2019), Dzwonkowski et al. (2018)

- **River Discharge** - New understanding the timing and variability river discharge and the ecosystem impacts (i.e., oyster harvesting)
  Dykstra and Dzwonkowski (2020), Coles et al. (2020), Dykstra and Dzwonkowski (2021)

- **Marine Heatwaves and Coastal Droughts** – Duration of the data allow for regional climatological events to be defined and identified
  Dzwonkowski et al. (2020)

- **Hurricane Intensity** – New ways to assess coastal ocean potential for storm intensification
  Dzwonkowski et al. (2020), Dzwonkowski et al. (Submitted 2021a,b)
Marine Heatwaves and Hurricane Intensity

Findings:
• New mechanisms for generating extreme thermal conditions (i.e., marine heatwaves) were identified for the coastal ocean

Significance:
• *Supercharging coastal heat content* is critical information for forecasting landfall storm intensification.
• Such events have significant implications for a range of interests (e.g., coral bleaching, hypoxia).
• Impact and frequency of this type of compound event should increase under expected climate change conditions.

Extensive Media Coverage:
UN Office for Disaster Risk Reduction (UNDRR) – PreventionWeb
National, regional, and local weather forecasters
Advancing GoMx understanding

Expanding stakeholder interest through event response

2019 - Bonnet Carré Spillway opening
2019 – Hypoxia event monitoring
2019 – Harmful algal bloom (Blue-green algae)
2019 - Usually Mortality Event – Northeast Gulf of Mexico – Bottlenose Dolphins
2020 – Extremely active storm season in the Gulf

During these events we actively reached out or were contacted by groups working on aspects of these events
Summary

• Real-time data was provided to the coastal community of Alabama

• ARCOS positioned to continue providing this service for next several years

• Expanded end-user interesting through developing new science-based applications
  - Baseline data from numerous events
  - 11 peer-view publications (+2 submitted)
  - 44 presentations/webinars
2017 Project: Ecosystem Modeling for Fisheries Management in the Gulf of Mexico

David Chagaris
November 16, 2021
NOAA RESTORE Science Program – Review
Project Goals and Objectives

Goal: Integrate information on ecosystem stressors and predator-prey interactions into the assessment and management of fisheries in the Gulf of Mexico

Objectives:
1. Involve end users in ecosystem model development
2. Adapt ecosystem models to better address assessment & management needs of gag and Gulf menhaden
3. Improve representation of spatially explicit stressors in ecosystem model
4. Incorporate outputs into stock assessments
5. Incorporate outputs into decisions making
6. Outreach and training

Gag Grouper
*Mycteroperca microlepis*

Gulf Menhaden
*Brevoortia Patronus*
Ecosystem Models

- West Florida Shelf (WFS) model
  - Red tide mortality application
- U.S. Gulf of Mexico model
  - Gulf Menhaden application
- Northern Gulf of Mexico model
  - Supported by NOAA NGOMEX funds
  - Gulf menhaden application (spatial, environmental)

All models were developed using Ecopath with Ecosim food web modeling software package (www.Ecopath.org)
End User Engagement

- Project Scoping Workshop
- Stock Assessment Workshops
- Scientific & Management Advisory Committees
- 1-on-1 communications
- Data visualization app development & training
Red tides routinely occur on Florida’s Gulf coast, causing fish kills and creating challenges for fisheries stock assessment and management.

Data Needs to Support Fisheries:
1. Historical estimates of red tide mortality for use in stock assessments
2. Contemporary (near-real time) estimates of red tide impacts to inform decisions on allowable catch
Simulating Red Tides in WFS Ecospace

Monthly red tide maps (cells/L) derived from nFLH satellite imagery and FWC HAB sampling. Input as spatial driver into WFS Ecospace Model.

Response functions used to drive mortality, foraging, and movement.

- Spatial overlap
- Bloom duration and severity
- Direct mortality
- Sub-lethal effects
- Avoidance
- Food web effects
**Informing Assessment & Management**

**Ecosystem Model Outputs:** Estimated age-specific red tide mortality rate of gag, 2002-2021 (current through Oct)

**Stock Assessment Inputs:** Red tide mortality vectors led to improved fits to index data when included in the gag stock assessment

**Informing OFL and ABC projections:** Near real-time estimates of 2021 mortality to be used in catch projections
Insights on Ecosystem Dynamics

**Recruitment Dynamics:**
mortality events followed by trophic-driven compensatory response (less predators & competitors)

**Population & Ecosystem Resiliency:**
delayed recovery times due to impacts on forage base (not captured by single species models)

**Ecosystem Impacts:**
Quantify effects of red tide on ecosystem structure (over space and time)
Project outcomes and products

- New episodic mortality forcing developed for Ecospace Software
- Ability to make near-real time assessments of red tide impacts
- First integration of GoM stock assessment dynamics into single modeling framework
- First use of an ecosystem model in GoM fisheries management decision
- Predator-prey tradeoffs for Gulf Menhaden
- New capabilities using parallel computing (>5000 runs/day)
- 1 publication, 3 more in prep; NOAA Tech Memo; 4 SEDAR working papers
- Red tide output visualization tool (rShiny app)
- Regional, national, and international presentations
- Student and post-doc training
Model Team, Data Providers, and Agency Partners
Daniel Vilas, Skyler Sagarese, Matthew Lauretta, Kim de Mutsert, Robert Ahrens, Igal Berenshtein, Joe Buszowski Jeroen Steenbeek, Carl Walters, Villy Christensen, Zach Siders, Matt Nuttall, Lisa Ailloud, Will Patterson, Nick Farmer, Amy Schueller, Steve Vanderkooy, Howard Townsed, Gulf Council Staff & SSC, Mandy Karnauskas, Brenden Turley, Ted Switzer, Kevin Thompson, Matt Campbell

Thank You!!!
Roundtable Discussion

2017 Decision-Support Tool Projects:

• Brian Dzwonkowski, DISL
• Grace Gray, NOAA
• Mary Kate Brown, TNC
• Katie Baltzer, TNC
• David Thornton, Pierpounder
• Dave Chagaris, UF
• Ryan Rindone, GMFMC
Break until 3:20 pm ET
2019 Funding Competition
Overview: Long-term trends

Julien Lartigue
November 16, 2021
NOAA RESTORE Science Program – Review
Funding Opportunity Overview

• Identify, track, understand, and/or predict trends and variability in living coastal and marine resources and the processes driving them

• Three areas of emphasis
  – Multiple species
  – Weather and/or climate impacts
  – Economic activity

• Link to management is key

• Long-term, integrated projects
  – $15M now (5 year awards)
  – $15M later (5 year renewals)
Areas of Emphasis

• **Multiple Species**
  – Multiple species response to same driver
  – Food web structure and dynamics
  – Multiple species stock assessments

• **Weather and/or climate impacts**
  – Role of weather and/or climate in driving trends and variability

• **Economic activity**
  – Relationships between trends and variability and economic activity
Link to Management

• To receive funding, projects had to directly address the needs of resource managers:
  – Relate to one or more issues managers face
  – Describe process for transfer and use of findings and products (within first five years)
  – Including managers on project teams was encouraged

Applicants were advised to interact with managers early and often
Decadal Plan

• Rationale for why a decade of research and investment is required for the resource management issue(s)
• Approach for engaging resource managers throughout 10 years and benefit from the project’s findings and products
• Explanation of how first five years will inform the second five years
• Overview of work planned for second five years
## Funding

<table>
<thead>
<tr>
<th></th>
<th>Announced</th>
<th>Awarded</th>
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<tbody>
<tr>
<td>Number of awards</td>
<td>~6</td>
<td>5</td>
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<tr>
<td>Amount available</td>
<td>~$15M</td>
<td>$19.3M</td>
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<tr>
<td>Minimum award</td>
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<td>Maximum award</td>
<td>$7.5M</td>
<td>$6.02M</td>
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<tr>
<td>Length of awards</td>
<td>5 years</td>
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<tr>
<td>Start date</td>
<td>Sep 2019</td>
<td>Sep 2019 (1 project, Jan 2020)</td>
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## Review Process

<table>
<thead>
<tr>
<th>Stage</th>
<th>Pre-proposals (5 page limit)</th>
<th>Full applications</th>
<th>Awards</th>
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<tbody>
<tr>
<td>Total count</td>
<td>163</td>
<td>68</td>
<td>5</td>
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<tr>
<td>Strongly encouraged</td>
<td>11</td>
<td>11 (100%)</td>
<td>1</td>
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<tr>
<td>Encouraged w/ minor modifications</td>
<td>56</td>
<td>51 (90.1%)</td>
<td>3</td>
</tr>
<tr>
<td>Discouraged w/out major modifications</td>
<td>40</td>
<td>3 (7.5%)</td>
<td>1</td>
</tr>
<tr>
<td>Discouraged</td>
<td>56</td>
<td>3 (5.3%)</td>
<td>0</td>
</tr>
<tr>
<td>Success rate (%)</td>
<td>---</td>
<td>---</td>
<td>7.4%</td>
</tr>
</tbody>
</table>
Awards by the Numbers

- 5 lead institutions (FL – 3, AL – 1, MS – 1)
- 51 investigators (40 Gulf of Mexico-based)

Organization Type:
- NGO: 16.0% (4 awards)
- State: 4.0% (1 award)
- Non-NOAA: 4.0% (1 award)
- NOAA: 4.0% (1 award)
- Academic: 72.0% (18 awards)
Awards by the Numbers

FFO-2019 Funding by State

- **FL**: 50.6%
- **Non-Gulf**: 18.8%
- **TX**: 4.0%
- **MS**: 12.2%
- **LA**: 3.5%
- **AL**: 10.9%
## Projects

<table>
<thead>
<tr>
<th>Title</th>
<th>Lead (Institution)</th>
<th>$K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building resilience for oysters, blue crabs, and spotted seatrout to environmental trends and variability in the Gulf of Mexico</td>
<td>John C. Lehrter (University of South Alabama)</td>
<td>$2,887</td>
</tr>
<tr>
<td>Optimization and expansion of Gulf-wide video survey efforts to better characterize temporal and spatial variability in reef fish assemblages in response to drivers at multiple scales: The G-FISHER (Gulf Fishery Independent Survey of Habitat and Ecosystem Resources) program</td>
<td>Theodore Switzer (Florida Fish and Wildlife Conservation Commission)</td>
<td>$6,019</td>
</tr>
<tr>
<td>Assessing Long-term Trends and Processes Driving Variability in Cetacean Density throughout the Gulf of Mexico using Passive Acoustic Monitoring and Habitat Modeling</td>
<td>Melissa Soldevilla (NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center)</td>
<td>$3,589</td>
</tr>
</tbody>
</table>
## Projects

<table>
<thead>
<tr>
<th>Title</th>
<th>Lead (Institution)</th>
<th>$K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire effects in Gulf of Mexico marshes: Historical perspectives, management, and monitoring of mottled ducks and black and yellow rails</td>
<td>Auriel M.V. Fournier (Mississippi State University)</td>
<td>$3,923</td>
</tr>
<tr>
<td>Trends and drivers of faunal abundance of the offshore Gulf of Mexico: Narrowing the data gap in the Gulf's largest ecosystem component</td>
<td>Tracey Sutton (Nova Southeastern University)</td>
<td>$2,794</td>
</tr>
</tbody>
</table>
Accomplishments

• The independent fisheries monitoring team completed 2020 survey efforts (camera drops, side scan sonar mapping, eDNA) in the eastern Gulf (1,000 sites)
  – New survey design resulted in increased precision and reduced bias in estimates of population abundance for most taxa.
  – Data products were provided for the assessment of gag grouper and red snapper.

• The Mobile Bay team invested significant time working with their management partners while continuing to make progress in their field hydrography and biogeochemical study, field settlement study, historical data analyses, downscaling, and estuarine modeling.

• The marine mammal acoustics team has held end-user meetings and made substantial progress on the collection of new data and the analysis and calibration of historic datasets.
Next Steps

• Renewal review (4th year)
• Decision on renewal
  – Renewal proposal review and award
  – Project close out
Renewal Process

To be invited to submit a new 5-year proposal, projects must:

• Be successful in an external review of the project’s quality, relevance, and performance
• Be successful in a review of the project’s financial and administrative performance
• Receive concurrence that the Science Program supports additional investment in a project’s subject matter or area

Renewal proposals:

• Build upon initial proposal, decadal plan, and what the project team learned in years 1-5
• Adhere to the guidelines from original funding competition
• Independent review
2019 Project:

Fire Effects in Gulf of Mexico Marshes: Historical Perspectives, Management, and Monitoring of Mottled Ducks and Black and Yellow Rails

Auriel M.V. Fournier
November 16, 2021
NOAA RESTORE Science Program – Review
How can prescribed fire in high marsh be used to benefit our focal species?
What circulation patterns are good burn conditions? Are those becoming less common?

How can prescribed fire in high marsh be used to benefit our focal species?
Climate

No change in frequency over time

Regional selection

Data inconsistent with hypothesis, leading us in new directions

Stakeholder feedback on this at last annual project meeting was key

<table>
<thead>
<tr>
<th>Region</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
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</thead>
<tbody>
<tr>
<td>Laguna Madre</td>
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<td>-0.5</td>
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<td>-0.5</td>
<td>3.5</td>
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<td>Texas Mid Coast</td>
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<tr>
<td>Chenier Plains</td>
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<td>-1</td>
<td>-3</td>
<td>-2</td>
<td>1</td>
<td>4</td>
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<td>3</td>
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<td>MS River Coastal Wetlands</td>
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<td>-2</td>
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<tr>
<td>Coastal MS AL</td>
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<td>-0.5</td>
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<td>Florida Big Bend</td>
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<td>-1</td>
<td>-1</td>
<td>2</td>
<td>-1</td>
<td>0</td>
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<tr>
<td>Tampa Bay</td>
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<td>0</td>
<td>0.5</td>
<td>0.5</td>
<td>1.5</td>
<td>-2</td>
<td>2</td>
<td>-3</td>
</tr>
</tbody>
</table>

Indicates avoidance strength (more positive number = stronger avoidance)
Indicates preference strength (more negative number = stronger preference)
What circulation patterns are good burn conditions? Are those becoming less common?

How can prescribed fire in high marsh be used to benefit our focal species?

Where is the high marsh?
Mapping

High utility outside our project for studying landcover change, recovering of Black Rail

Sentinel information for sea level rise

Ecotone for rare plants
Winter and Breeding season focal species data collection

How can prescribed fire in high marsh be used to benefit our focal species?

Where is the high marsh?

What circulation patterns are good burn conditions? Are those becoming less common?

Prediction about fire bird relationship

Winter and Breeding season focal species data collection

Figure 1 - Adaptive Management Double Loop Process
Adaptive management

- Framed the problem in terms of **objectives** and **performance measures**
- Created **conceptual models** of system behavior
- Generated 9 **hypotheses** on how management actions might affect outcomes

**Workshop Participant Organizations:**

Florida Fish and Wildlife Conservation Commission
Alabama Dept of Conservation and Nat Resources
Mississippi Dept Wildlife Fisheries and Parks
Louisiana Dept Wildlife and Fisheries
Texas Dept Parks and Wildlife
USFWS
  - two regions
  - ecological services
  - national wildlife refuges
Audubon Delta
Gulf Coast Joint Venture
Private Landowners
USGS
University of Central Oklahoma
University of Georgia
Mississippi State University
Tall Timbers Research Station
Louisiana State University
Fire return interval

Management action: Apply prescribed fire during the same season but treatments include different fire return intervals.
Increased understanding

We’ve addressed manager concerns about climate and prescribed fire

Our map product allows us to know where on the landscape this important, disappearing habitat type is for the first time across all 5 states.
Informing Decisions

Bit early for direct results

Black Rail federal listing 5-year review will be shortly after our final results are available, helping inform further recover of the species.
Acknowledgements

Thanks to the entire team!

Mark Woodrey Mississippi State University
Jim Cox Tall Timbers Research Station
Heather Levy Tall Timbers Research Station
Peter Kappes Mississippi State University
Erik Johnson National Audubon Society
Jonathan Lueck National Audubon Society
Andy Nyman Louisiana State University
Warren Conway Texas Tech University
Jena Moon USFWS
Chris Butler University Central Oklahoma
Nicholas Enwright USGS
Kristine Evans Mississippi State University
James Lyons USGS
Michelle Stantial USGS
Robert Rohli Louisiana State University
Chelsea Kross Illinois Natural History Survey

Amy Schwarzer & Ron Bielefeld Florida Fish and Wildlife Conservation Commission;
Michael Brasher Ducks Unlimited;
Joe Lancaster & William Vermillion Gulf Coast Joint Venture;
Jena Moon & Jennifer Wilson USFWS;
Eric Soehren Alabama Dept Conservation and Natural Resources
Robert Cooper, University of Georgia
2019 Project:

Trends and drivers of faunal abundance of the offshore Gulf of Mexico: narrowing the data gap in the Gulf’s largest ecosystem component (DEEPEND)

Tracey Sutton
November 16, 2021
NOAA RESTORE Science Program – Review
The offshore pelagic domain
Meso/bathypelagic = 90.4% of Gulf’s volume
This data gap came to haunt us...

The deep-pelagic received 100% of the spilled oil/gas/SSDI

900-1200 m

~ 1500 m
Detecting pelagic trends: 
the time series

Deep-pelagic research in the Gulf since DWH

GoMex Offshore Nekton Sampling and Analysis Program 
(ONSAP)

Office of Response and Restoration

2010-2015

DEEPEND

2015-2019 (GoMRI) 2019-2024 (2029?) RESTORE
What is DEEPEND?

(Deep-Pelagic Nekton Dynamics)

Pls: Tracey Sutton, April Cook, Andrea Bernard, Kevin Boswell, Heather Bracken-Grissom, Marta D’Elia, Danté Fenolio, Tamara Frank, Dan Hahn, Matt Johnston, Heather Judkins, Rosanna Milligan, Jon Moore, John Quinlan, Isabel Romero, Mahmood Shivji, Mike Vecchione

47 total members from 11 institutions
The focal taxa: pelagic nekton

Pelagic shrimps, cephalopods and fishes (plus net-caught gelatinous zooplankton)
The time series

Discrete-depth sampling (0 – 1500 m): 2011-2021

- 10-m² multiple-net trawl that can be opened and closed at depth
- ~2400 trawl samples
The time series

Multi-frequency bioacoustics

“Connectivity of the domains”
The time series

Petrochemical contamination

Population genetics
Products since 2020

- 44 publications since 2020
  - See restore.deependconsortium.org
  - Four currently in review
- 25 scientific presentations
- 15 outreach presentations
- 26 graduate students working on DEEPEND projects
  - 4 Ph.D., 19 MS, 1 UG
  - Funded via fellowships, grants, TA-ships
Major findings

The Gulf is a global hotspot of deep-pelagic biodiversity

Sutton et al. (2017)
Major findings

The Gulf oceanic fish fauna

897 species identified to date
• 186 are new records

❖ 1 in 10 fish species we now know in the Gulf we know from this program

❖ The majority of fish species in Gulf use pelagic habitat for all or part of their lives
Major findings

Title: Deep-sea pelagic populations plummeted in the years following the Deepwater Horizon disaster

Authors: Tracey T. Sutton1,* , Rosanna J. Milligan1 , April B. Cook1 , Kevin M. Boswell2 , Marta D’ Elia2 , Tamara Frank1 , Heather Bracken-Grissom2 , Daniel R. Hahn3 , Matthew W. Johnston1 , Heather Judkins4 , Jon Moore5 , Nina M. Pruzinsky1 , John A. Quinlan6 , Isabel C. Romero7 , Michael Vecchione8 , Joseph D. Warren9
Major findings

Lanternfishes have declined 85% since 2011
Major findings

Euphausiids ("krill") have declined 92% since 2011
Major findings

Long-term persistence of DWH contaminants in pelagic fauna

- Eggs contain ~50% more PAHs.
- Based on other species, PAH content in eggs **above levels with known sublethal effects in embryos**.
  - Maternal transfer of contaminants is important

NOTE: analyses ongoing, added gelzoo, which carry heavy PAH signal in gonads
Major findings

Simulations revealed that ~ one-quarter of all offshore trophic interactions changed significantly due to depleted d.p.n. stocks

Direct top-down interactions changed more frequently than other interactions
We now have baselines for future NRDAs
Resource management applications

Prey field data for oceanic predator management, conservation, and/or restoration
Resource management applications

Step 1: what eats deep-pelagic living resources?...

Perdido rig diet study 2021
Resource management applications

Example: a “lanternfish index” of offshore prey availability for the CETACEAN Project

(Compilation of Environmental, Threats, and Animal Data for Cetacean Population Health Analyses)

– funded by NOAA Open Ocean Restoration TIG

– primary contact: Elizabeth Fetherston-Resch

**Goal:** create a metric of offshore prey status for key taxa, with the end goal of producing a user-friendly “reference state” index that would assist NOAA Trustees, restoration planners, and conservation managers in assessing marine mammals stocks and stressors.
DEEPEND providing subject matter expertise on mesopelagic prey of critically endangered species
DEEPEND is:
1) providing subject matter expertise for restoration planning, and
2) tailoring field work to investigate important ecological processes
Resource management applications

DEEPEND cruise DP07; Apr-May, 2021

MDBC sites of interest

Viosca Knoll Lophelia thicket
Resource management applications

MBC? Would be first in Atlantic
Roundtable Discussion

2019 Projects:

• Auriel Fournier, UIUC
• Mark Woodrey, MSU
• John Tirpak, USFWS
• Kevin Kalasz, USFWS
• Jena Moon, USFWS
• Tracey Sutton, NSU
• Mandy Karnauskas, NOAA
• Kris Benson, NOAA
• Libby Fetherston-Resch, NOAA
Day 1 Summary

- Program Overview
- Funding Competitions
- Project Management
- 2015 Projects
- 2017 Projects
- 2019 Projects

UP NEXT:
- Executive Session I (30 min)
  — See separate video call link
Day 2 Preview: 1 pm – 5 pm ET

• Welcome
• Evaluating Application
• Promoting Co-Production
• -Break-
• Coordination and Collaboration
• Roundtable with Partner Programs
• Wrap-Up
• Executive Session II (1 hour)

Please use the same video link you used today to join for Day 2 and 3.