Gulf Coast Ecosystem Restoration Science, Observation, Monitoring and Technology Program

NOAA RESTORE Science Program

RESTORE SCIENCE PROGRAM

2021 Program Review

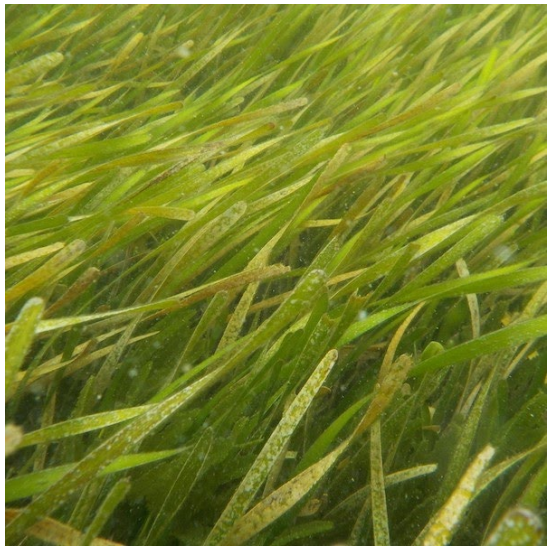
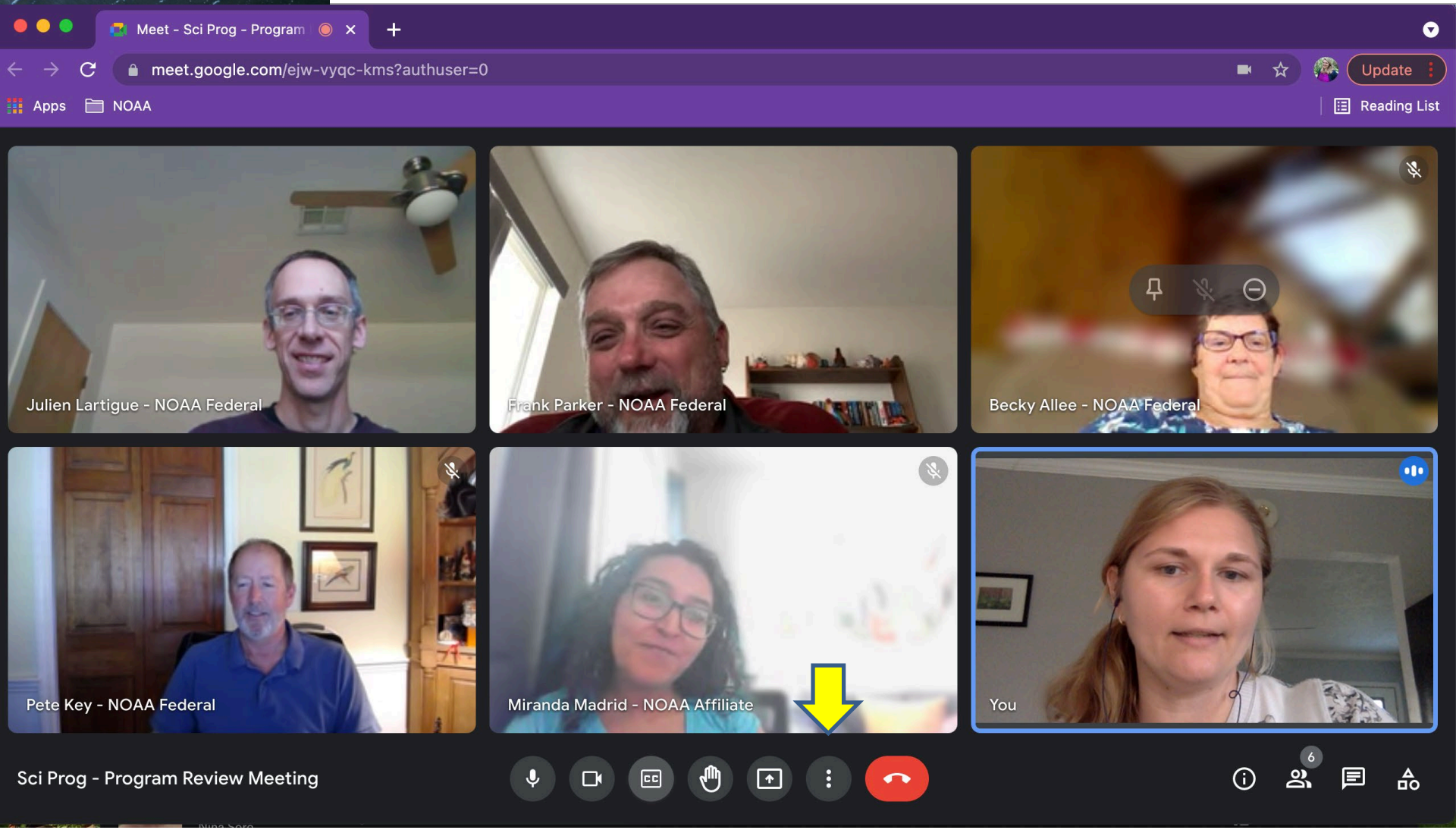


Photo by USDA Risk Management Agency

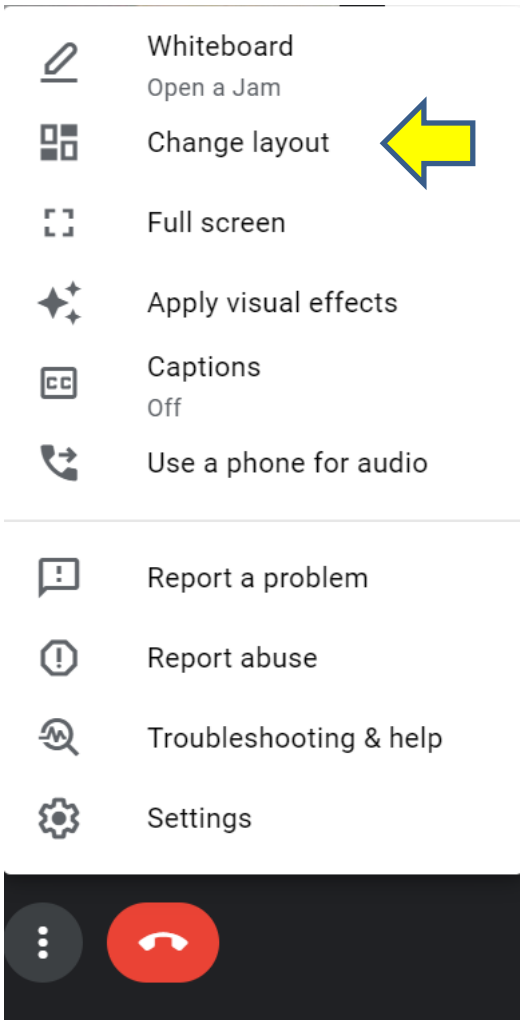
November 16, 2021

Welcome and Thank You!

Google Meet


Meet - Sci Prog - Program
meet.google.com/ejw-vyqc-kms?authuser=0
Update
Apps
NOAA
Reading List
Julien Lartigue - NOAA Federal
Frank Parker - NOAA Federal
Becky Allee - NOAA Federal
Pete Key - NOAA Federal
Miranda Madrid - NOAA Affiliate
You
Sci Prog - Program Review Meeting
6

Google Meet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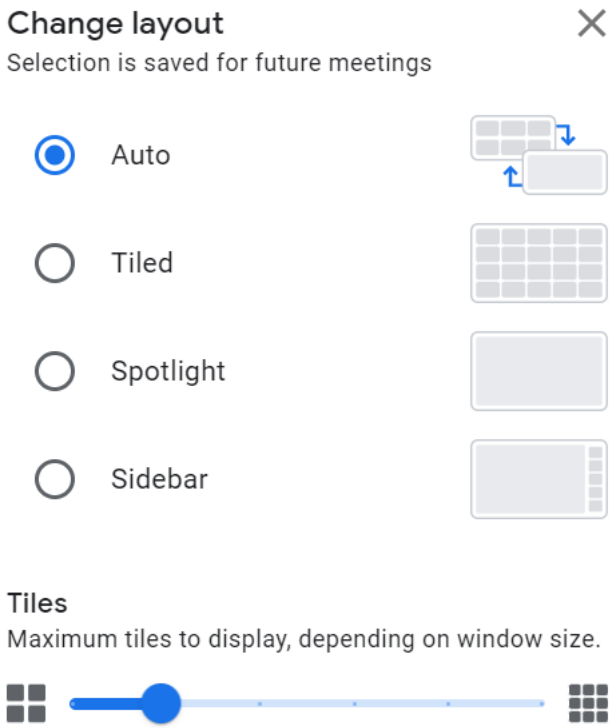
Report a problem
Report abuse
Troubleshooting & help
Settings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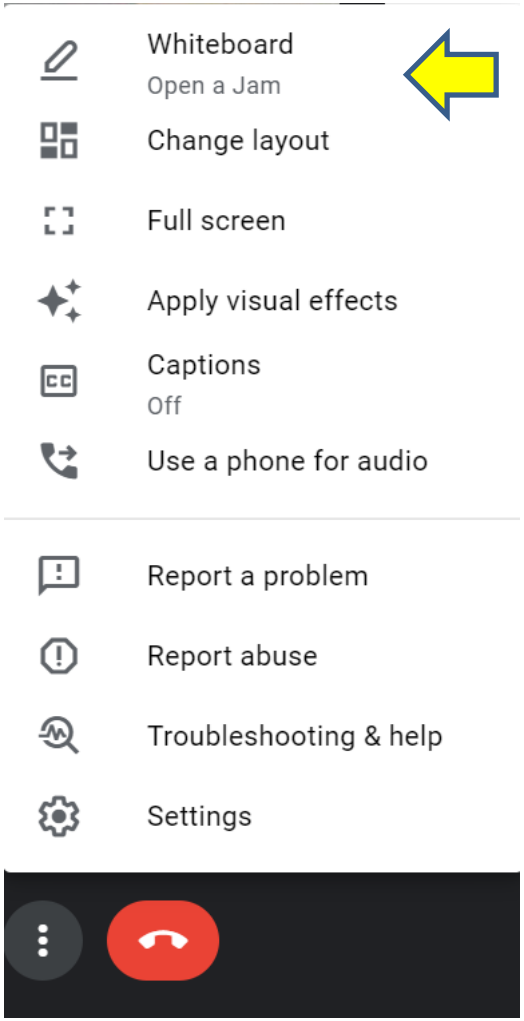
Google Meet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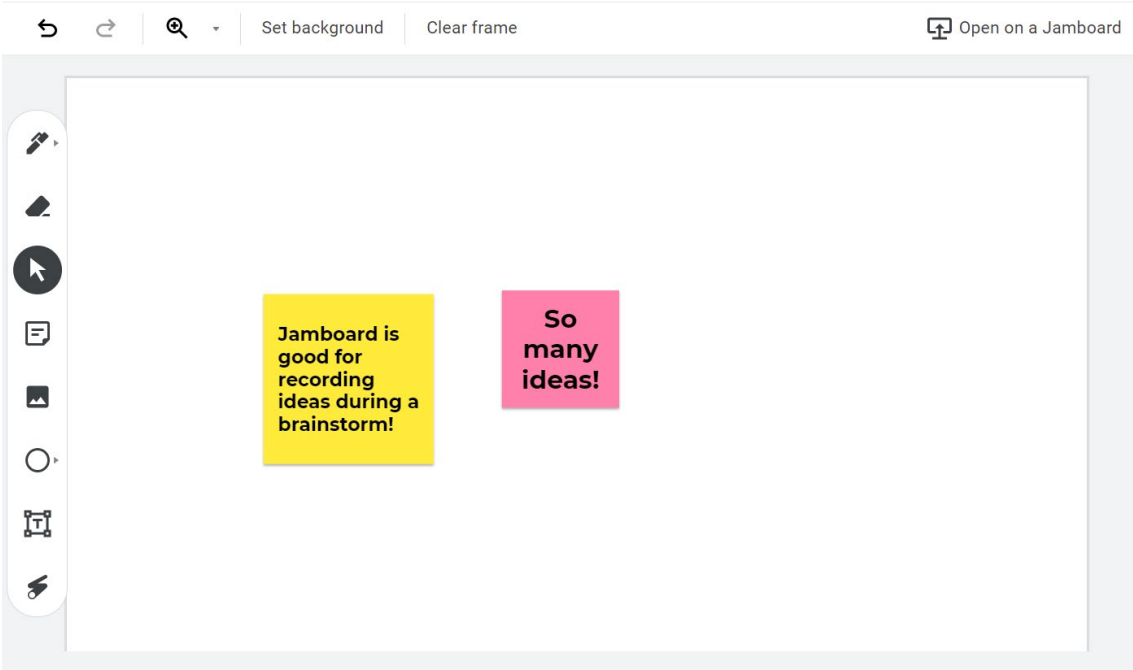

Set background
Clear frame
Open on a Jamboard
Jamboard is good for recording ideas during a brainstorm!
So many ideas!

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.

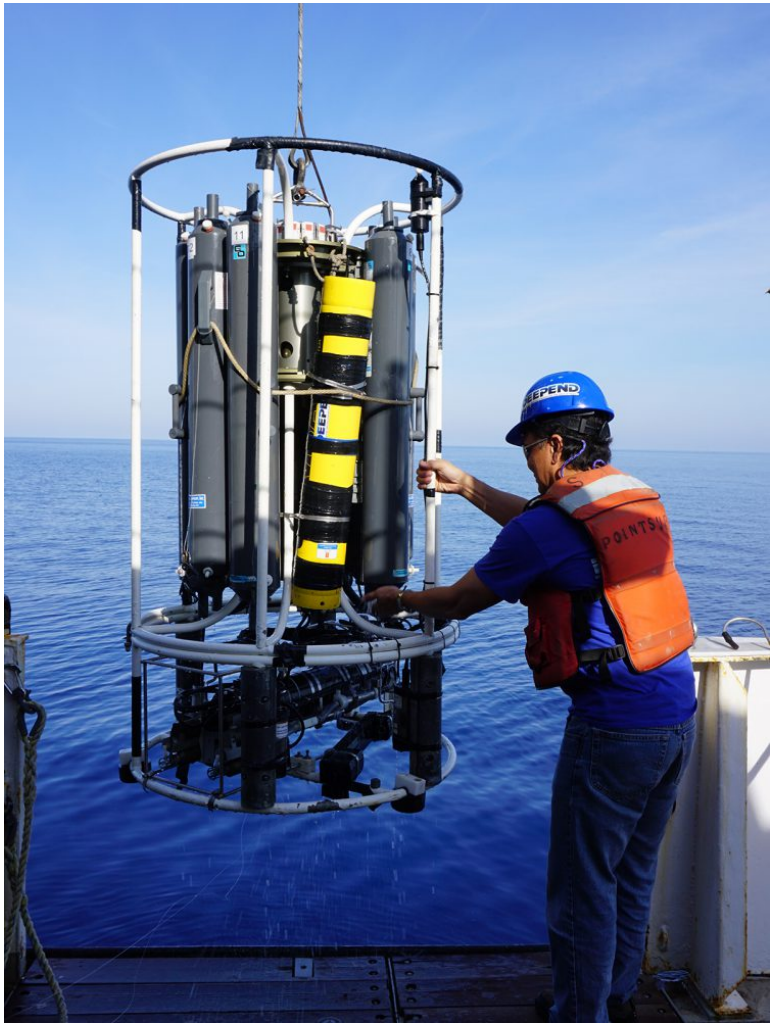
Agenda Overview

- **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.

RESTORE SCIENCE PROGRAM

Questions before we begin?

NOAA RESTORE Science Program Overview

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

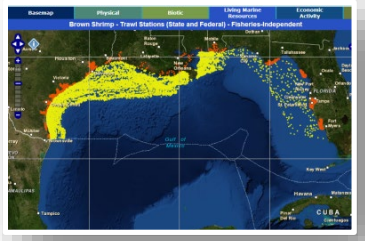
RESTORE SCIENCE PROGRAM

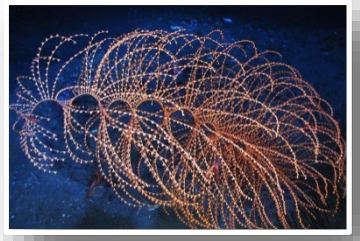
Outline

- Mission and outcomes
- Legislative mandate
- Deepwater Horizon funding landscape
- Program structure
- General approach
  - Funding competitions and projects
  - Project management
  - Additional activities

Mission

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.





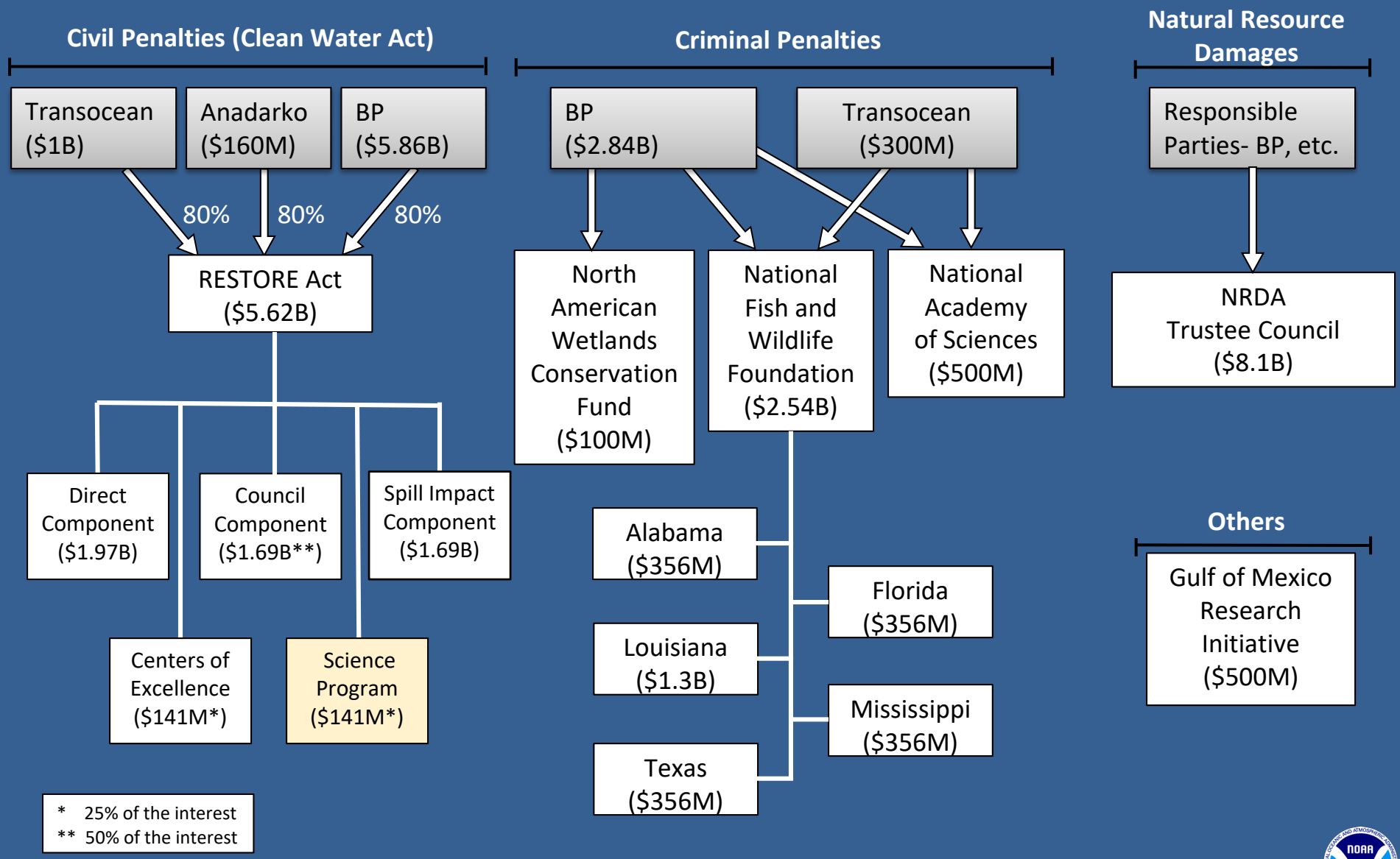
Outcomes

- 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.

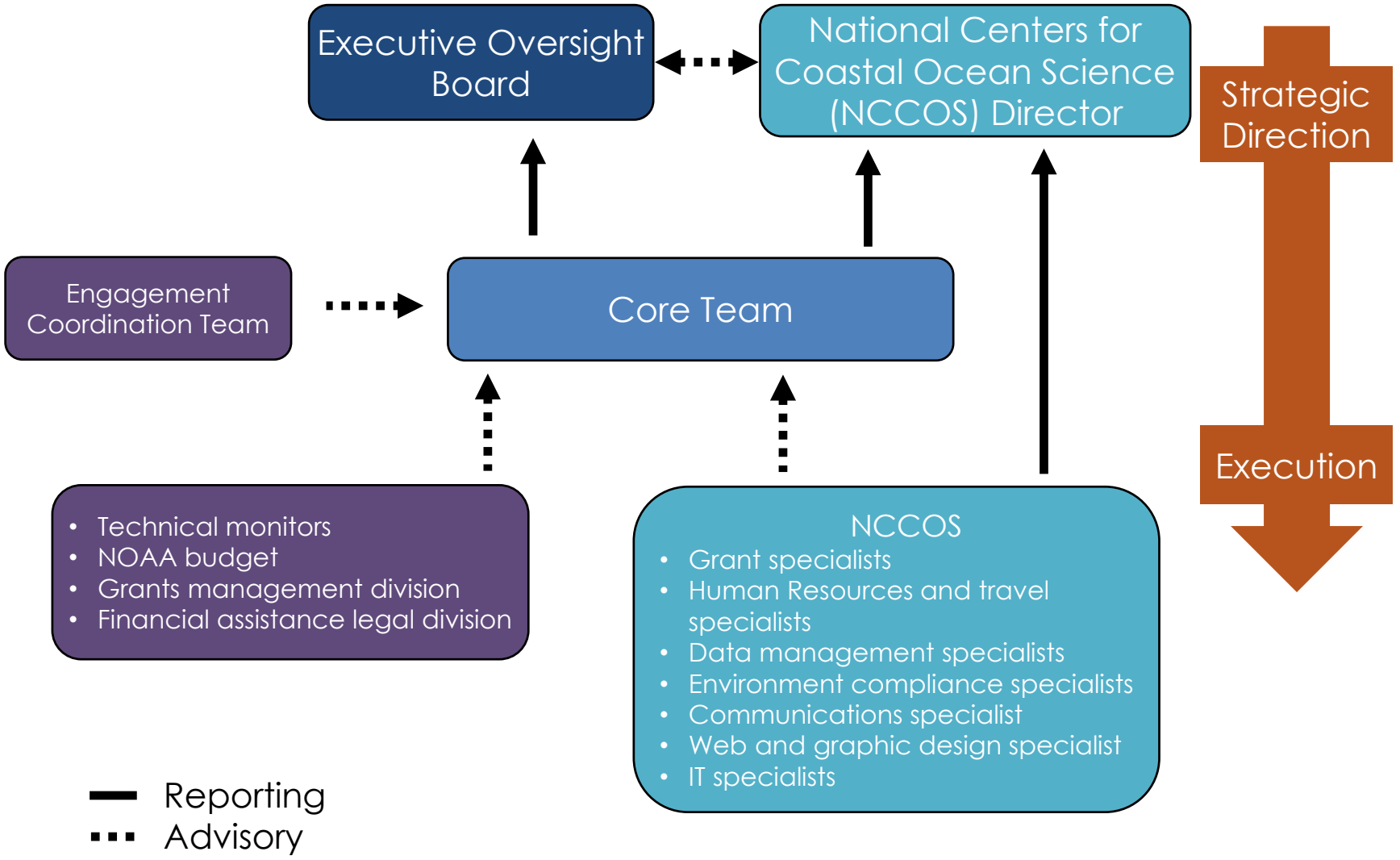
Legislative Mandate

- 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



Program Structure



Core Team

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

* 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

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

* 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

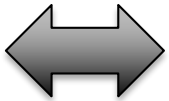
Application

Management-ready ecosystem models

Long-term trends on ecosystem status

Environmental and socioeconomic indicators

Decision-support tools



Monitoring

Integrating data and information

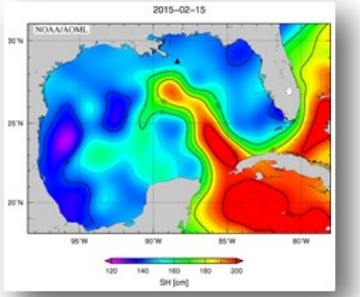
Advanced technologies

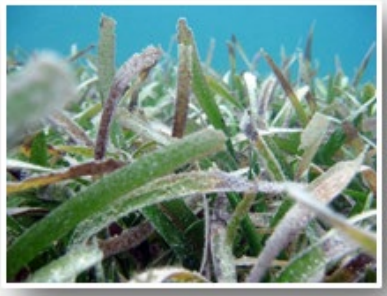
Managing Our Awards

- 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

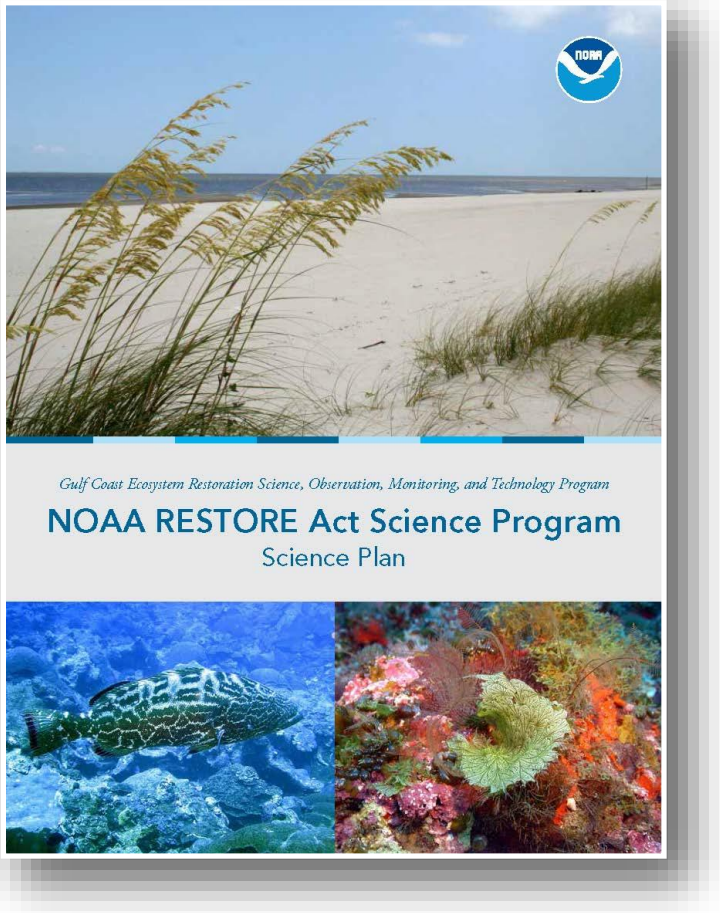
RESTORE SCIENCE PROGRAM

Questions and Answers

Backup

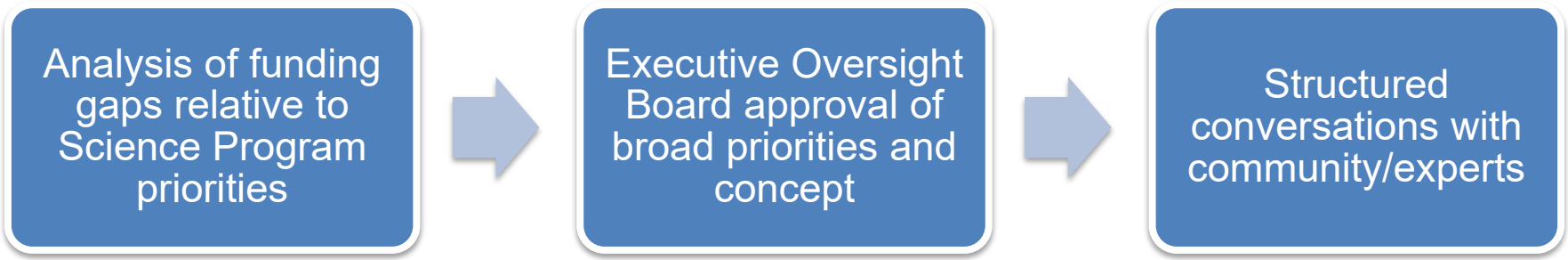
Science Plan

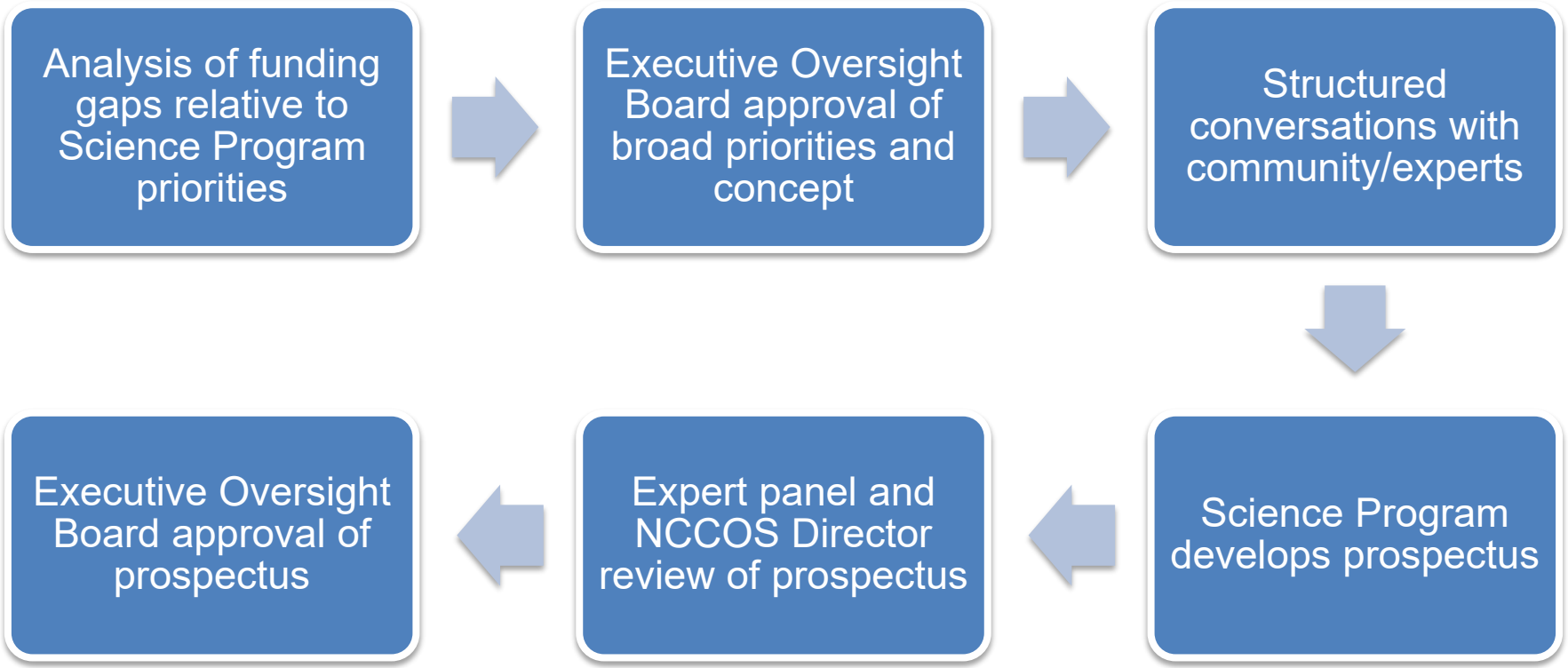
- Highlights the areas of investment for the Program
- Long-term priorities
- Describes competitive program approach
- Identifies partners with which the Science Program will leverage future opportunities



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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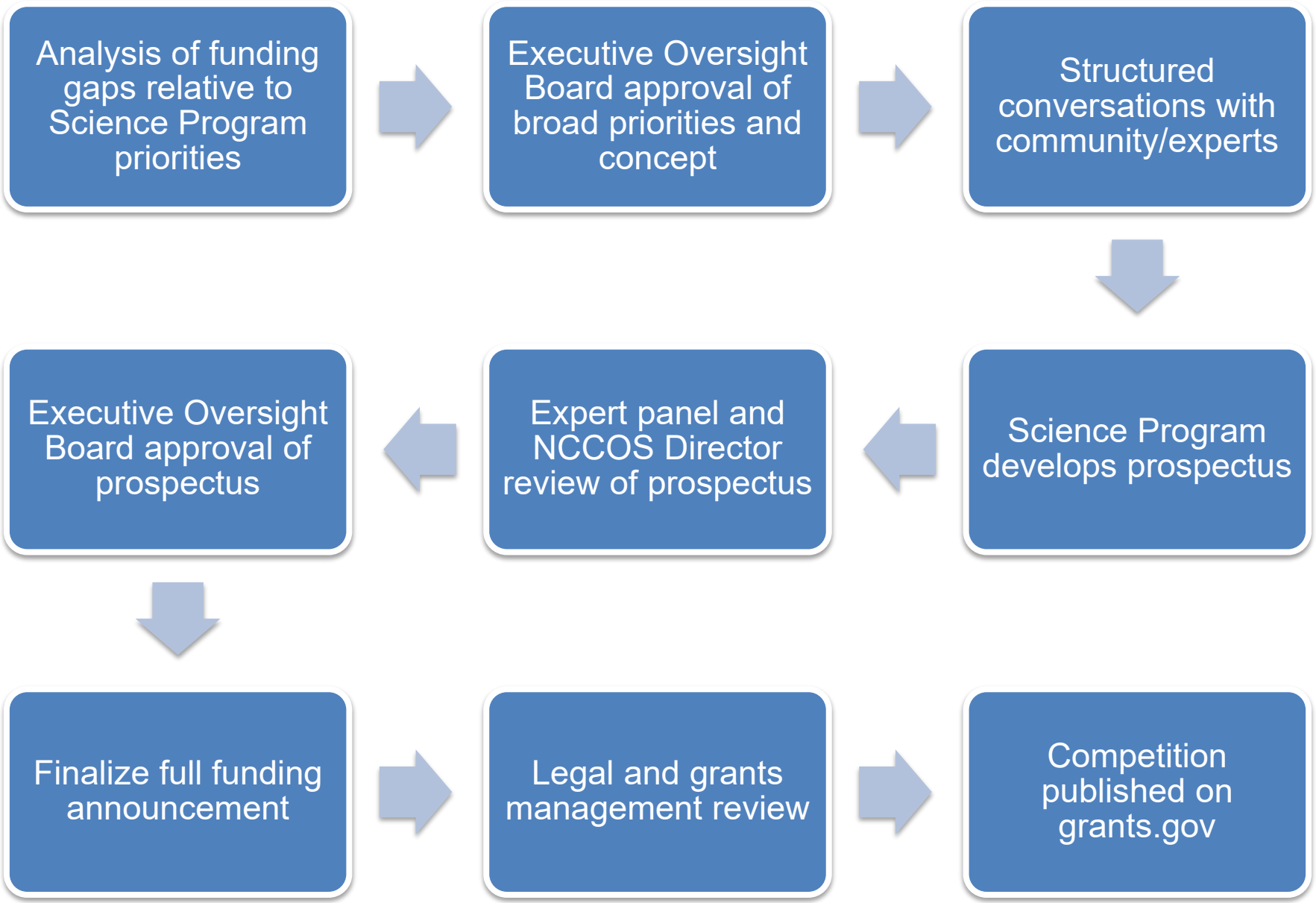
Science Program develops prospectus
Expert panel and NCCOS Director review of prospectus
Executive Oversight Board approval of prospectus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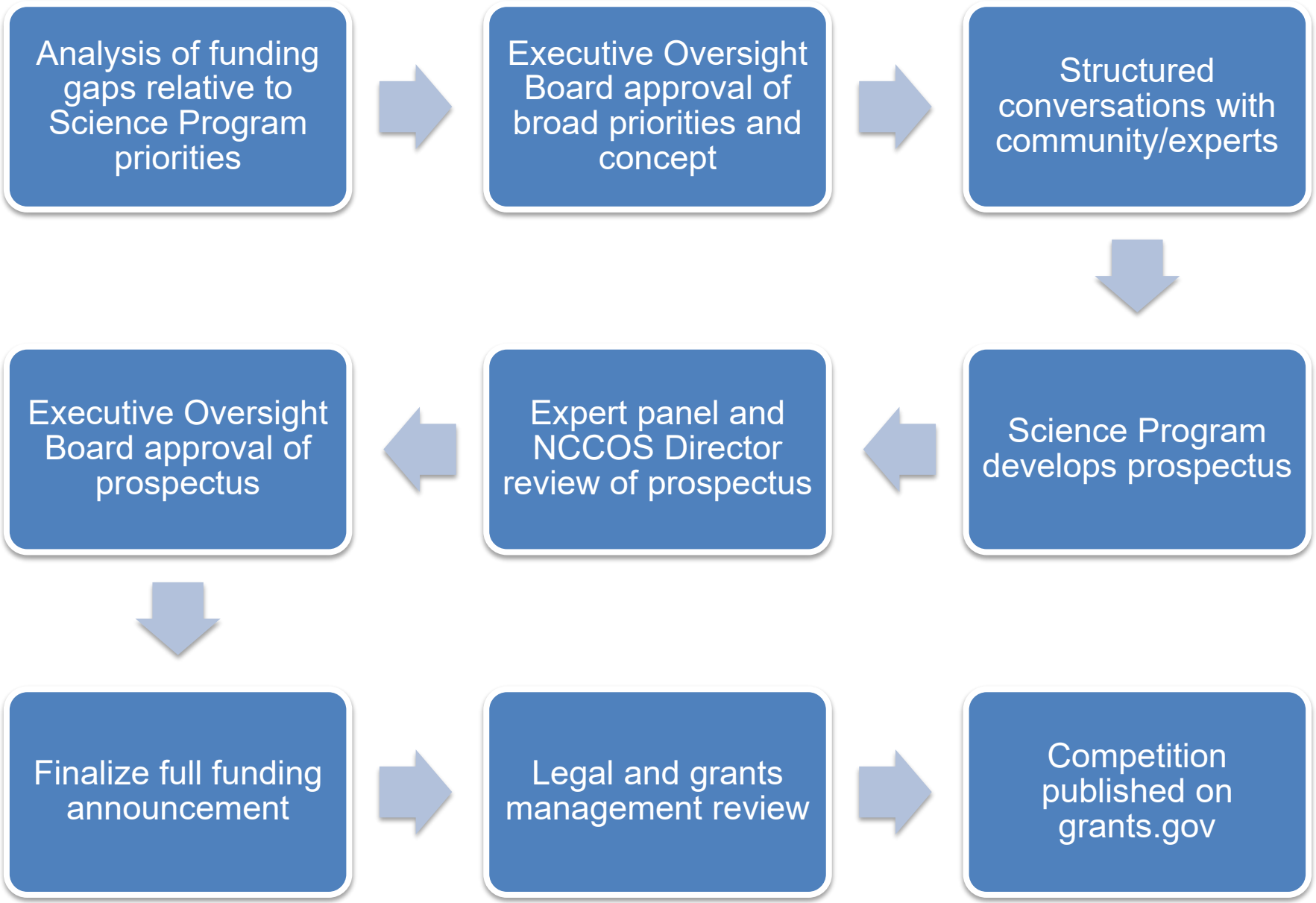
Structured conversations with community/experts
Science Program develops prospectus
Expert panel and NCCOS Director review of prospectus
Executive Oversight Board approval of prospectus
Finalize full funding announcement
Legal and grants management review
Competition published on grants.gov



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

Link to Management

- 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.

FFO	Link to management language from FFOs
2015	• "synthesize current scientific understanding and management needs"
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

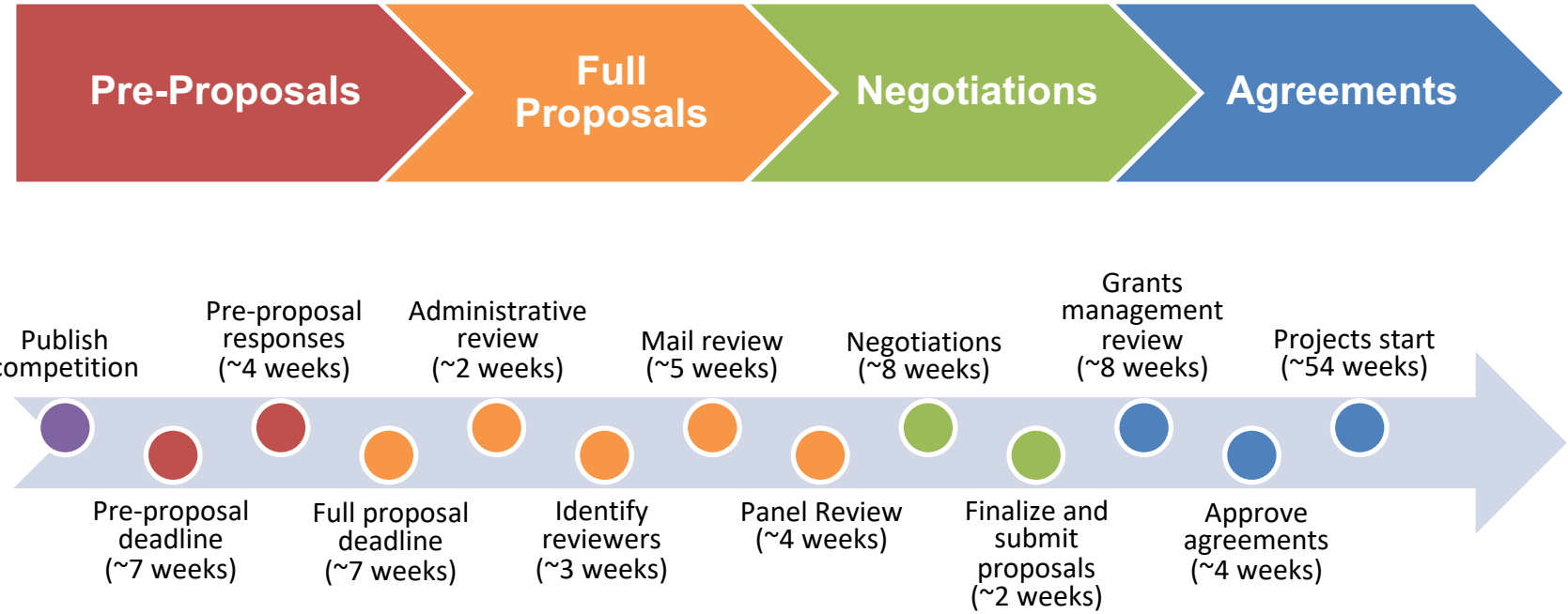
- Rollout of the competition
  - Grants.gov posting
  - Subscriber announcement
  - Website content
    - Overview of competition and Frequently Asked Questions
  - Webinars
  - Additional outreach
- Letter of intent/pre-proposal feedback webinars and one-on-one meetings with project teams

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

- 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

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- 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

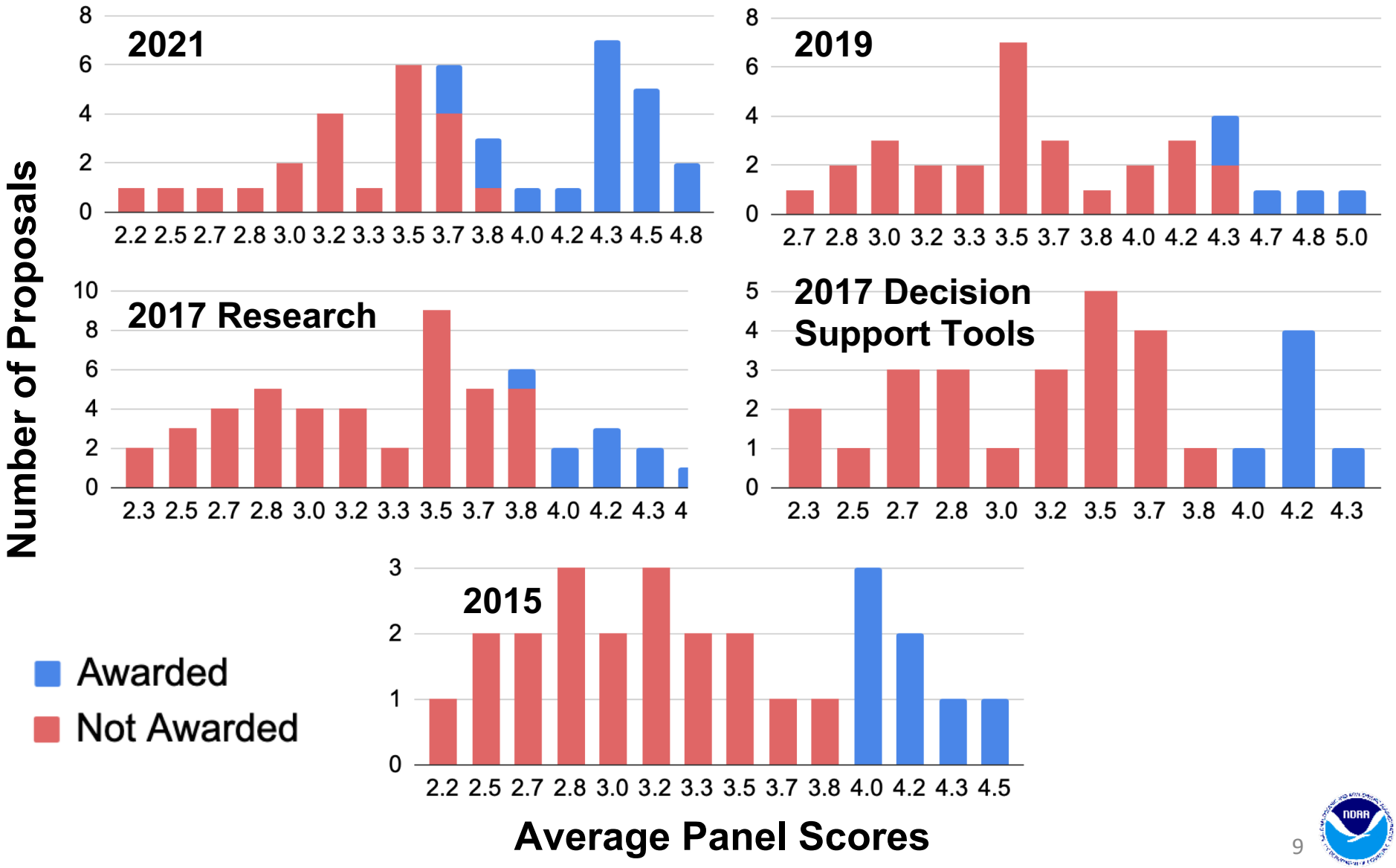
FFO-2019 Evaluation Criteria

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?

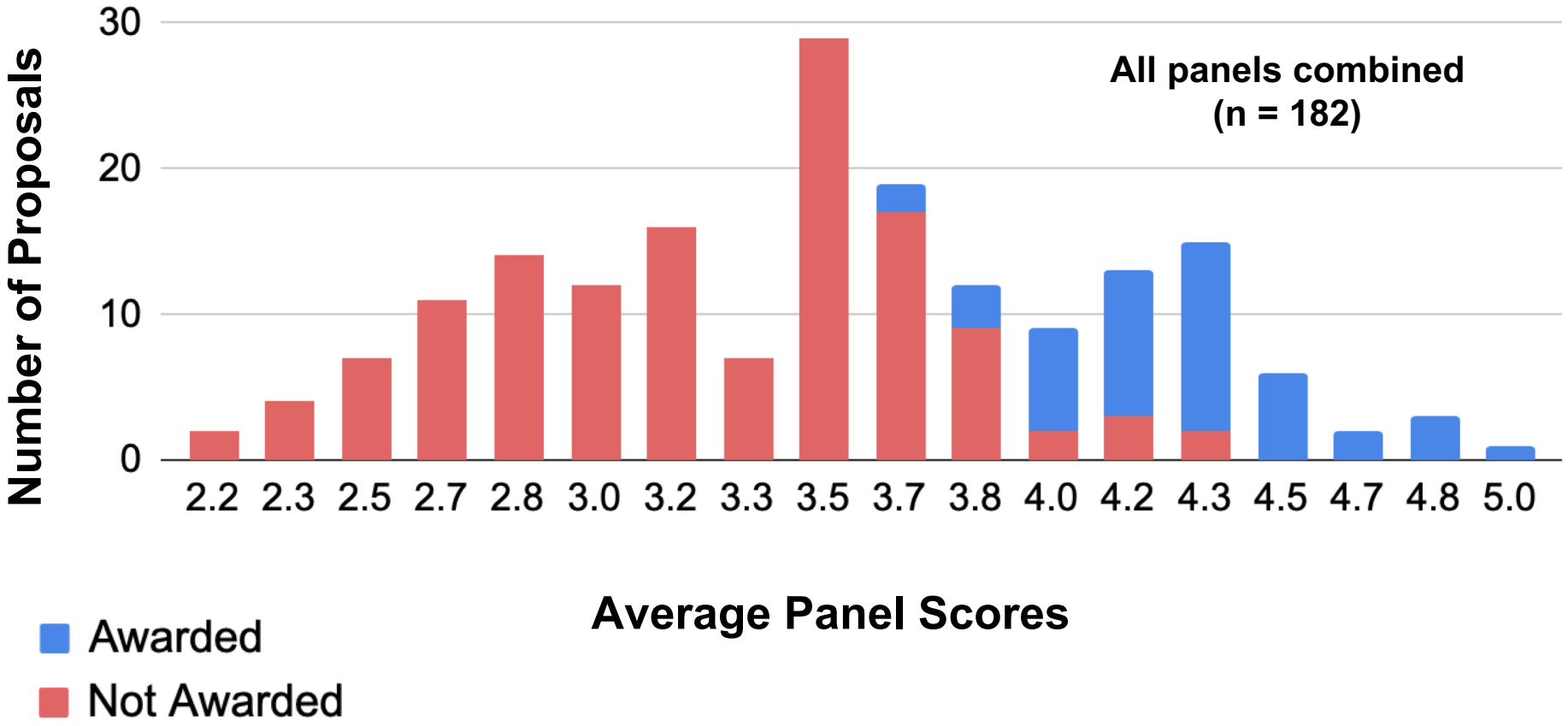
Panel Scoring Scale

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



Review Panel Scores



Post-Panel Next Steps

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

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- 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

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    - 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

RESTORE SCIENCE PROGRAM

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)
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- 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

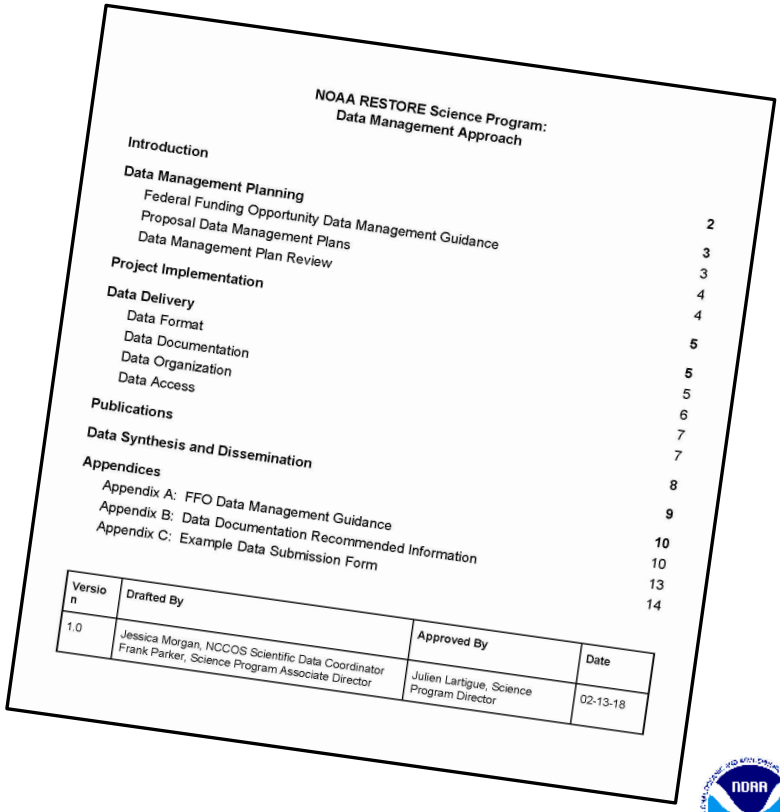
Tracking Progress

- 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*

Data Management 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



NOAA RESTORE Science Program:
Data Management Approach

Version	Drafted By	Approved By	Date
1.0	Jessica Morgan, NCCOS Scientific Data Coordinator Frank Parker, Science Program Associate Director	Julien Lartigue, Science Program Director	02-13-18

Roundtable Discussion

Technical Monitors:

- Becky Allee, NOAA
- Cheryl Morrison, USGS
- Jeff Gleason, USFWS
- Melissa Carle, NOAA

RESTORE SCIENCE PROGRAM

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

RESTORE SCIENCE PROGRAM

Funding

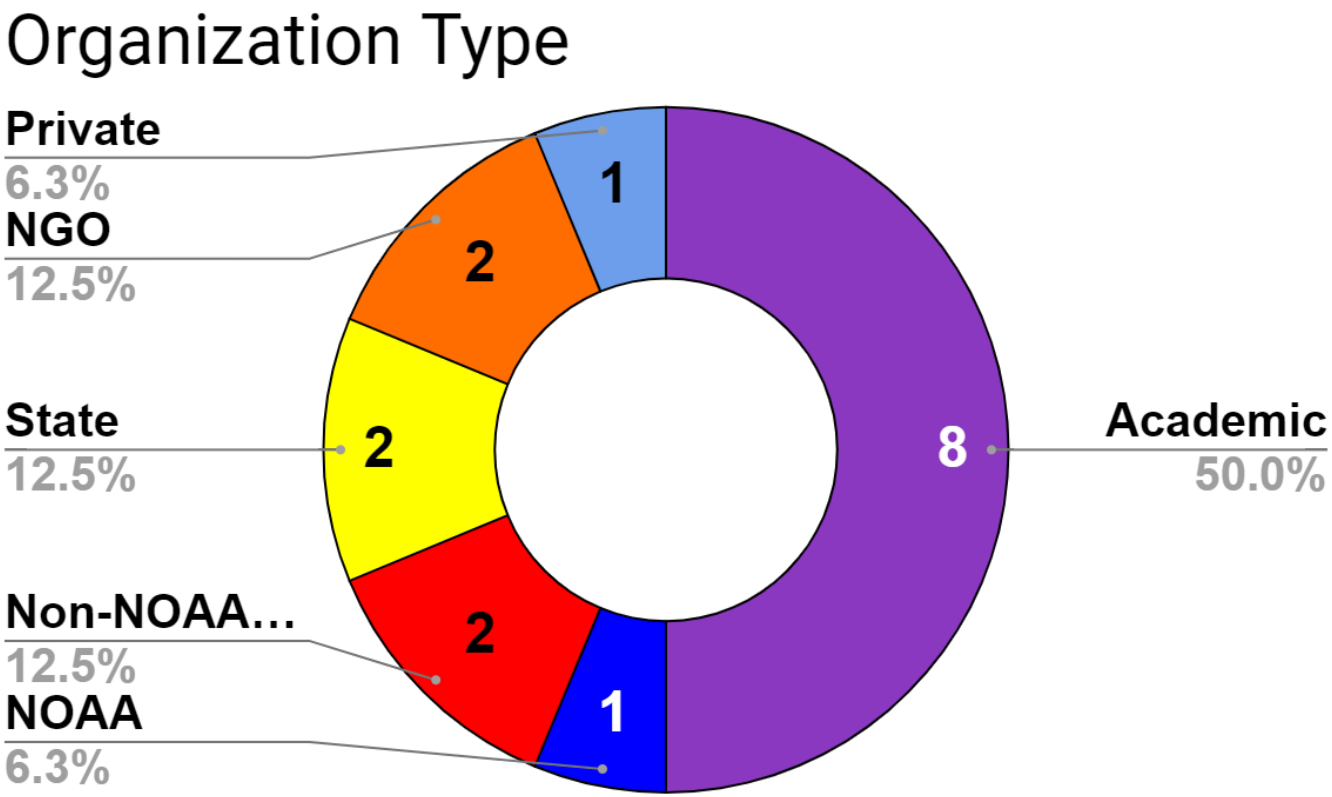
	Announced	Awarded
Number of awards	3-7	7
Amount available	~$2-2.5M	$2.7M
Minimum award	~$200K	$309K
Maximum award	~$400K	$400K
Length of awards	1-2 years	3-4 years (includes no cost extensions)
Start date	Sep 2015	Sep 2015

Review Process

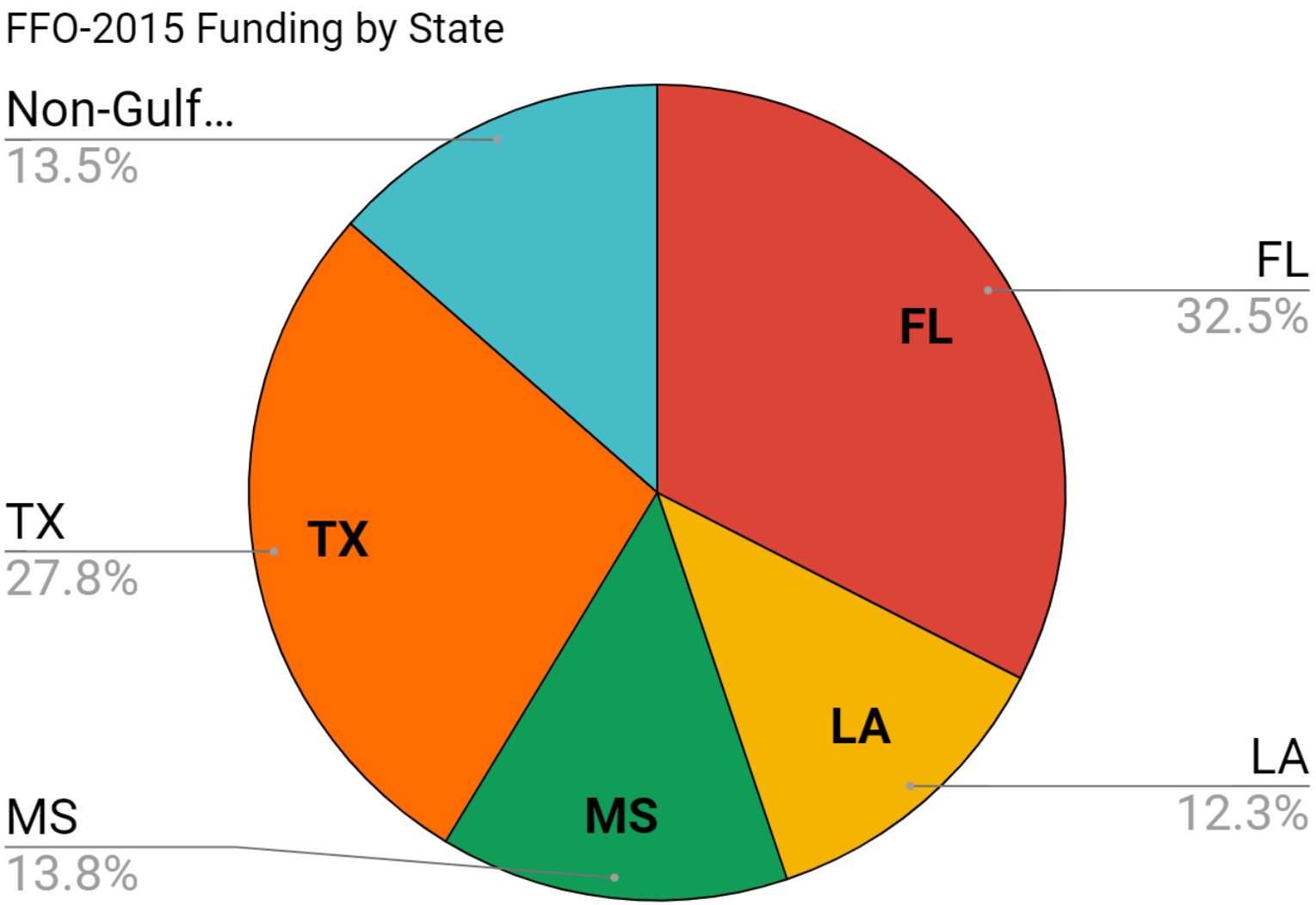
Stage	Letters of Intent (2 page limit)	Full applications	Awards
Total count	102	37	7
Encouraged	47	31 (77.5%)	6
Encouraged with modifications	20	3 (15.0%)	1
Discouraged	35	1 (2.8%)	0
No response	2	2 (100%)	0
Success rate (%)	---	---	18.9%

Awards by the Numbers

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



Awards by the Numbers



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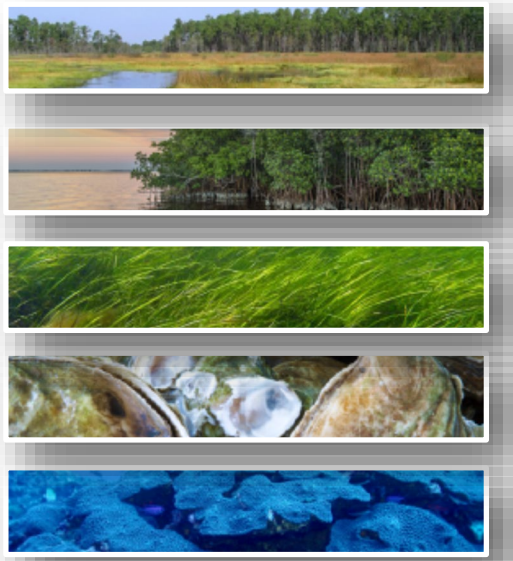
Projects

Short Title	Lead (Institution)	$K
Indicators for ecosystem health and services	Larry McKinney (Texas A&M University Corpus Christi)	$398
Ecosystem indicators inventory	Kathy Goodin (NatureServe)	$400
Assessing ecosystem modeling	Jim Simons (Texas A&M University Corpus Christi)	$395
Impact of Mississippi River	Alex Kolker (Louisiana Universities Marine Consortium)	$309
Identifying ecological hotspots	Bob Arnone (University of Southern Mississippi)	$367
Ocean observing systems and ecosystem management	Matthieu Le Henaff (University of Miami)	$399
Spawning aggregations	Brad Erisman (University of Texas at Austin)	$391

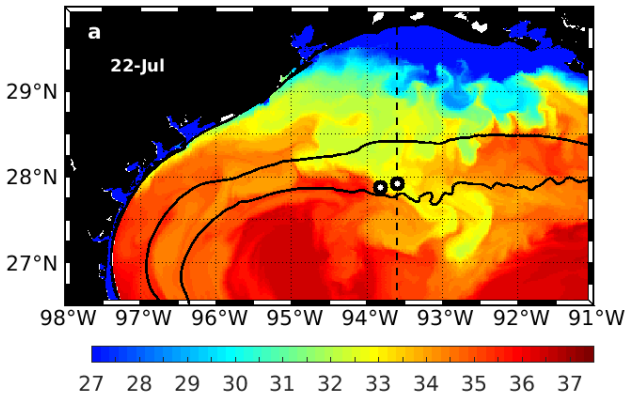
Accomplishments

- 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

Brad Erisman
(University of Texas at Austin)
Principal Investigator
Send Mail

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(University of Florida)
Collaborator

Jorge Brenner
(The Nature Conservancy)
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Chris Taylor (NOS/NCCOS/CCFHR)
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Shane Cantrell (CFA)
Caitlin Young (NOAA RESTORE)
Don DeMaria
Wayne Werner
Keith Guindon
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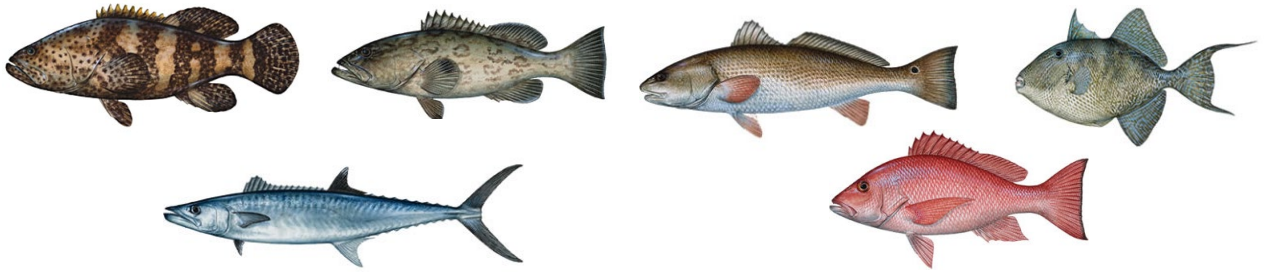
Fish Spawning Aggregations

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



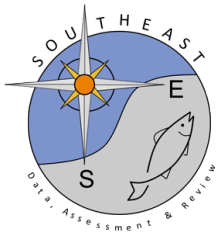
...built upon a wealth of scientific information and regional knowledge

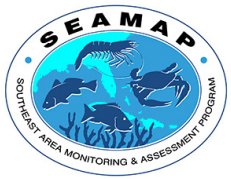

Reproductive styles of shallow-water groupers (Pisces: Serranidae) in the eastern Gulf of Mexico and the consequences of fishing spawning aggregations

Felicia C. Coleman[1], Christopher C. Koenig[1,2] & L. Alan Collins[2]

[1] FSU/NMFS Institute for Fishery Resource Ecology, Department of Biological Science, Florida State University, Tallahassee, FL 32306-2043, U.S.A.

[2] National Marine Fisheries Service, 3500 Delwood Beach Road, Panama City, FL 32408-7499, U.S.A.





...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.

RESTORE SCIENCE PROGRAM

http://geo.gcoos.org/restore

RESTORE 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

Online Database of 800 Records

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References

as of December 2017

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

Citation for Data set (Excel file)

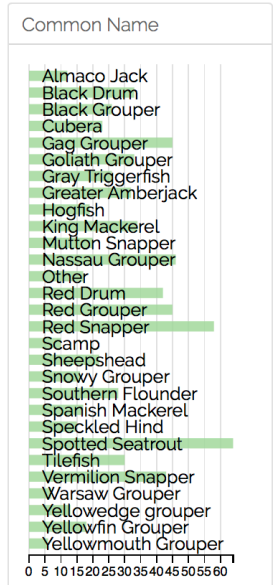
Biggs, C., B. Erisman, W. Heyman, S.Kobara, N. Farmer, S. Lowerre-Barbieri, M. Karnauskas, and J. Brenner. (2017). Cooperative monitoring program for spawning aggregations in the Gulf of Mexico: References. Version 2017.12. Available from GCOOS Web site: http://geo.gcoos.org/restore

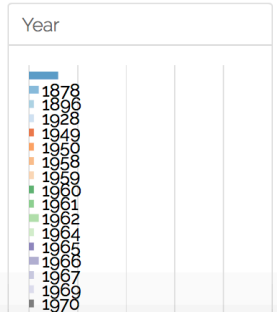
Data Table (It will show different entries based on filters. Click a bar chart to filter data)

Show 25 rows | Copy selected | Export as CSV | Save as XLSX | Export as PDF | Column visibility

Search:

Author	Year	Title	URL	Common Name	LH Index
Koenig C, Bueno L, Coleman F, Cusick J, Ellis R, Kingon K, Locascio J, Malinowski C, Murie D, Stallings C	2017	Diel, lunar, and seasonal spawning patterns of the Atlantic goliath grouper, Epinephelus itajara, off Florida, United States. Bull Mar Sci 93:391–406	Link	Goliath Grouper	
Devries, D. A., Gardner, C. L., Raley, P., & Overly, K.	2016	Almaco jackSeriola rivolianaFindings from the NMFS Panama City Laboratory Trap & Camera Fishery-Independent Survey 2004-2014. SEDAR 49-DW-15. SEDAR, North Charleston, SC.	Link	Almaco Jack	
Farmer, N. A., Malinowski, R. P., McGovern, M. F., & Rubec, P. J.	2016	Stock complexes for fisheries management in the Gulf of Mexico. Marine and Coastal Fisheries,8(1), 177–201.	Link	Almaco Jack	289
Sedar.	2016	Sedar 49 Gulf of Mexico Data-limited Species : red drum, lane snapper, wenchman, yellowmouth grouper, speckled hind, snowy grouper, almaco jack, lesser amberjack. North Charleston, SC.		Almaco Jack	356
Farmer, N. A., Malinowski, R. P., McGovern, M. F., & Rubec, P. J.	2016	Stock complexes for fisheries management in the Gulf of Mexico. Marine and Coastal Fisheries,8(1), 177–201.	Link	Black Grouper	289
Biggs, C., & Nemeth, R.	2016	Spatial and temporal movement patterns of two snapper species at a multi-species spawning aggregation. Marine Ecology Progress Series,558, 129–142.	Link	Cubera	47





Summary of Life History and Spawning Behavior Parameters

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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 (Excel file)
Biggs, C., B. Erisman, W. Heyman, S.Kobara, N. Farmer, S. Lowerre-Barbieri, M. Karnauskas, and J. Brenner. (2018). Cooperative monitoring program for spawning aggregations in the Gulf of Mexico: Life History and Spawning Behavior. Version 2018.07. Available from GCOOS Web site: http://geo.gcoos.org/restore

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Search:

Name	FMP Category	Aggregation Type	Spawning Season Duration (1-4)	Density Change (1-4)	Max Age (yr)	Max Weight (kg)	Max Length (cm)	K vB Growth Coeff.	Linf Asym. Length (cm)	Age at length 0 (yr)	Age at Maturity (months)	Length at Maturity (cm)
Almaco Jack	Reef Fish	Mixed	2	3	22	60	160	0.13	163	0.83	53	81
Black Drum	Not Federally Managed	Mixed	2	4	58	51	150	0.17	113.6	-0.129	60	65
Black Grouper	Reef Fish	Transient	3	4	33	163	150	0.14	133.4	-0.903	78	86
Cubera Snapper	Reef Fish	Transient	3	6	22	57	160	0.16	120	-0.3	24	62
Gag	Reef Fish	Transient	3	3	31	37	145	0.13	127.8	-0.067	42	54
Goliath Grouper	Reef Fish	Transient	3	3	37	363	250	0.09	222.1	-0.684	72	120
Gray Triggerfish	Reef Fish	Resident	3	4	15	6	30	0.14	58.97	-1.66	18	17
Greater Amberjack	Reef Fish	Mixed	3	3	15	81	190	0.14	143.6	-0.954	27	79
Hogfish	Reef Fish	Resident	2	2	23	10	91	0.11	84.89	-1.329	11	15
King Mackerel	Coastal Migratory Pelagics	Simple Migratory	3	2	24	42.3	184	0.19	115.41	-2.596	48	60
Mutton Snapper	Reef Fish	Transient	3	5	40	15.6	94	0.17	86.1	-1.32	48	50
Nassau Grouper	Reef Fish	Transient	4	6	29	27	100	0.13	76	-1.12	60	40

Species Profiles

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Sheepshead

Choose Species

Image credit: Robertson & Van Tassell - Contact

Archosargus probatocephalus

Link to »

Life History Parameters	Value
Maximum weight (kg)	9.6
Maximum age (year)	20
Age at length 0 (year)	-0.42
Age at Maturity (months)	24
Maximum Length (cm)	92
Length at Maturity (cm)	30
Linf. Asymptotic Length (cm)	46.3
K - von Bertalanffy growth coefficient	0.36
Natural Mortality	0.15

Spawning Season (Peak month in bold):

- Feb **Mar** **Apr** - - - - - - - -

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. Sheepshead 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, Sheepshead 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 montly commercial and recreational landings are greater duing spawning months than non-spawning months

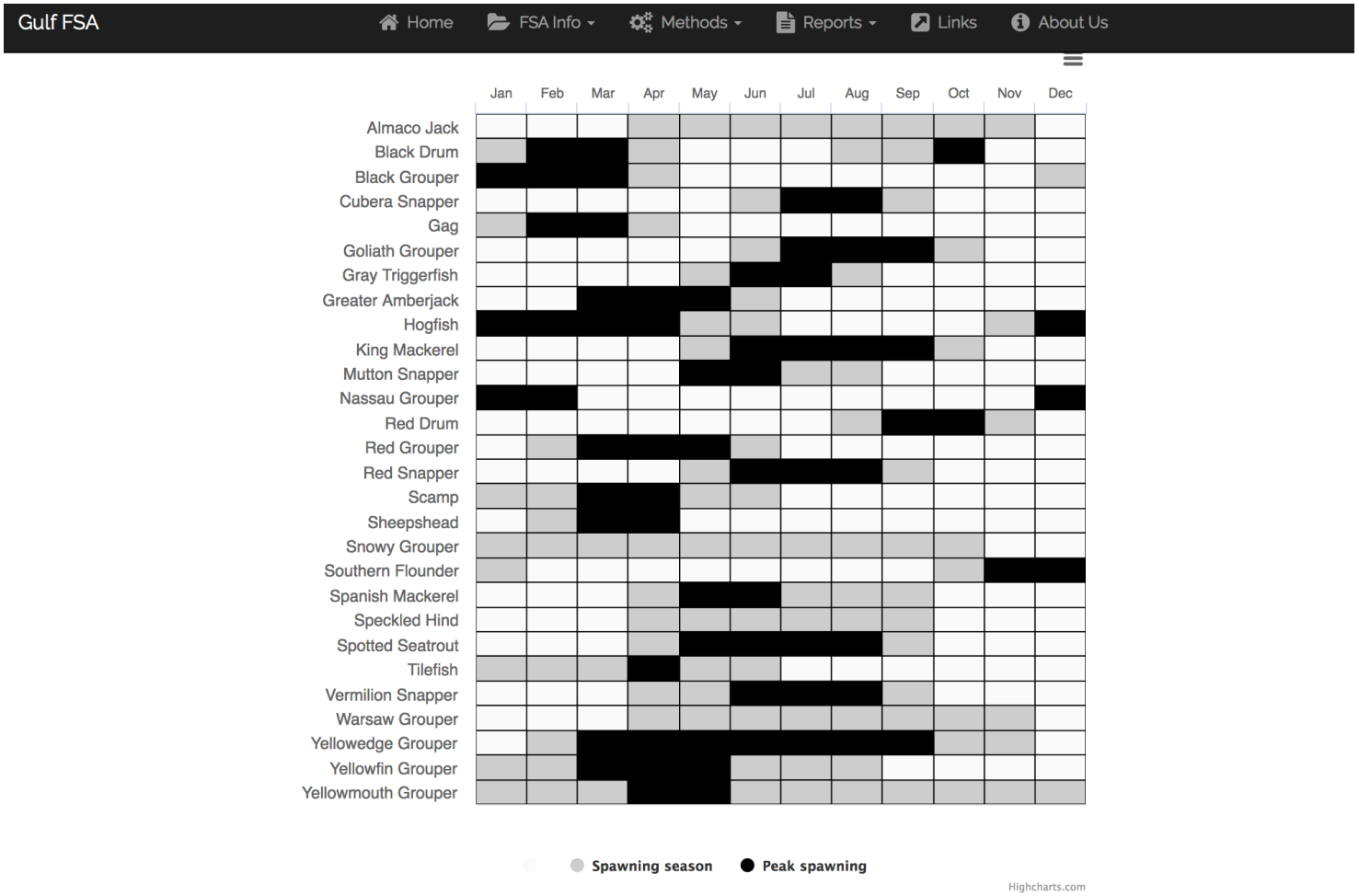
Management of Spawning Aggregations

Sheepshead 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 minimimum 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 Sheepshead.

Research and Management Priorities

While numerous studies have been conducted on the reproductive biology and life history of Sheepshead 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

Spawning Seasonality



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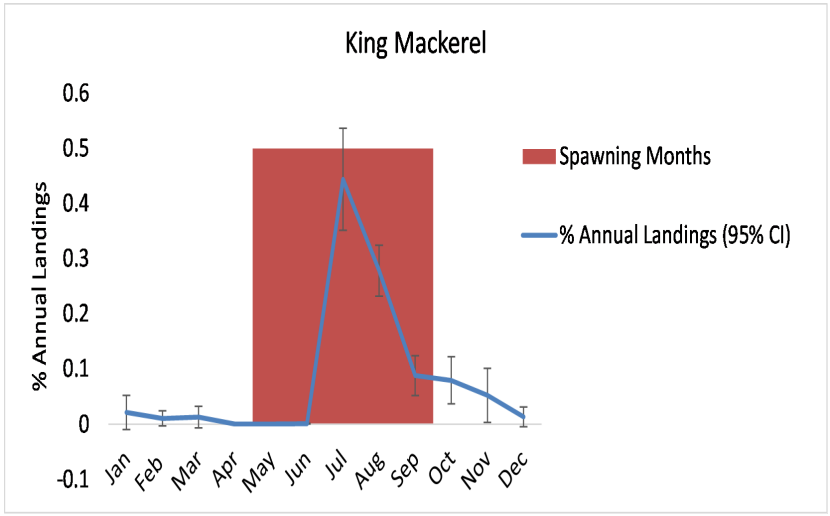
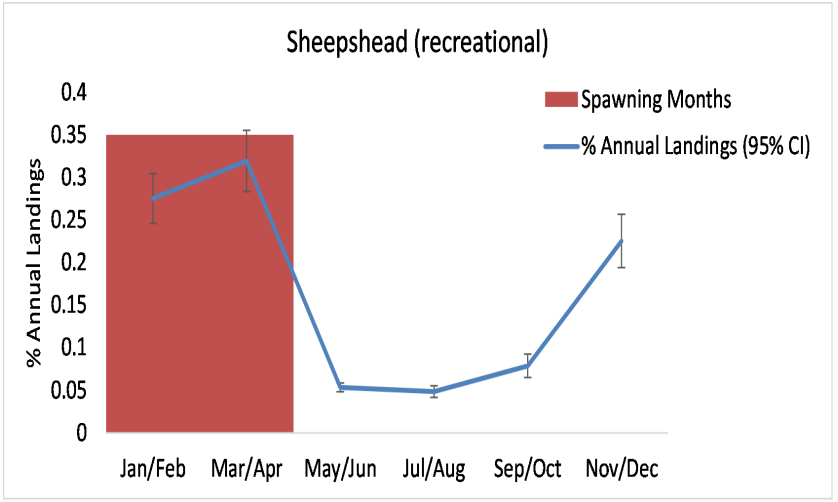
Spawning-Fishing Interactions





Existing Protections for Spawning Fish

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Citation for Data set (Excel file)
Biggs, C., B. Erisman, W. Heyman, S.Kobara, N. Farmer, S. Lowerre-Barbieri, M. Karnauskas, and J. Brenner. (2018). Cooperative monitoring program for spawning aggregations in the Gulf of Mexico: Management Parameters. Version 2018.03. Available from GCOOS Web site: http://geo.gcoos.org/restore

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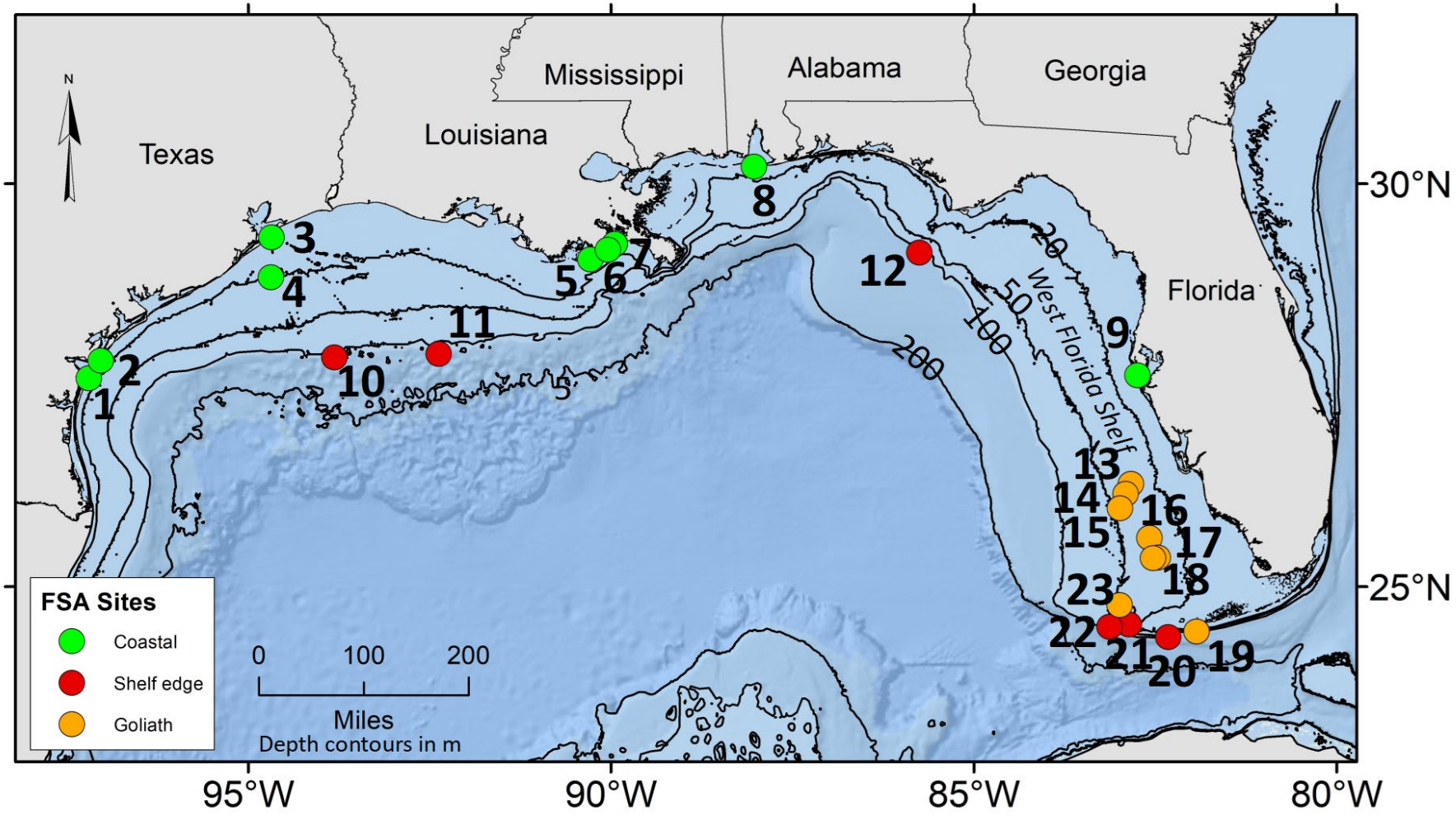
Search:

Common Name	FMP Category	Scientific Name	Federal Catch limits	Federal Gear measures	Federal Seasonal Restriction	Federal Site closures	State Catch limits	State Gear measures	State Seasonal Restriction	State Site closures
Almaco Jack	Reef Fish	Seriola rivoliana	4	4	4	2	4	3	4	4
Black Drum	Not Federally Managed	Pogonias cromis	4	4	4	2	3	3	4	4
Black Grouper	Reef Fish	Mycteroperca bonaci	2	3	4	2	3	3	2	4
Cubera Snapper	Reef Fish	Lutjanus cyanopterus	3	3	4	2	3	3	4	4
Gag Grouper	Reef Fish	Mycteroperca microlepis	-	3	4	2	2	3	2	4
Goliath Grouper	Reef Fish	Epinephelus itajara	1	1	1	1	1	1	1	4
Gray Triggerfish	Reef Fish	Balistes capriscus	1	4	2	2	2	3	2	4
Greater Amberjack	Reef Fish	Seriola dumerili	1	4	3	2	3	3	2	4
Hogfish	Reef Fish	Lachnolaimus maximus	3	4	4	2	3	3	4	4
King Mackerel	Coastal Migratory Pelagics	Scomberomorus cavalla	1	2	4	2	2	3	4	4
Mutton Snapper	Reef Fish	Lutjanus analis	3	3	4	2	3	3	4	4
Nassau Grouper	Reef Fish	Epinephelus striatus	1	1	1	1	1	1	1	4

Map of Validated Spawning Aggregation Sites in GOM



Spawning Aggregations and Marine Protected Areas

Marine Policy 109 (2019) 103689

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol

Cooperative monitoring, assessment, and management of fish spawning aggregations and associated fisheries in the U.S. Gulf of Mexico

William D. Heyman[a,*], Arnaud Grüss[b], Christopher R. Biggs[c], Shin'ichi Kobara[d], Nicholas A. Farmer[e], Mandy Karnauskas[f], Sue Lowerre-Barbieri[g], Brad Erisman[c]

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

Site Number (Fig. 1)	Site Name	Shelf position	Management status	Characterization status	Documented FSAs: Species at Sites: Goliath grouper (*Epinephelus itajara*)	Black grouper (*Mycteroperca bonaci*)	Gag (*Mycteroperca microlepis*)	Scamp (*Mycteroperca phenax*)	Mutton snapper (*Lutjanus analis*)	Cubera snapper (*Lutjanus cyanopterus*)	Greater amberjack (*Seriola dumerili*)	Spotted seatrout (*Cynoscion nebulosus*)	Black drum (*Pogonias cromis*)	Red drum (*Sciaenops ocellatus*)	Sheepshead (*Archosargus probatocephalus*)	References
1	Corpus Christi Pass, TX	C	3	3									■	■		1
2	Port Aransas	C	3	2								■	■	■	■	2
3	Galveston Channel, TX	C	3	2								■	■	■	■	3
4	Bucaneer Rig, TX	MS	3	2											■	4
5	Barataria Pass, LA	C	3	3								■	■			5
6	East Timbalier Pass, LA	C	3	3								■	■			5
7	Caminada Pass, LA	C	3	3								■	■			5
8	Mobile Point, AL	C	3	3									■	■		6
9	Tampa Bay, FL	C	3	1								■		■		7, 8
10	Wayne's Lump	SE	3	2						■						3
11	Madison Swanson	SE	1	1			■	■								9, 10, 11
12	Fantastico wreck	MS	3	3	■											12, 13, 14
13	Stoney ferry boat wreck	MS	3	3	■											13, 14
14	Patrol boat wreck	MS	3	3	■											13
15	Shrimp boat wreck	MS	3	3	■											13
16	Tower	MS	3	3	■											13
17	Californian wreck	MS	3	3	■											13
18	Western Dry Rocks, FL	SE	3	3	■				■							13,15
19	Warsaw Hole	SE	1	3							■					16, 17
20	Tortugas Banks	SE	3	3		■										13, 18
21	Riley's Hump	SE	1	1		■			■	■						18, 19, 20
22	Shrimp boat wreck	MS	3	3	■											12, 13

Legend

Shelf position	Management Status (1-3)	Characterization status (1-3)
C = Coastal	1 Site closed all year	1 Site well mapped and characterized
MS = Mid Shelf	2 Site closed part of the year	2 Some recent mapping or characterization
SE = Shelf Edge	3 No spatial closure	3 Poor or outdated map or characterization
	■ Documented FSA	

Identified Priority Areas for Surveys, Monitoring, and Management

SCIENTIFIC REPORTS

OPEN

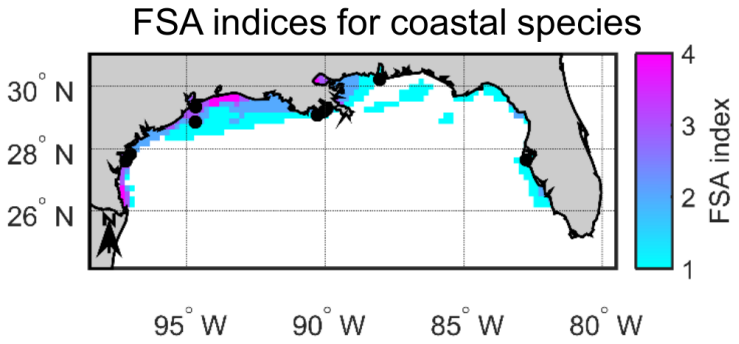
Prioritizing monitoring and conservation efforts for fish spawning aggregations in the U.S. Gulf of Mexico

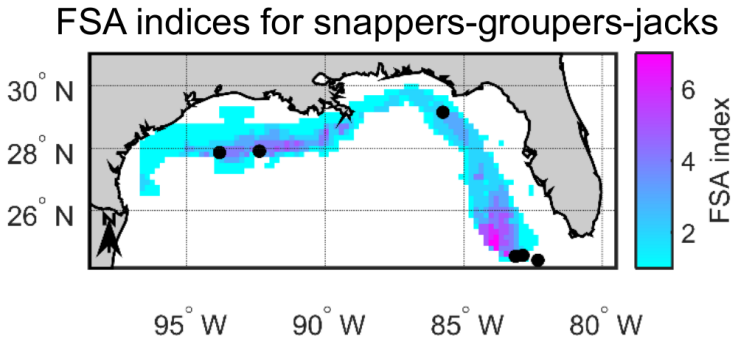
Received: 18 December 2017
Accepted: 21 May 2018
Published online: 31 May 2018

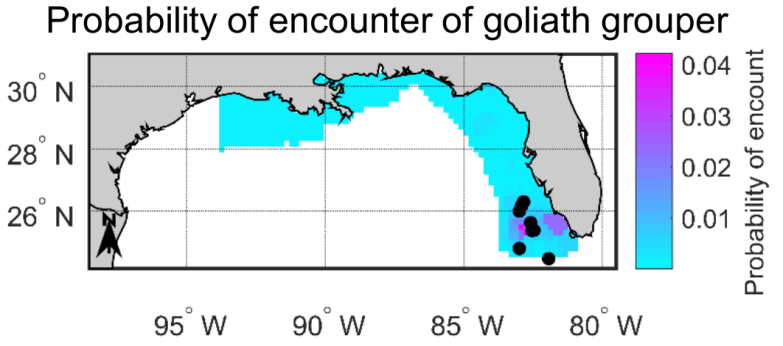
Arnaud Grüss[1], Christopher Biggs[2], William D. Heyman[3] & Brad Erisman[2]

HOTSPOTS!

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







Monitoring Protocol

Gulf FSA | Home | FSA Info | Methods | Reports | Links | About Us

Page: 1 of 36 | Automatic Zoom

UF IFAS UNIVERSITY of FLORIDA | The Nature Conservancy | NOAA | COBI

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

LGL Ecological Research Associates, Inc. | GCOOS GULF OF MEXICO COASTAL OCEAN OBSERVING SYSTEM

 Department of Oceanography 3146 TAMU, College Station, TX 77843-3146

RESTORE SCIENCE PROGRAM

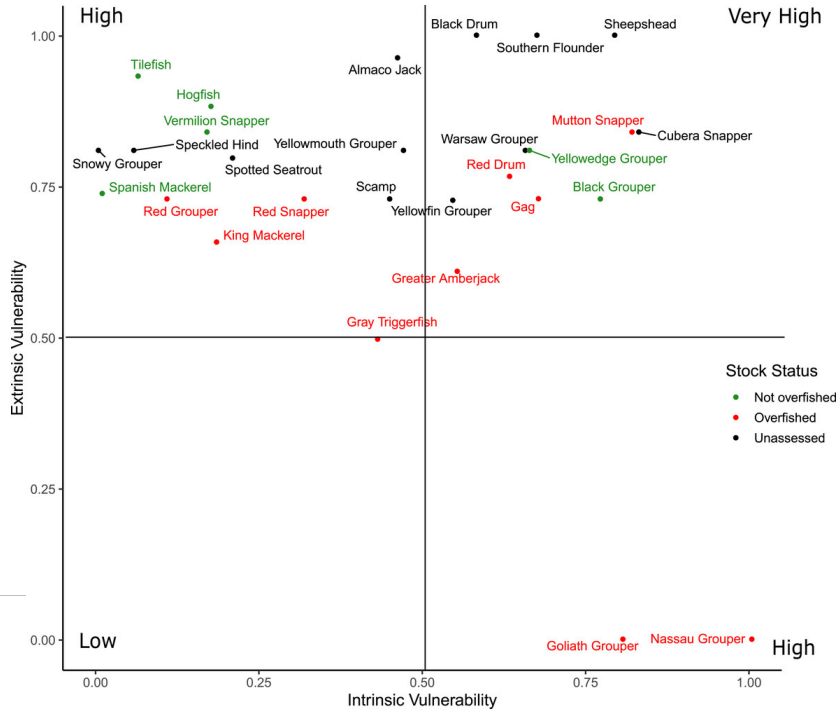
Spawning Aggregations Workshop

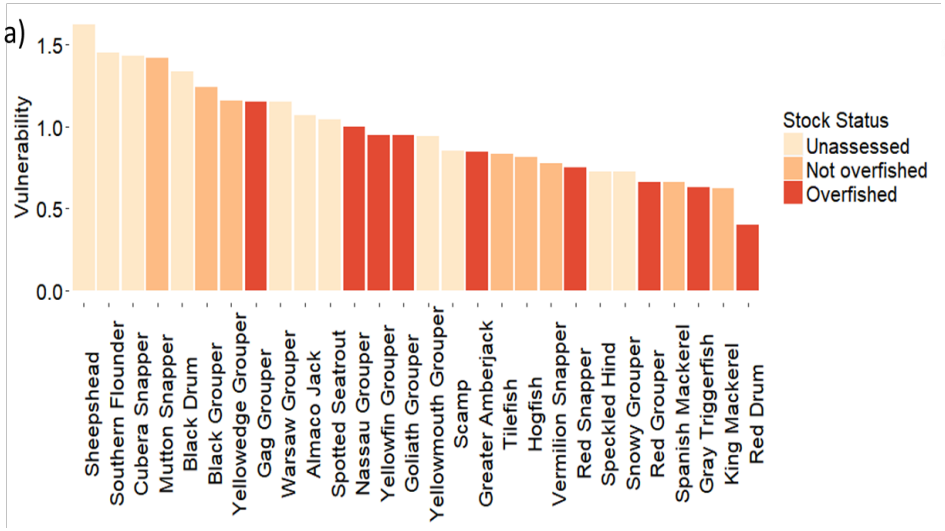
Vulnerability Assessment

PeerJ

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

Christopher R. Biggs[1], William D. Heyman[2], Nicholas A. Farmer[3], Shin'ichi Kobara[4], Derek G. Bolser[1,8], Jan Robinson[5], Susan K. Lowerre-Barbieri[6] and Brad E. Erisman[1,7]





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.

RESTORE SCIENCE PROGRAM

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

Link to Management

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

Research	Letters of intent	Full applications	Awards
Total count	186	93	9
Encouraged	37	33 (89%)	3
Encouraged with modifications	93	59 (63%)	6
Discouraged	56	1 (2%)	0
Success rate (%)	---	---	9.7%

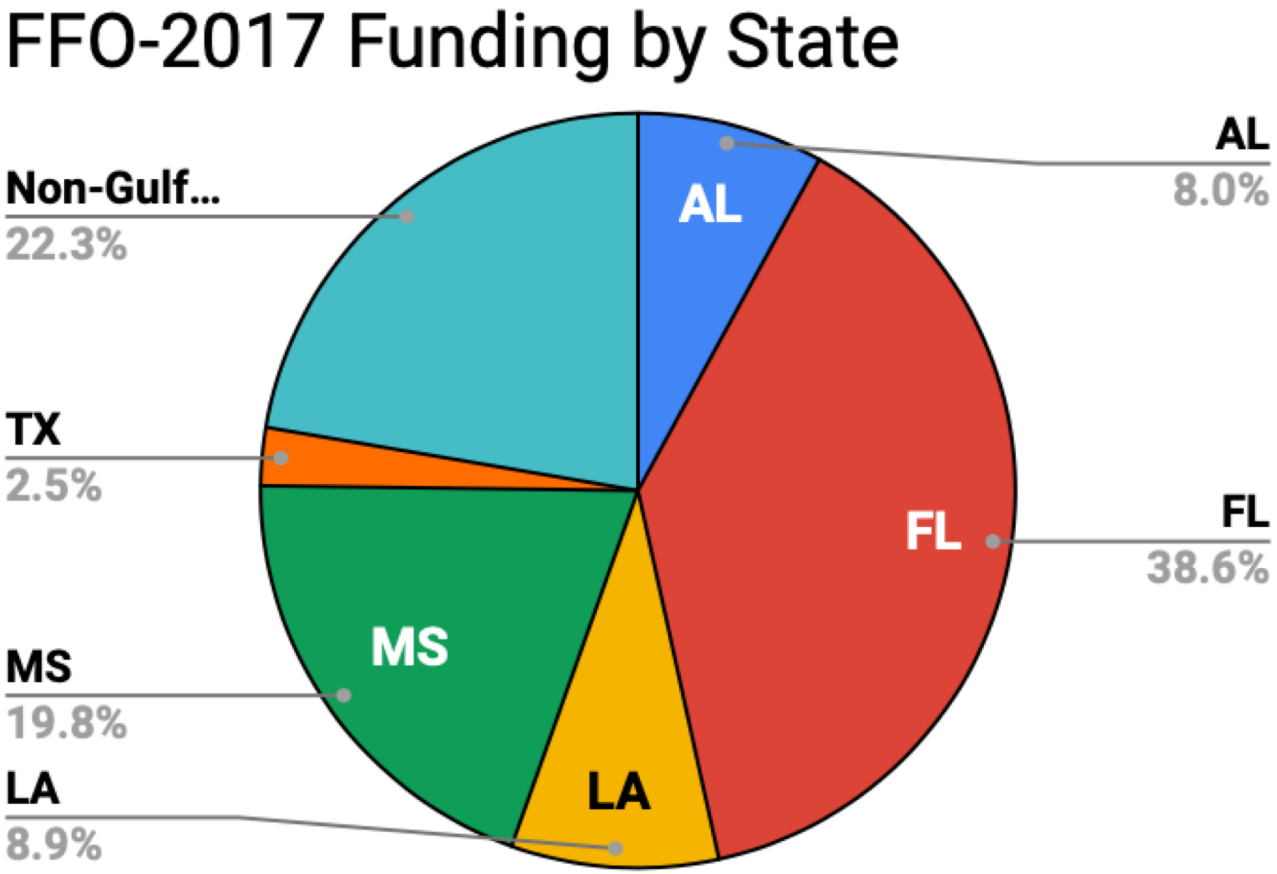
Decision-Support Tools	Letters of intent	Full applications	Awards
Total count	82	40	6
Encouraged	19	18 (95%)	3
Encouraged with modifications	40	22 (55%)	3
Discouraged	23	0 (0%)	0
Success rate (%)	---	---	15%

Funding

	Research	Decision-Support Tools
Number of awards	9	6
Amount provided	$12.4M	$4.5M
Award range	$0.23 - $2.31M	$0.52 – $1.17M
Average award	$1.37M	$0.75M
Length of awards*	4 to ≥5 years	3 to 5 years

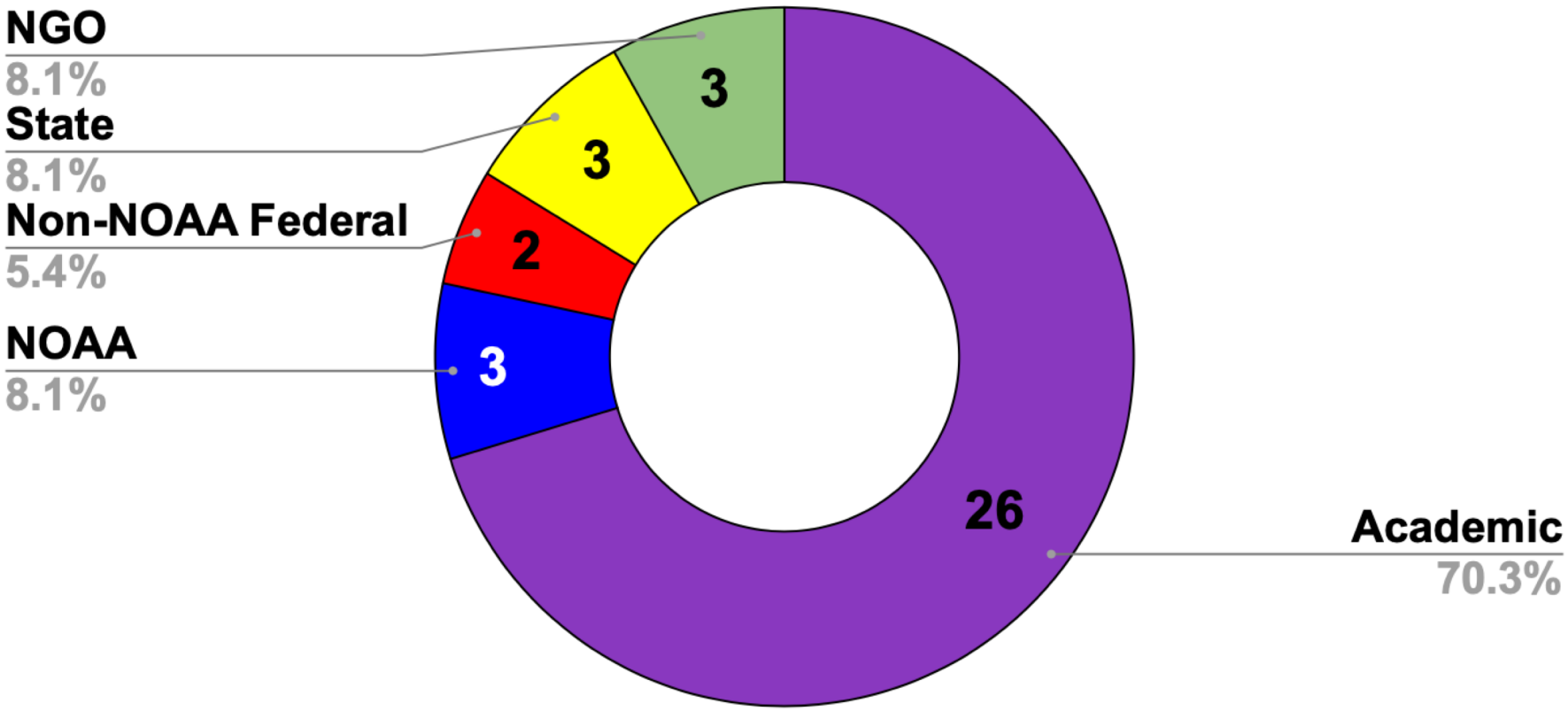
*Includes no-cost extensions

Funding


FFO-2017 Funding by State
Non-Gulf…
22.3%
TX
2.5%
MS
19.8%
LA
8.9%
AL
8.0%
FL
38.6%
AL
FL
MS
LA

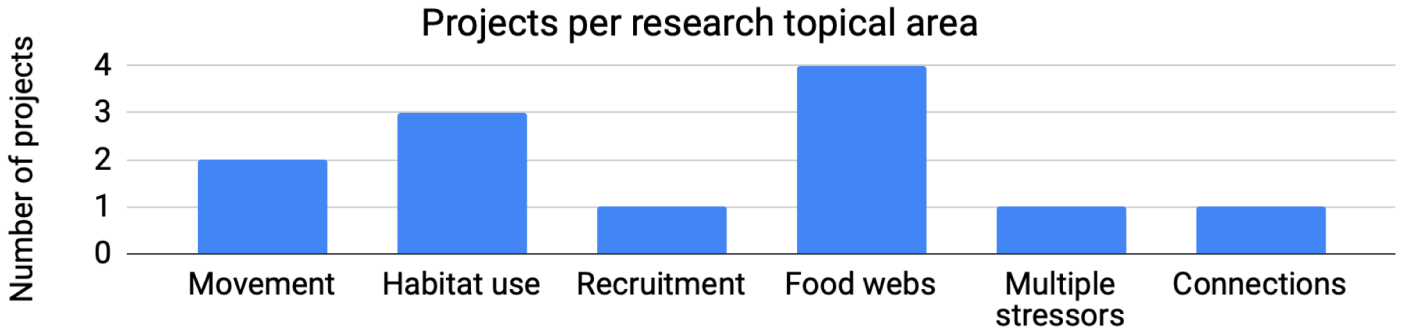
Funding

Organization Type



Research Projects

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



Decision-Support Tool Projects

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

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

Fig 2 - Schematic view of flow in the GoM including the Loop Current (orange), warm-core (anti-cyclonic) eddies (red), and cold-core (cyclonic) eddies (blue). These features are

BUSINESS INSIDER

Bluefin Tuna Sells For Record-Breaking $1.8 Million

THE TELEGRAPH

A bluefin tuna has sold for a record 155.4 million yen (£1.09 million) at a Tokyo auction – nearly three times the previous high set last year.

The record sale comes as environmentalists warn that stocks of the majestic, speedy fish are being depleted worldwide amid strong demand for sushi.

In the year's first auction at Tokyo's sprawling Tsukiji fish market, the 489-pound tuna caught off northeastern Japan sold for the record price, said Ryoji Yagi, a market official.

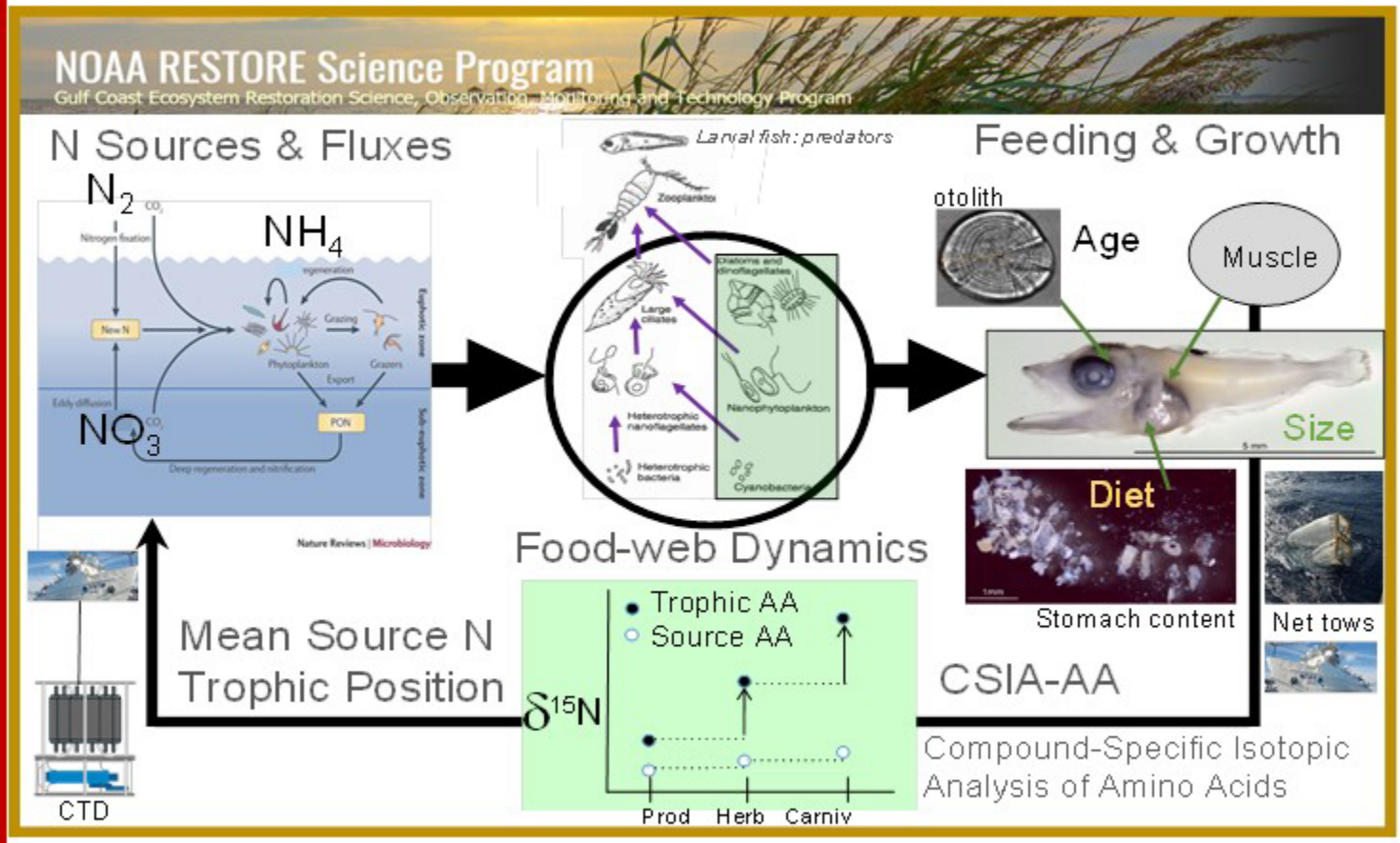
Objective:

- 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



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

Finding 1: Source of Nitrogen

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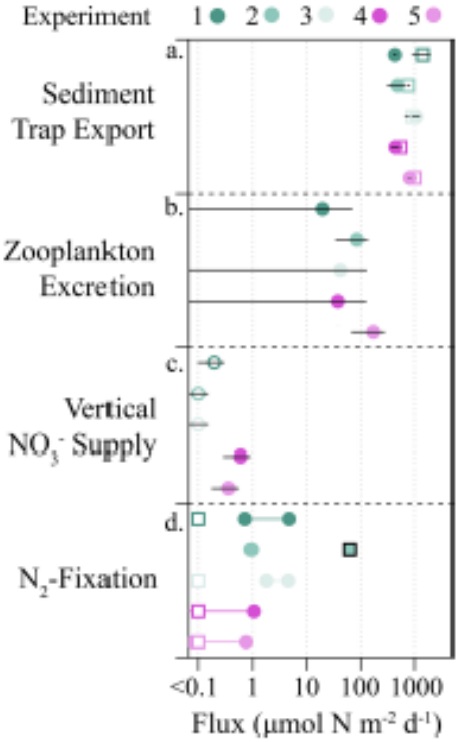
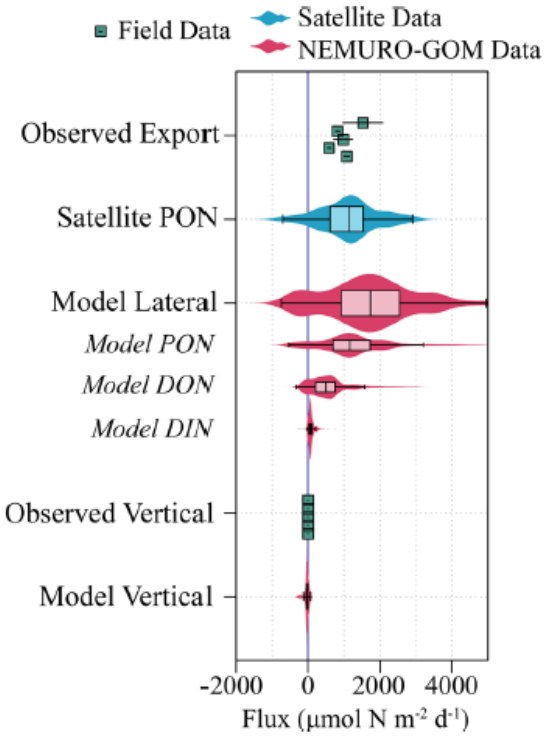
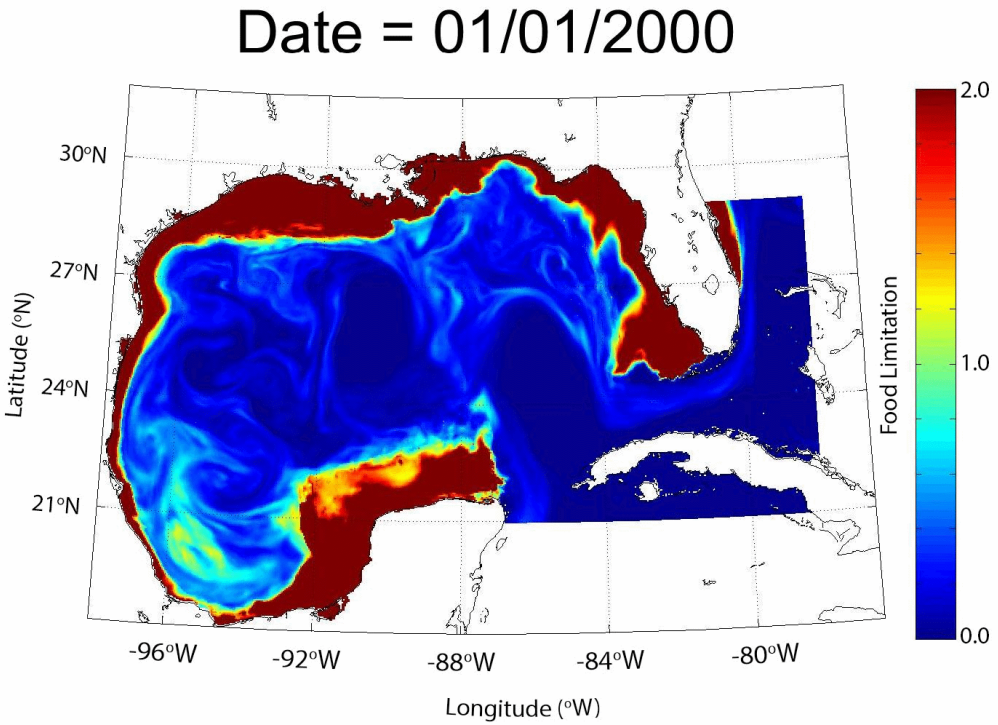




Kelly et al. (2021, Nat. Comm.

Finding 1: Source of Nitrogen

- ~~Hypothesis 1: Ecosystem is supported by upwelled nitrate~~
  - ~~Alternate Hypothesis 1a: Ecosystem is supported by 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**



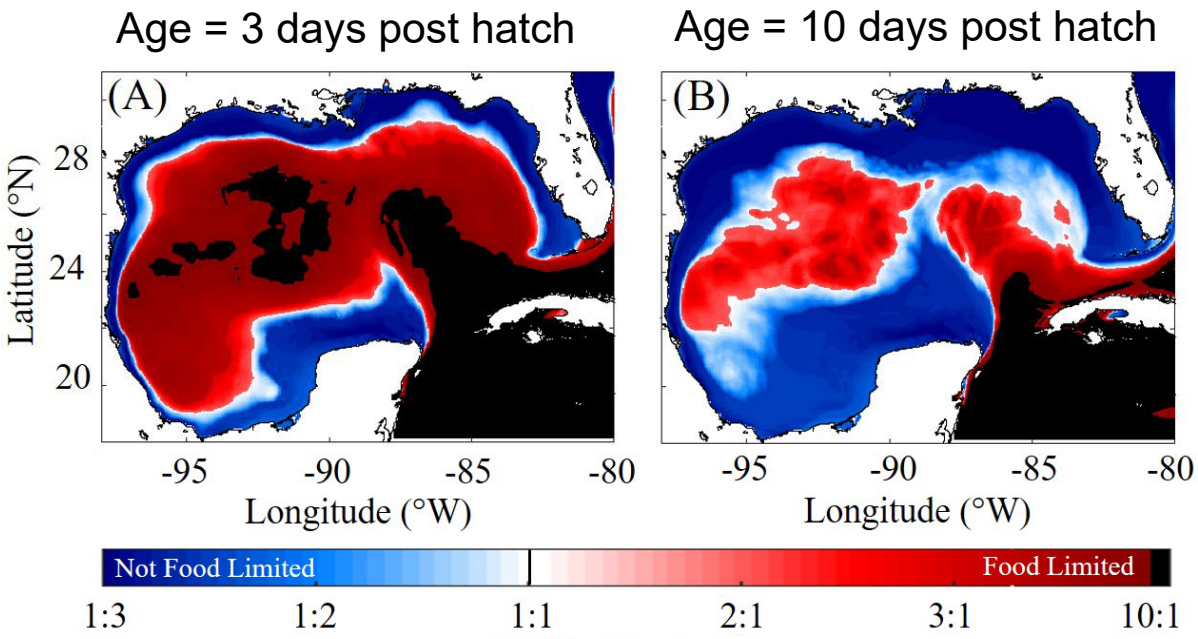
Shropshire et al. (2020, L&O)

Shropshire et al. (2021, JPR)

<u>Constrained with data from:</u>
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



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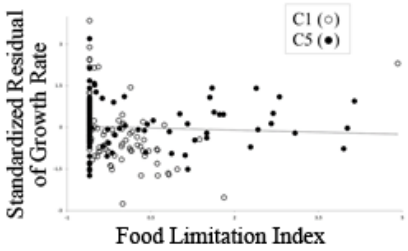
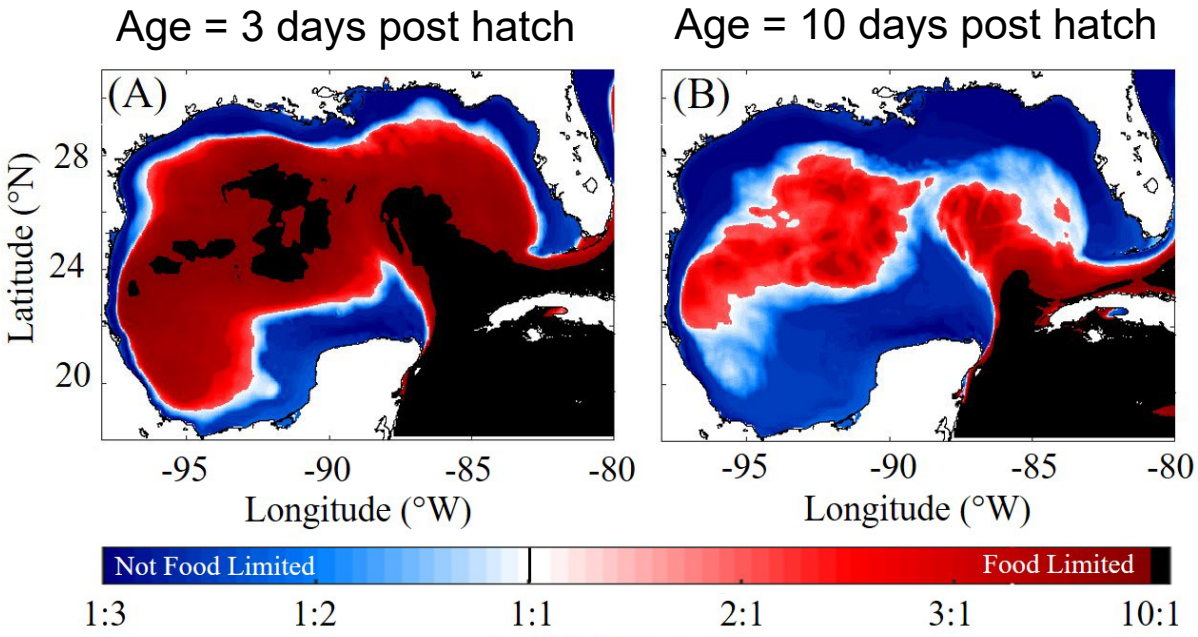


Food limitation index recently validated using otolith-based growth measurements (Malca et al., in prep.)



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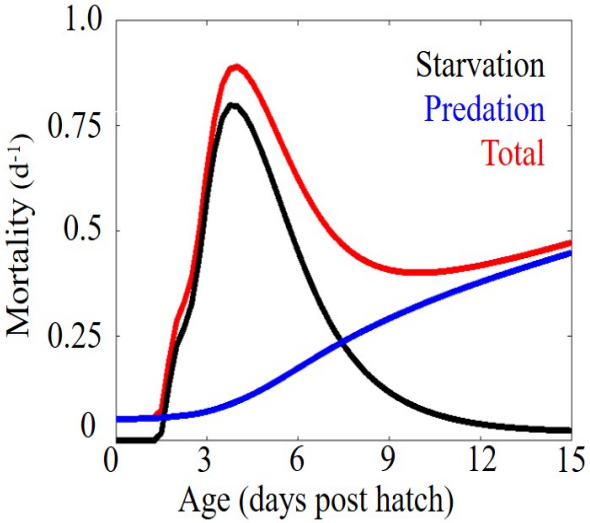
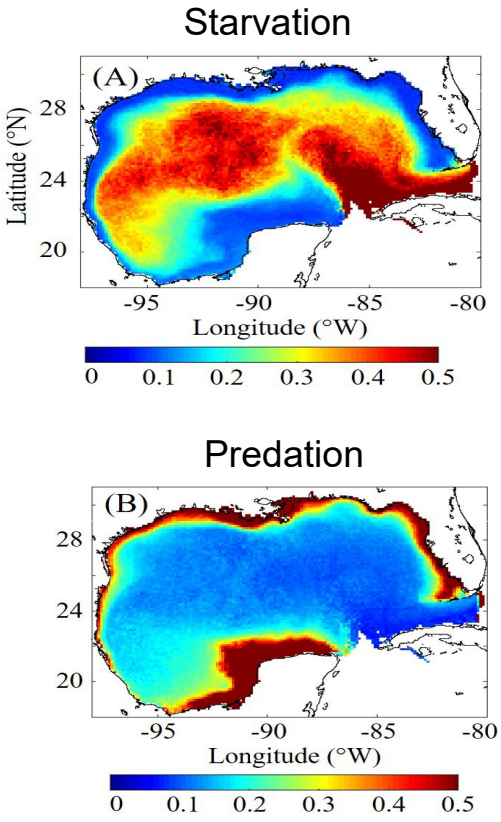
Malca et al. (in prep)
Selph et al. (2021)
Shiroza et al. (2021)
Stukel et al. (2021)
Yingling et al. (2021)

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)





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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)~~
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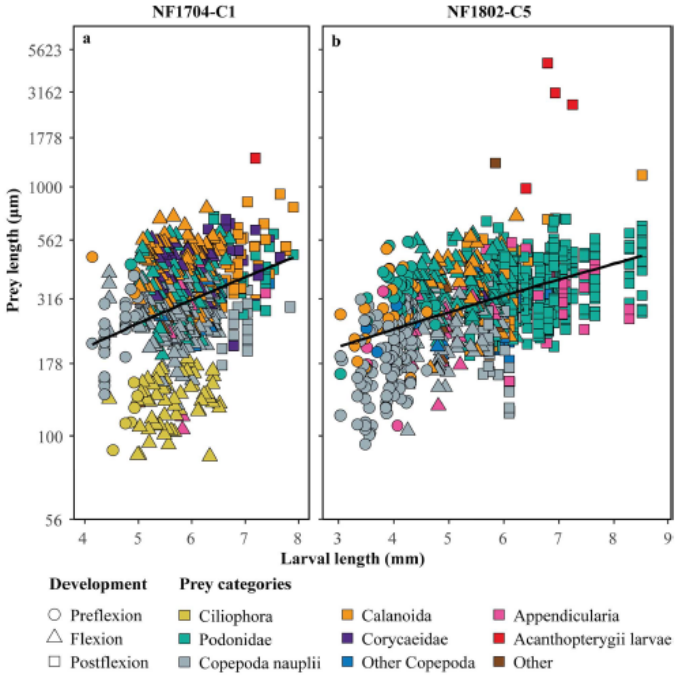
  - ~~Alternate Hypothesis 1b: Larvae are not selective feeders~~



- 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

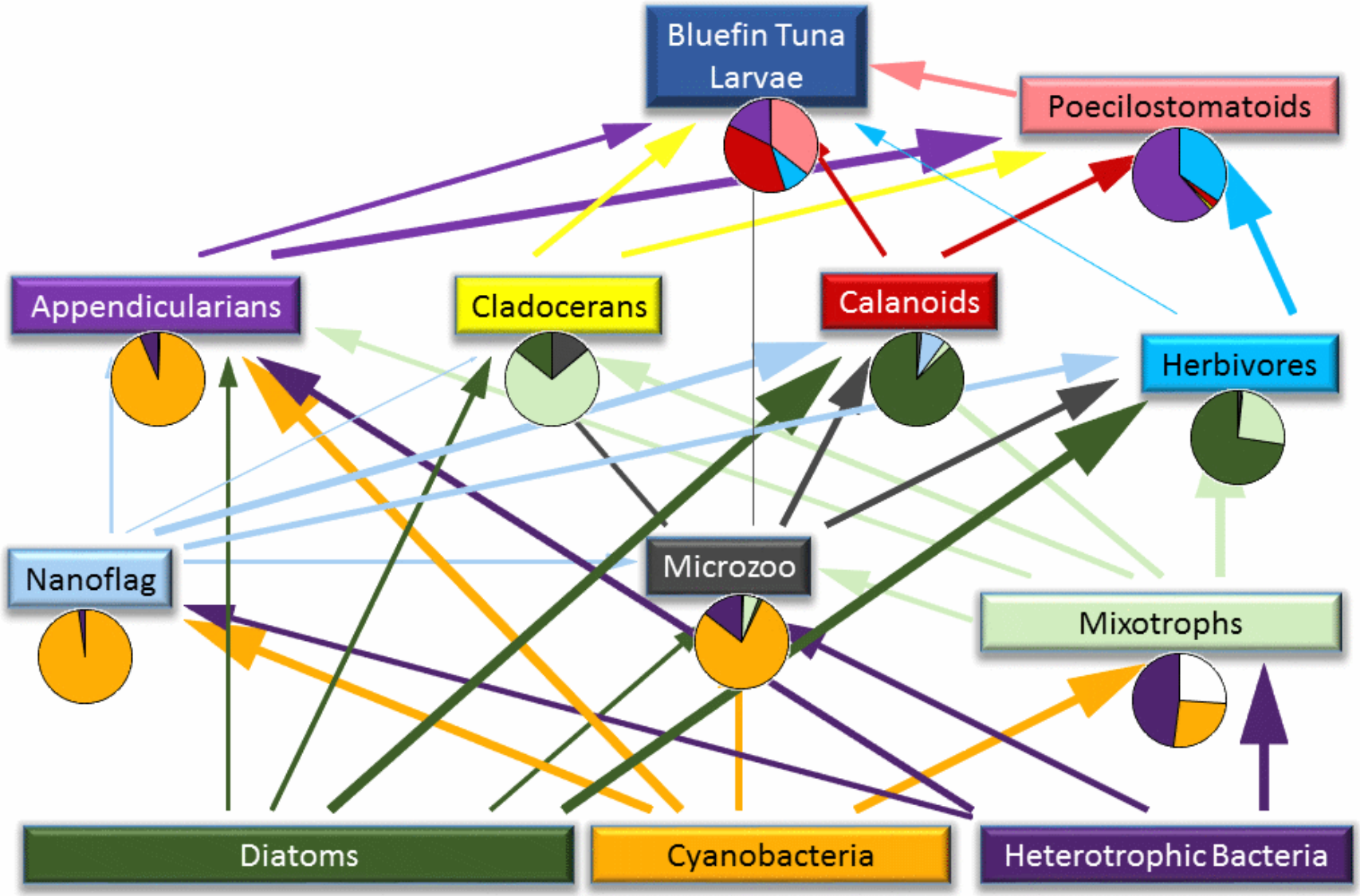
- ~~Hypothesis 1: Larvae feed preferentially on appendicularians (short pathway from cyanobacteria to larvae)~~
  - **Alternate Hypothesis 1a: Larvae feed preferentially on zooplankton that consume large phytoplankton (especially podonid cladocerans)**
  - ~~Alternate Hypothesis 1b: Larvae are not selective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

RESTORE SCIENCE PROGRAM

Product 2: Foodweb Model



Outputs

- Gerard, T., Lamkin, J., Kelly, T., Knapp, A., Laiz-Carrion, R., Malca, E., Selph, K., Shiroza, A., Shropshire, T., Stukel, M., Swalethorp, R., Yingling, N., Landry, M. (in review) Bluefin Larvae in Oligotrophic Ocean Foodwebs, Investigations of Nutrients to Zooplankton: Overview of the BLOOFINZ- Gulf of Mexico Program. J. Plankton Res.
- Kelly, T. B., A. N. Knapp, M. R. Landry, K. E. Selph, T. A. Shropshire, R. Thomas, M. R. Stukel (2021). Lateral advection supports nitrogen export in the oligotrophic open-ocean Gulf of Mexico. Nature Communications.
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- Landry, M. R., L. E. Beckley and B. A. Muhling (2019). "Climate sensitivities and uncertainties in food-web pathways supporting larval bluefin tuna in subtropical oligotrophic oceans." Ices Journal of Marine Science 76(2): 359-369.
- Landry, M. R., Selph, K. E., Stukel, M. R., Swalethorp, R., Kelly, T. B., Beatty, J. L. and Quackenbush, C. R. (2021) Microbial food web dynamics in the oceanic Gulf of Mexico. J. Plankton Res.
- Landry, M. R. and Swalethorp, R. (2021) Mesozooplankton biomass, grazing and trophic structure in the bluefin tuna spawning area of the oceanic Gulf of Mexico. J. Plankton Res.
- Selph, K. E., Swalethorp, R., Stukel, M. R., Kelly, T. B., Knapp, A. N., Fleming, K., 866 Hernandez, T. and Landry, M. R. (2021) Phytoplankton community composition and biomass in the open-ocean Gulf of Mexico. J. Plankton Res.
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- Shropshire, T. A., S. L. Morey, E. P. Chassignet, A. Bozec, V. J. Coles, M. R. Landry, R. Swalethorp, G. Zapfe, M. R. Stukel, (2020). Quantifying spatiotemporal variability in zooplankton dynamics in the Gulf of Mexico with a physical-biogeochemical model. Biogeosciences. 17: 1-23.
- Shropshire, T., Morey, S. L., Chassignet, E., Karnauskas, M., Coles, V. J., Malca, E., Laiz Carrión, Fiksen, O., et al. (2021) Trade-offs between risks of predation and starvation in larvae make the shelf break an optimal spawning location for Atlantic Bluefin tuna. J. Plankton Res.
- Stukel, M. R., Gerard, T., Kelly, T. B., Knapp, A. N., Laiz-Carrión, R., Lamkin, J. T., Landry, M. R., Malca, E. et al. (2021) Plankton food webs in the oligotrophic Gulf of Mexico spawning grounds of Atlantic Bluefin tuna. J. Plankton Res .
- Stukel, M. R., Kelly, T. B., Landry, M. R., Selph, K. E. and Swalethorp, R. (2021) Sinking carbon, nitrogen, and pigment flux within and beneath the euphotic zone in the oligotrophic, open-ocean Gulf of Mexico. J. Plankton Res.
- Stukel, M. R., M. Décima, T. B. Kelly (2018). A new approach for incorporating 15N isotopic data into linear inverse ecosystem models with Markov Chain Monte Carlo sampling. PLOS ONE.
- Stukel, M. R. (2020). Investigating equations for measuring dissolved inorganic nutrient uptake in oligotrophic conditions. Limnology and Oceanography: Methods. 18 (11): 656-672.
- Swalethorp, R., L. Aluwihare, A. R. Thompson, M. D. Ohman and M. R. Landry (2020). "Errors associated with compound-specific δ15N analysis of amino acids in preserved fish samples purified by high-pressure liquid chromatography." Limnology and Oceanography: Methods.
- Yingling, N., Kelly, T. B., Selph, K. E., Landry, M. R., Knapp, A. N., Kranz, S. A. and Stukel, M. R. (2021) Taxon-specific phytoplankton growth, nutrient limitation, and light limitation in the oligotrophic Gulf of Mexico. J. Plankton Res.
- 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

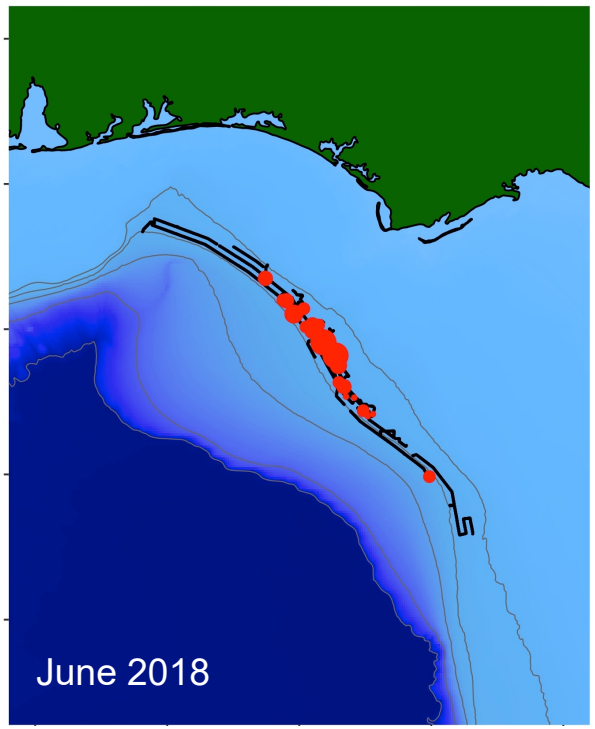
NOAA RESTORE Science Program – Review

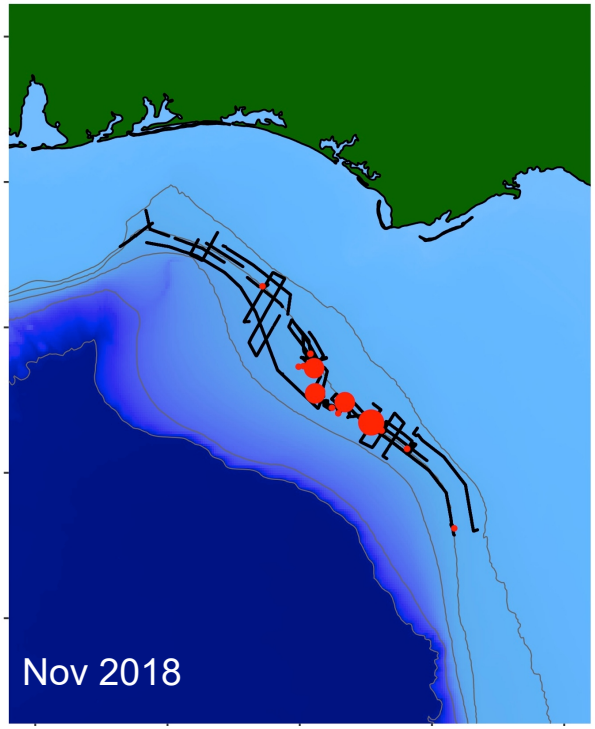
Rice's Whale Status

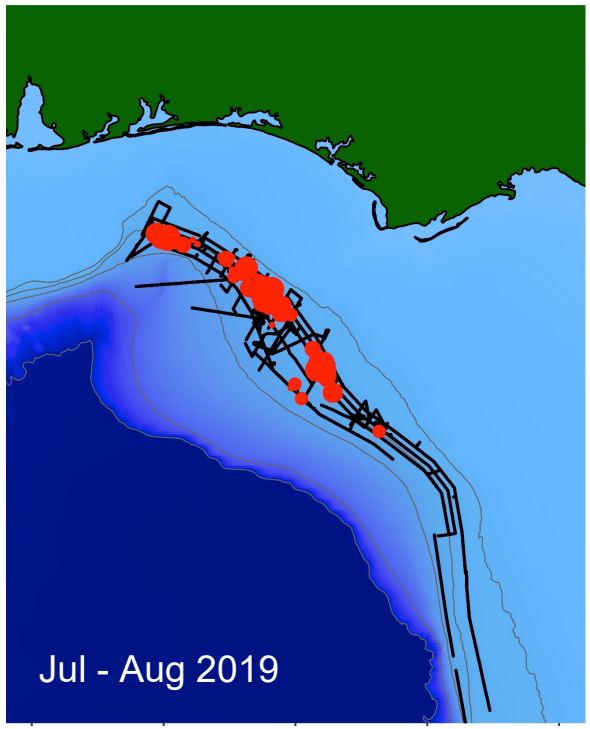
- Only resident baleen whale in Gulf of Mexico
- Best estimate of abundance (from 2017-2018) is N=51.3 CV=0.50
- Potential threats include vessel traffic, fishery interactions, noise, exposure to DWH and other oil spills
- Project objective: Characterize the physical and biological habitat of Rice's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

Trophic Ecology Project

Large Vessel Surveys in Core Rice's Whale Habitat

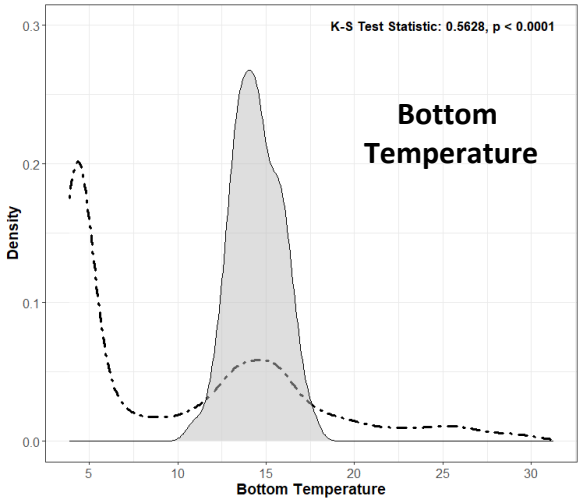


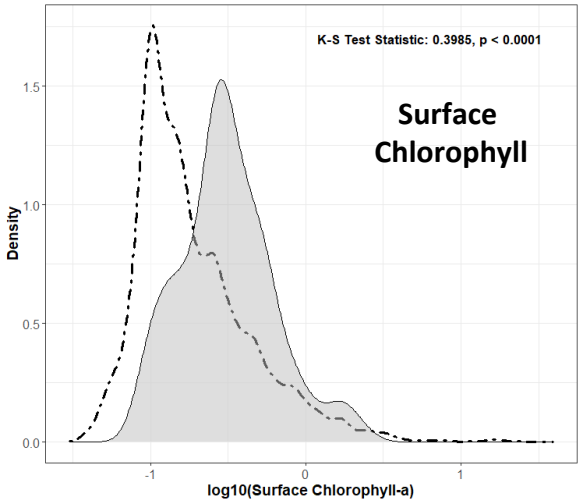


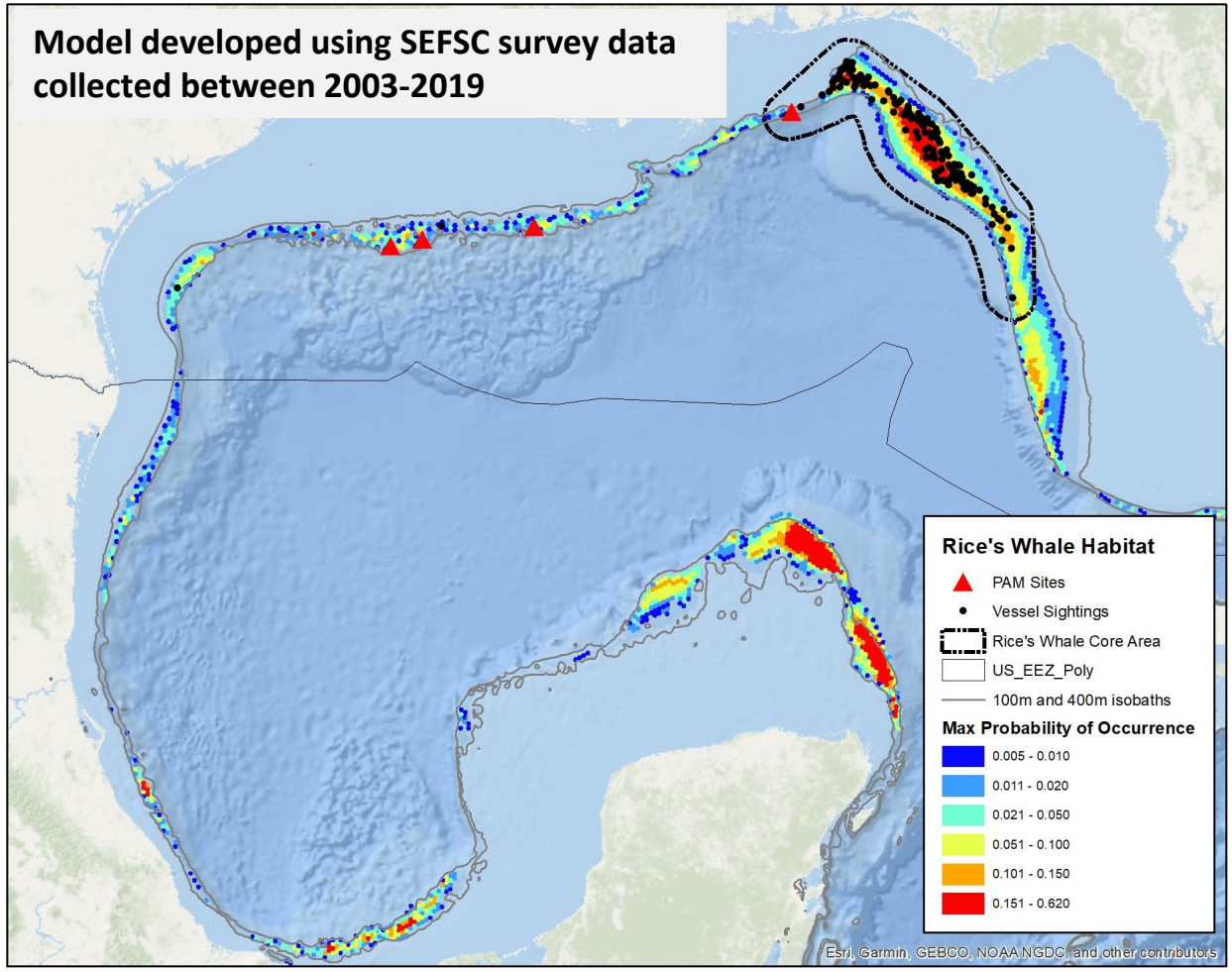


- Along-shelf visual and passive acoustics surveys, night time cross-shelf acoustic transects
- Small boat close approaches for tagging, photo-id, eDNA collection, and UAS work
- Underway acoustic backscatter, trawl sampling of prey during summer 2019

Habitat Modeling

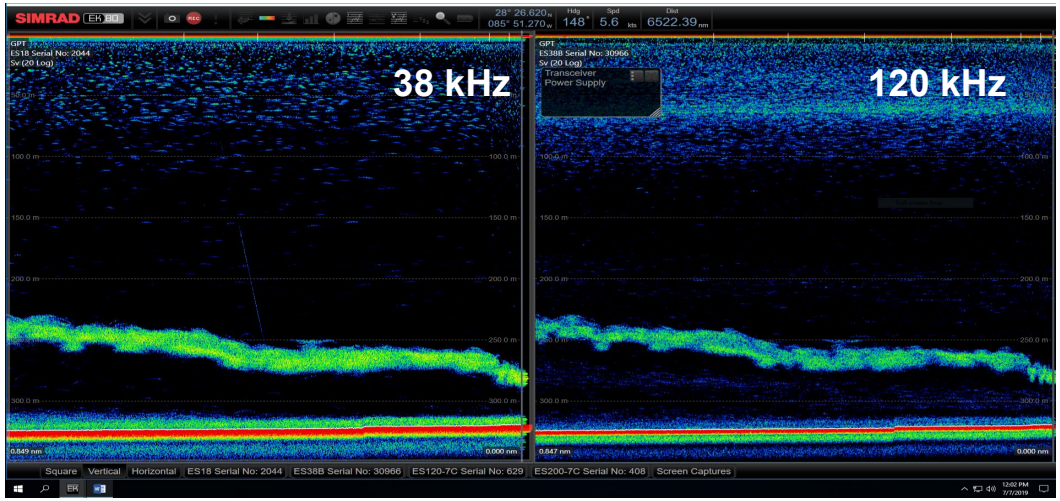


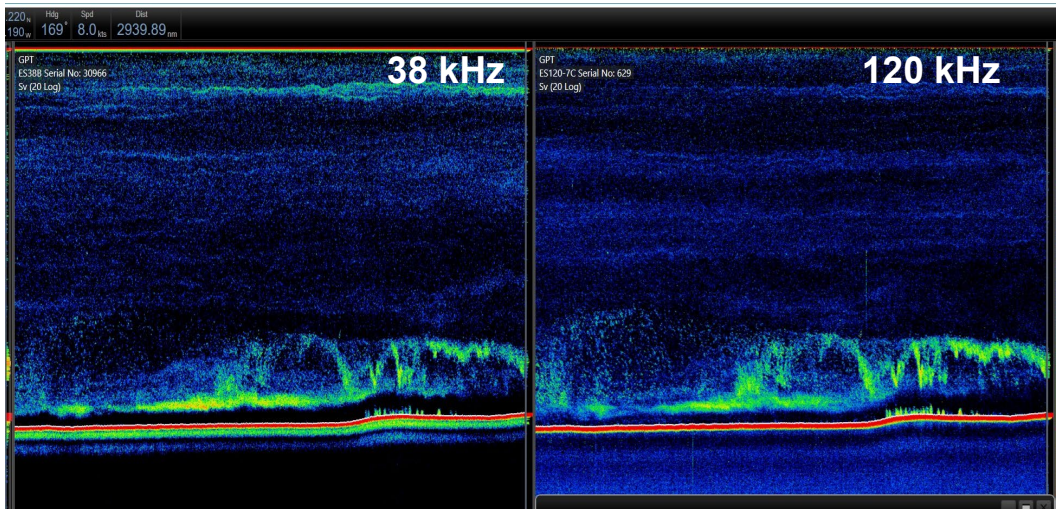




High predicted occurrence over inner shelf break, low bottom temperatures associated with upwelling, and intermediate surface chlorophyll

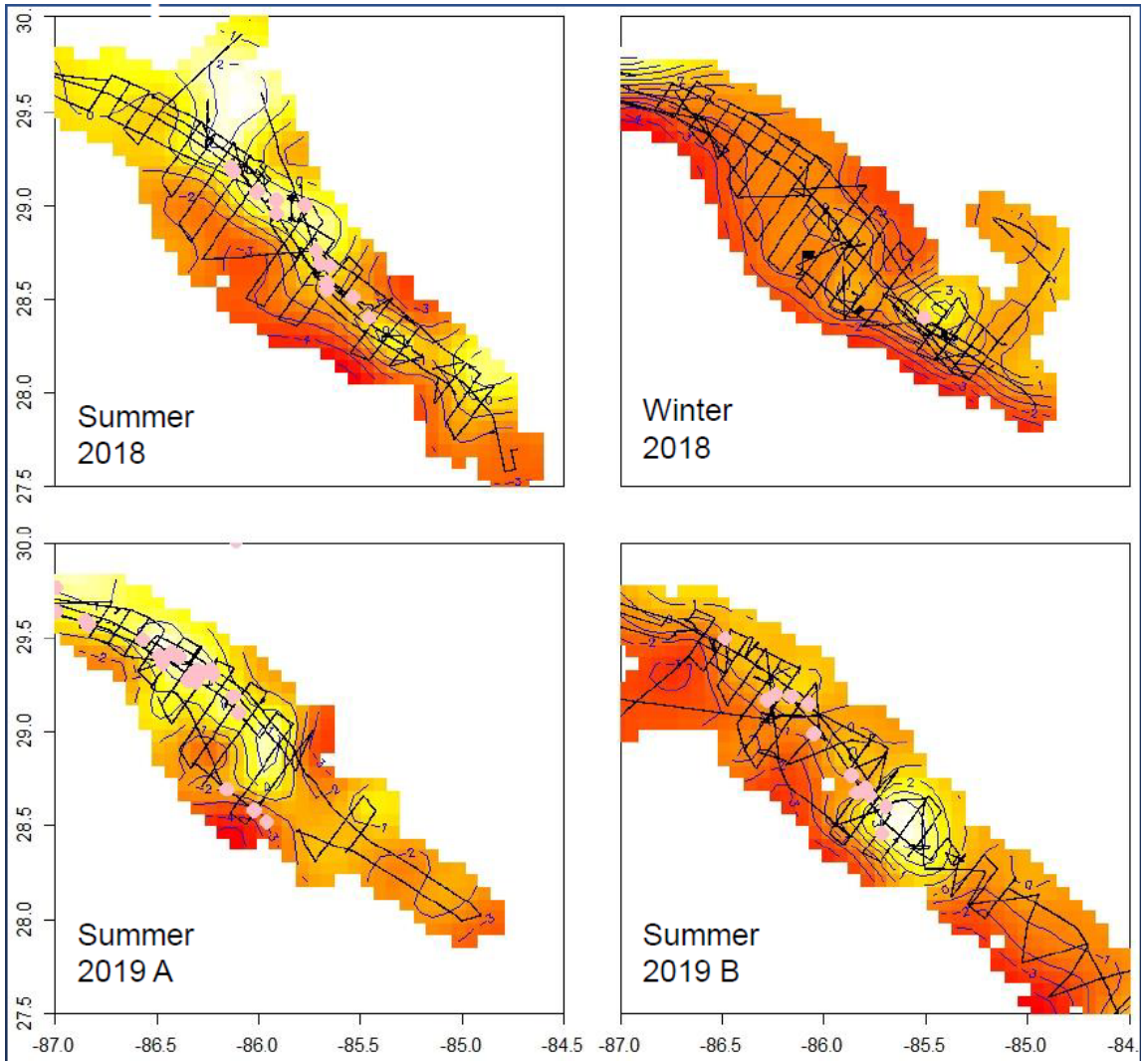
Acoustic Backscatter





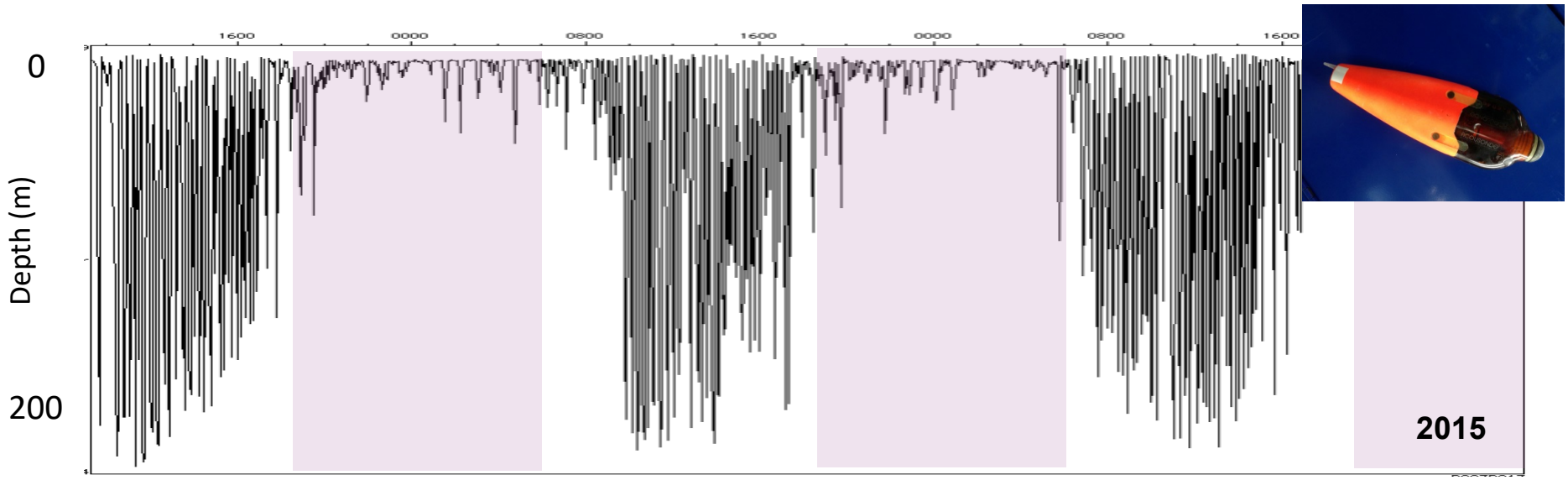
- Strong vertically migrating layer that is well dispersed in the upper water column at night
- Aggregates and migrates downward in early morning
- Persistent near bottom during the day with varying intensity
- Formation of patchy, intense aggregations, which are often associated with feeding whales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

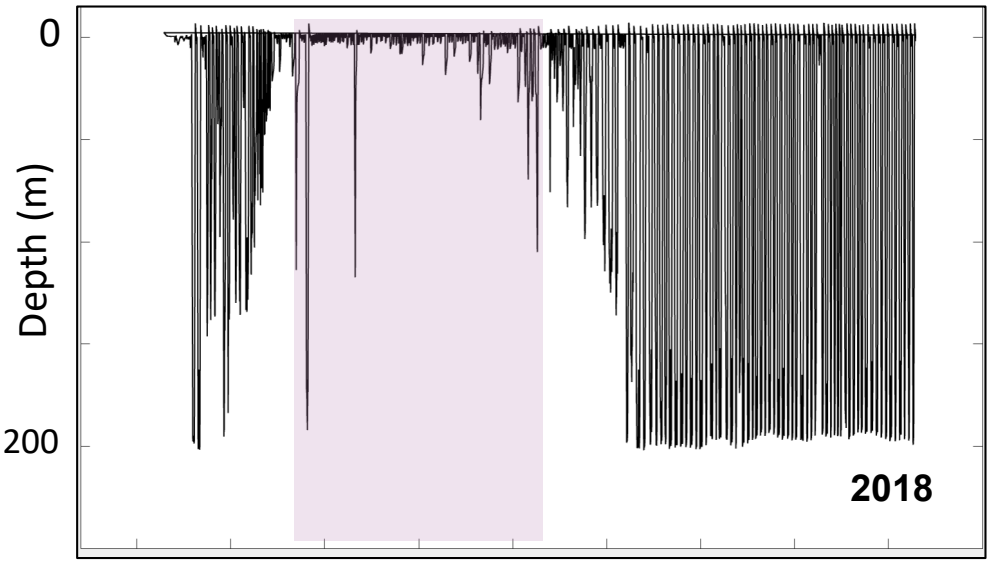
Acoustic Backscatter



- 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

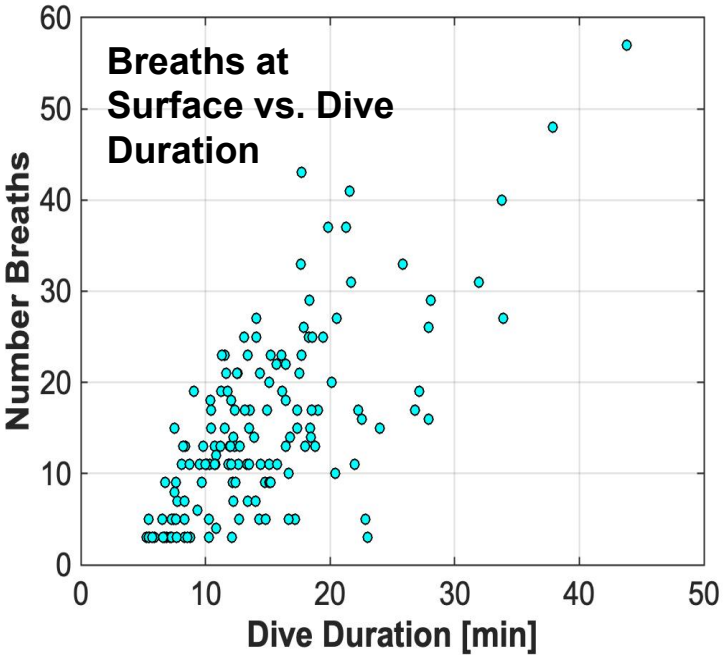


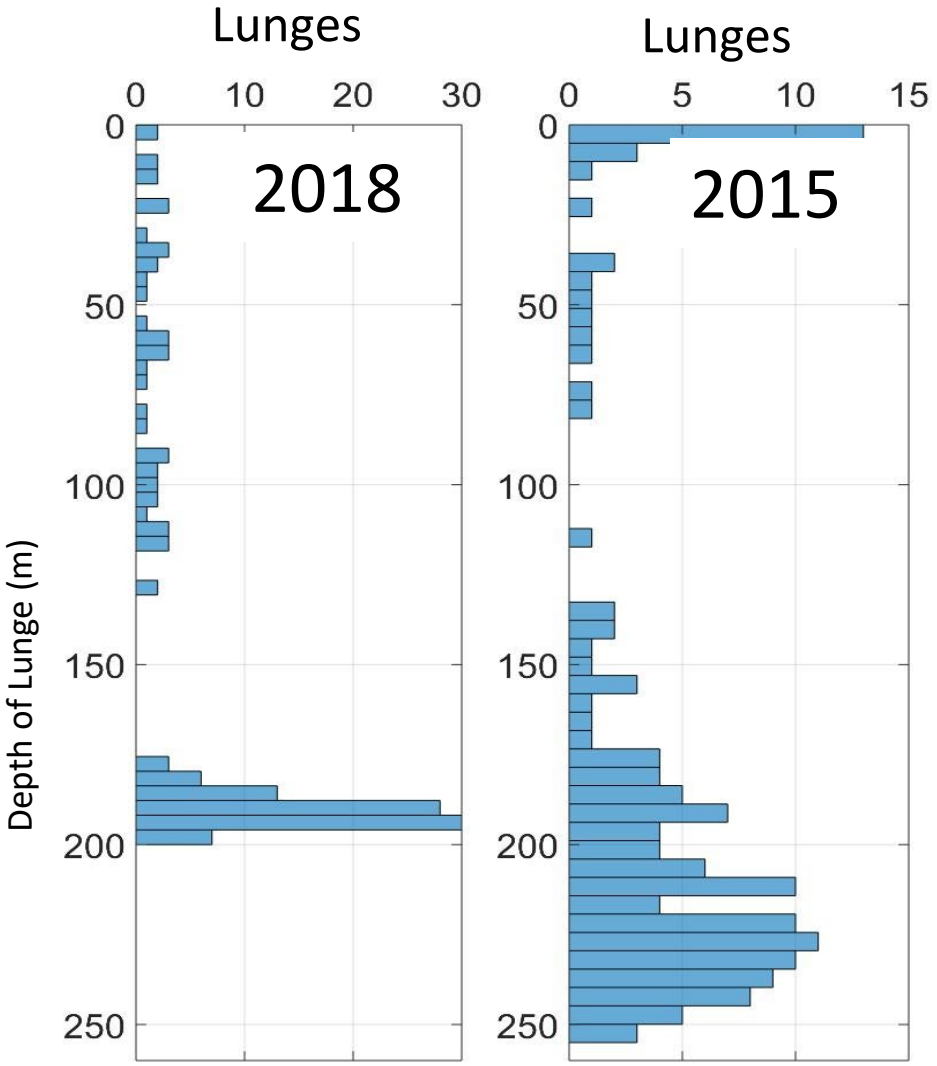


- Daytime deep dives to near bottom depths
- Moving upward in water column near dusk
- Near surface during the evening

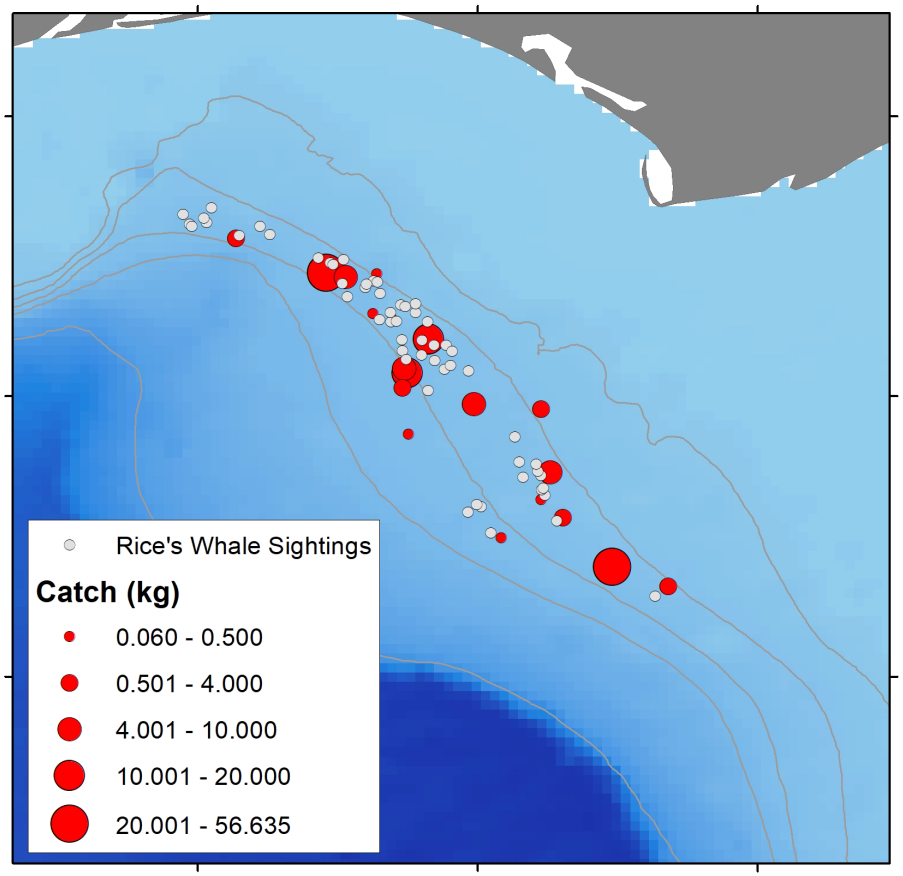
Kinematic Tag: Foraging Behavior

- 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

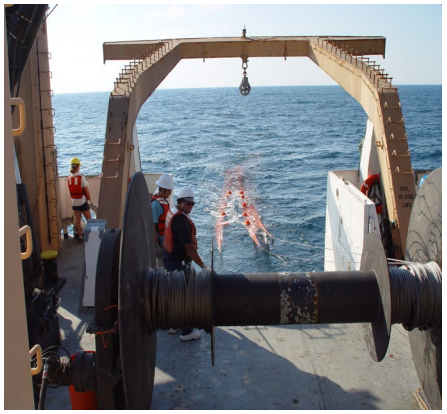




Trawling: Forage Base

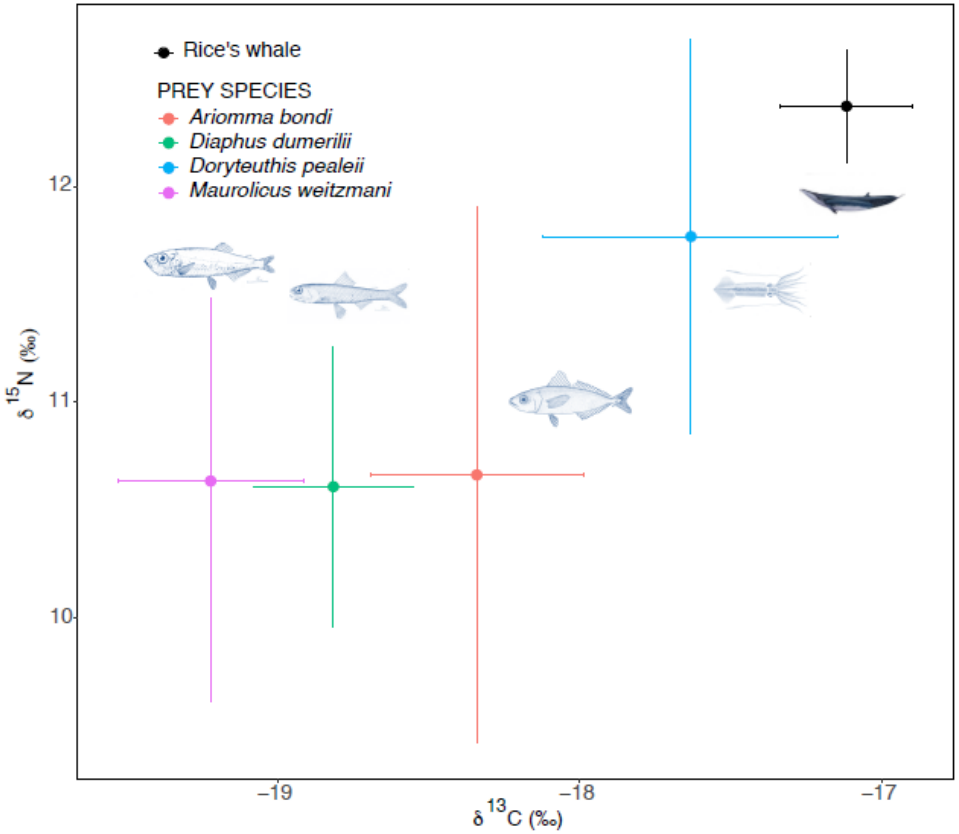


19 trawl stations, targeted on aggregations observed in the EK80 data. Generally near or just above the bottom.

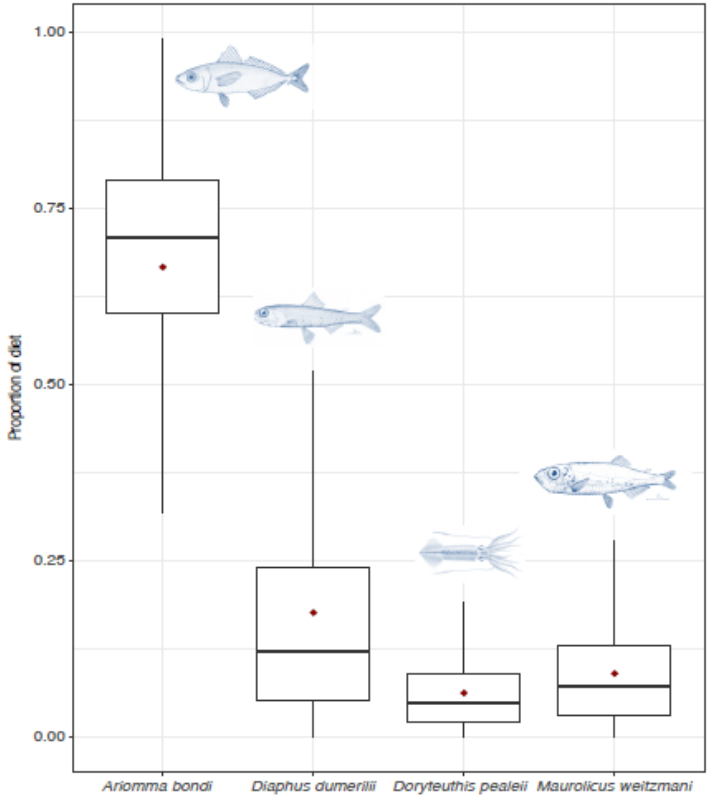


Stable Isotopes: Likely Prey

Stable Isotope Signatures for Whales and Prey

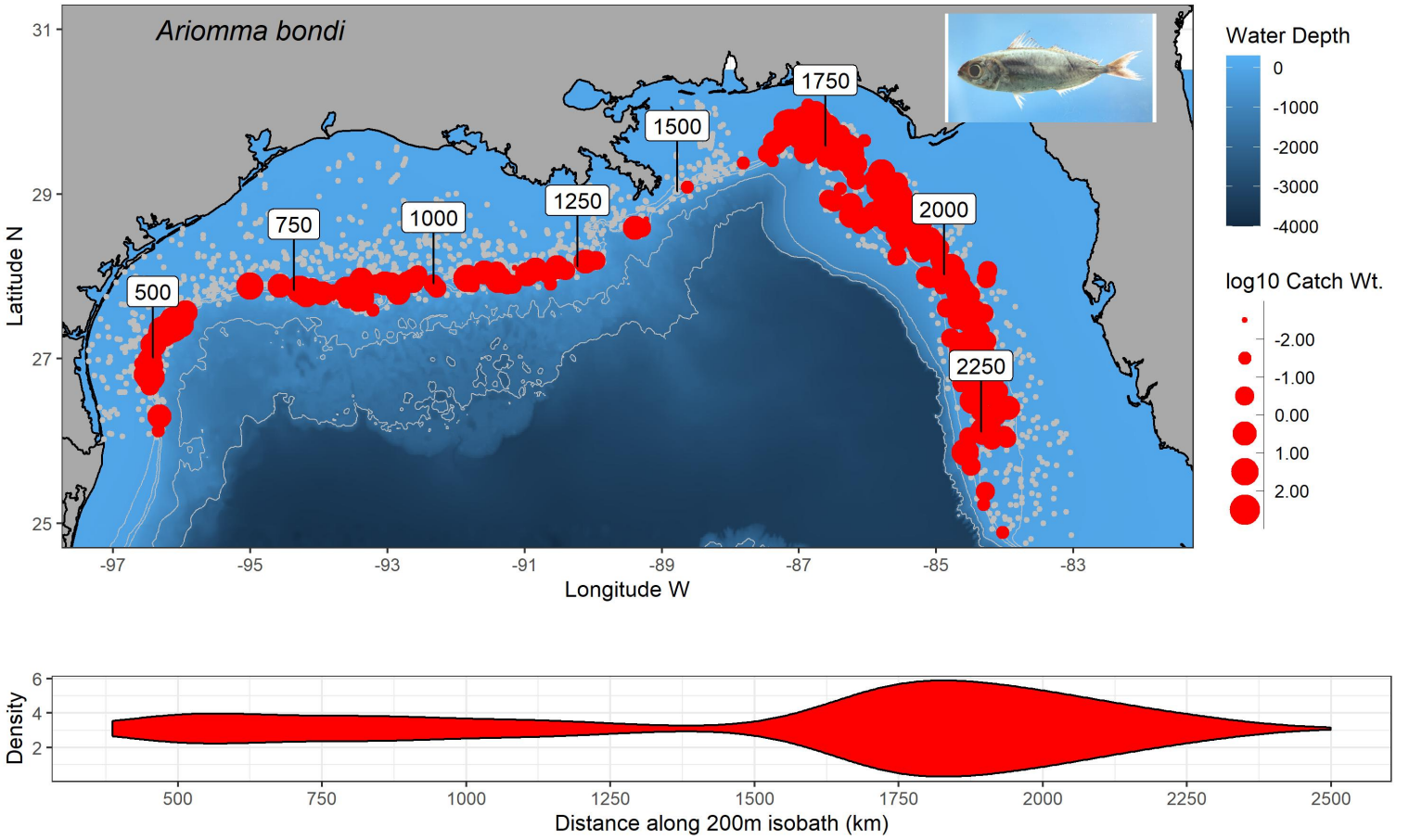


Inferred Diet Composition



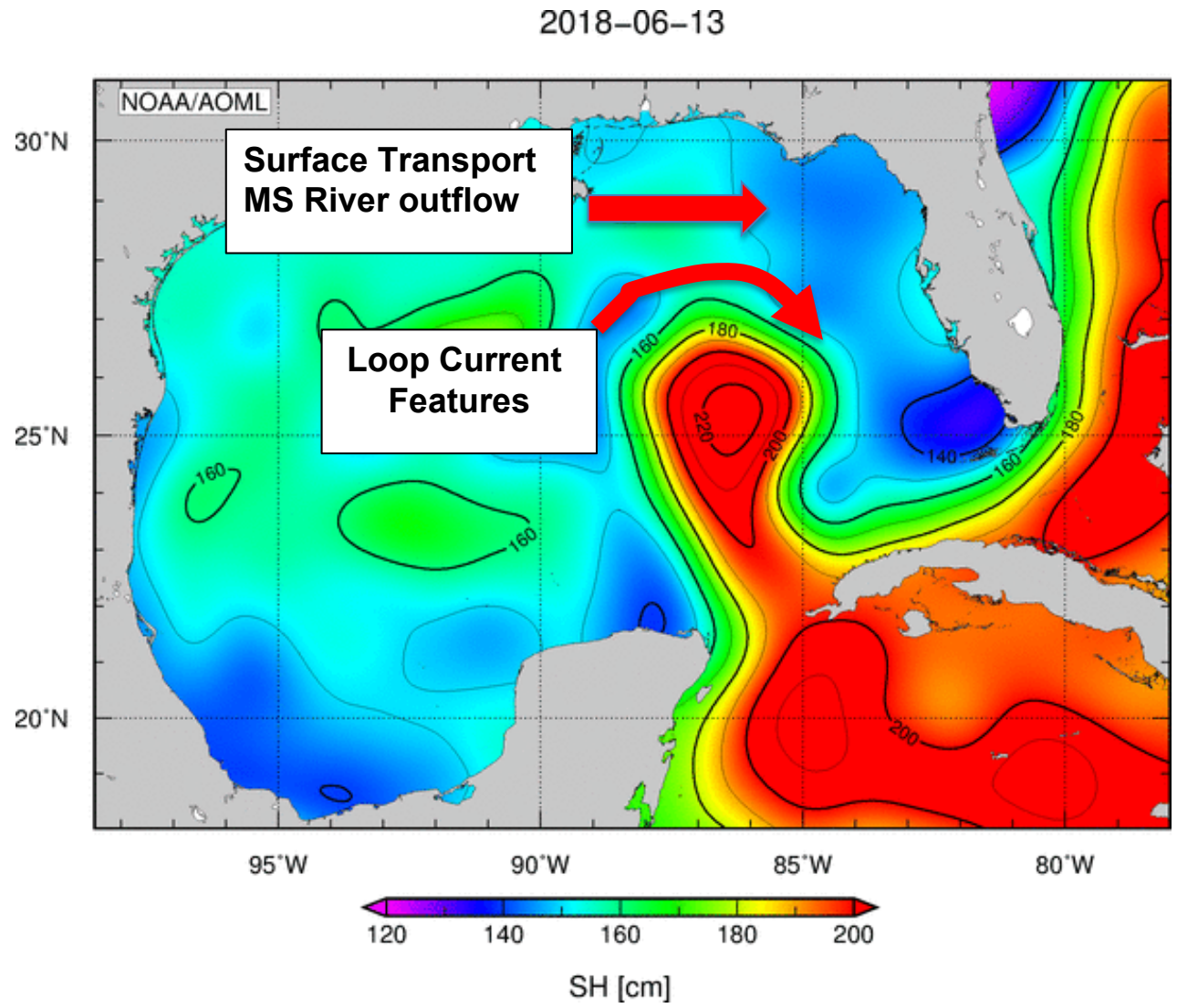
- Probable prey inferred from stable isotope mixing models
- Sensitive to inferences about trophic enrichment levels – used Fin Whales as a model
- Inferred diet dominated by Ariomma bondi (Silver Rag Drift-fish)

Prey Distribution



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

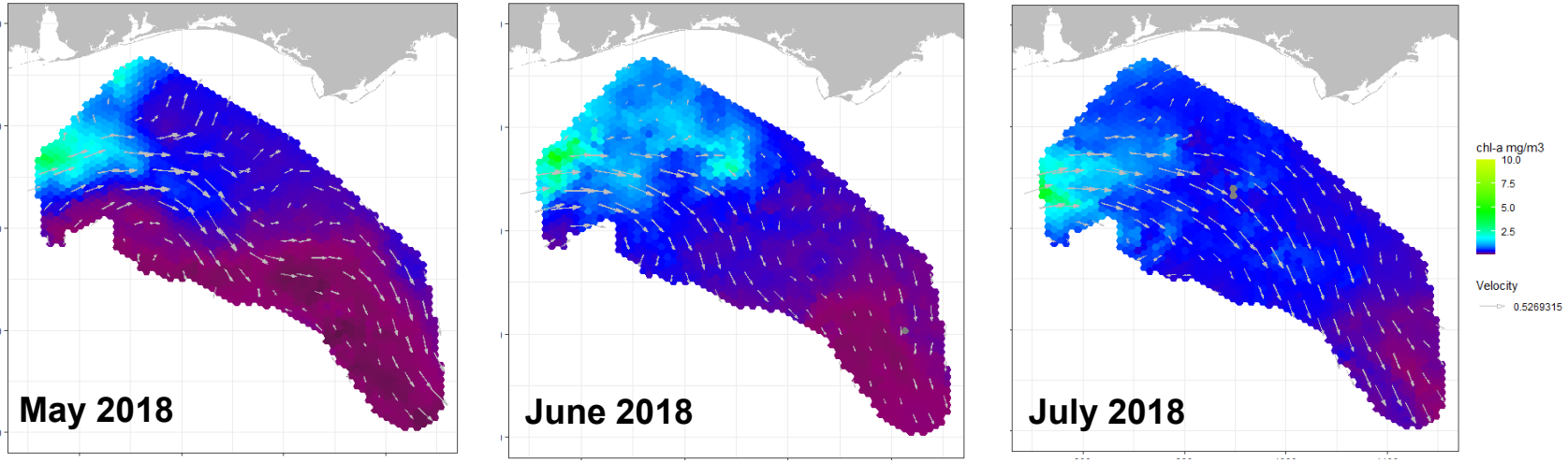
Ecosystem Connectivity

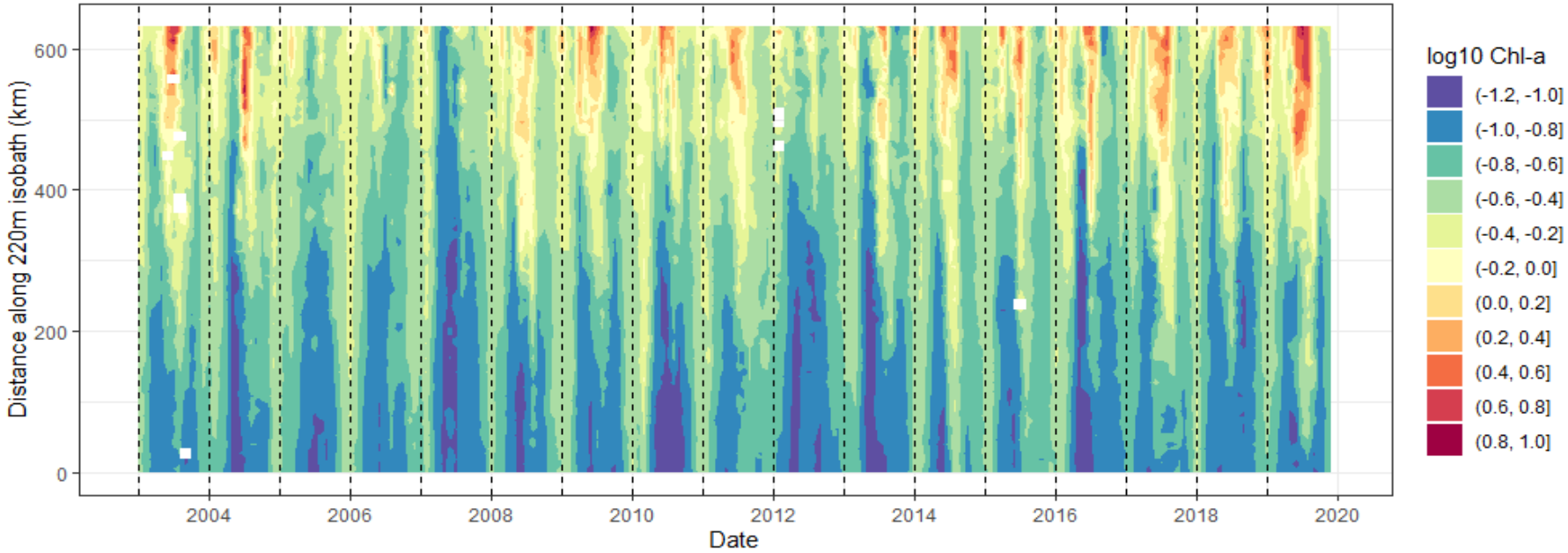


Sea Surface Height Anomaly, June 2018, NOAA AOML

- 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

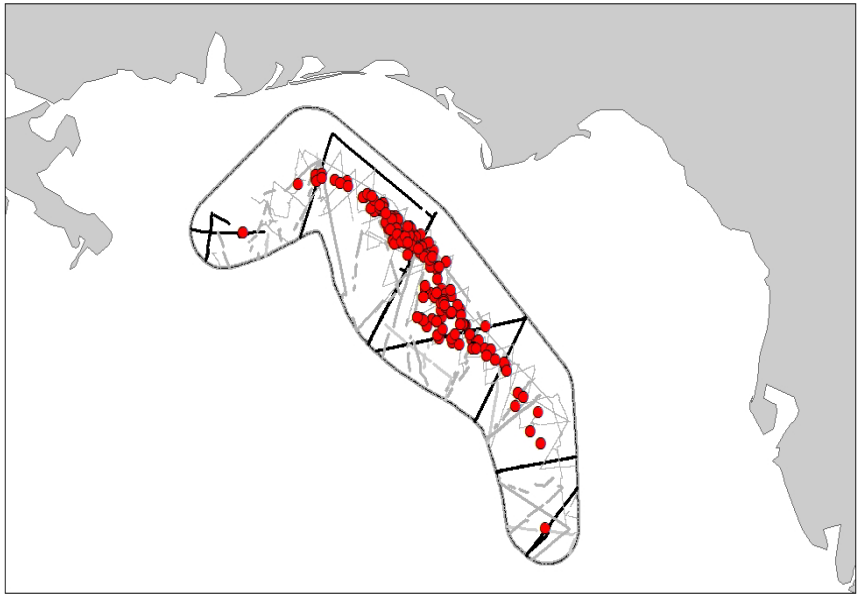
Ecosystem Connectivity



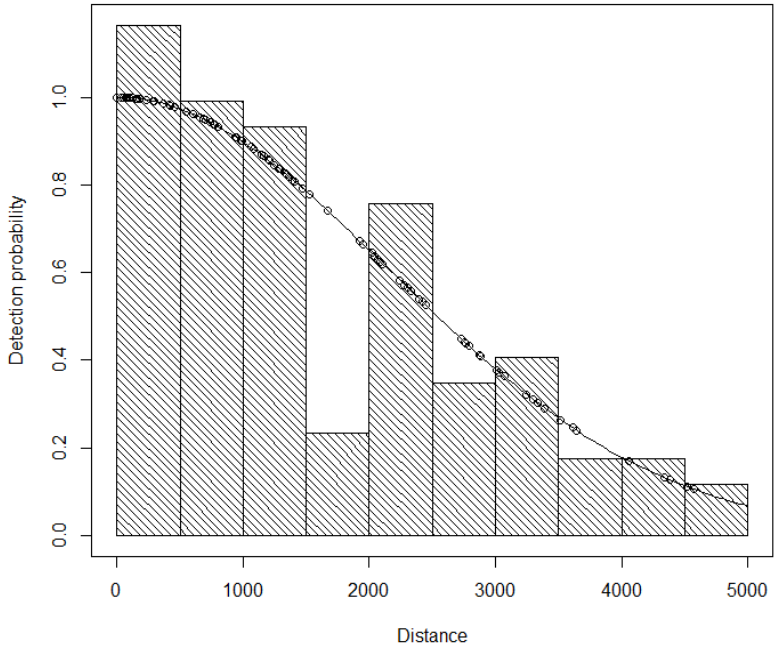


Applications: Stock Assessment

Sightings and Effort in Core Habitat Area 2003-2019

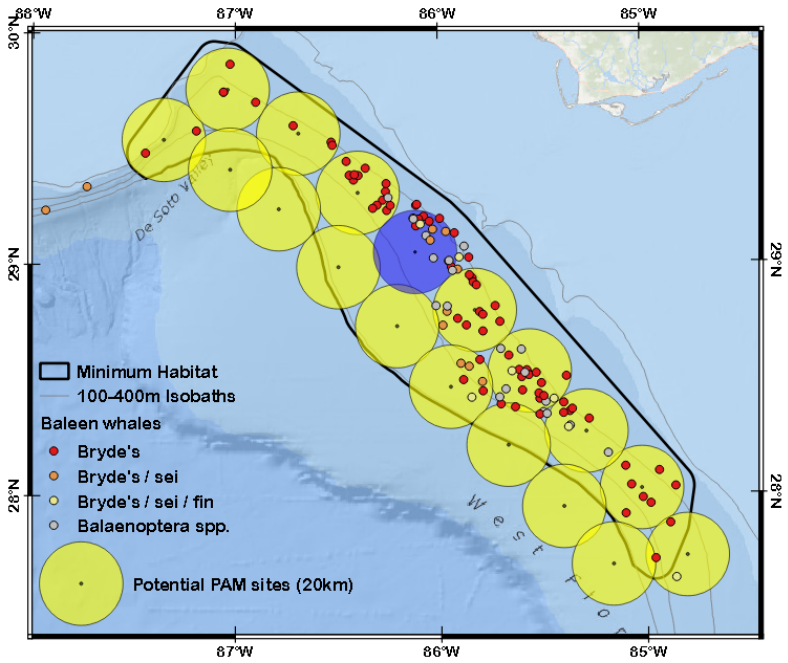


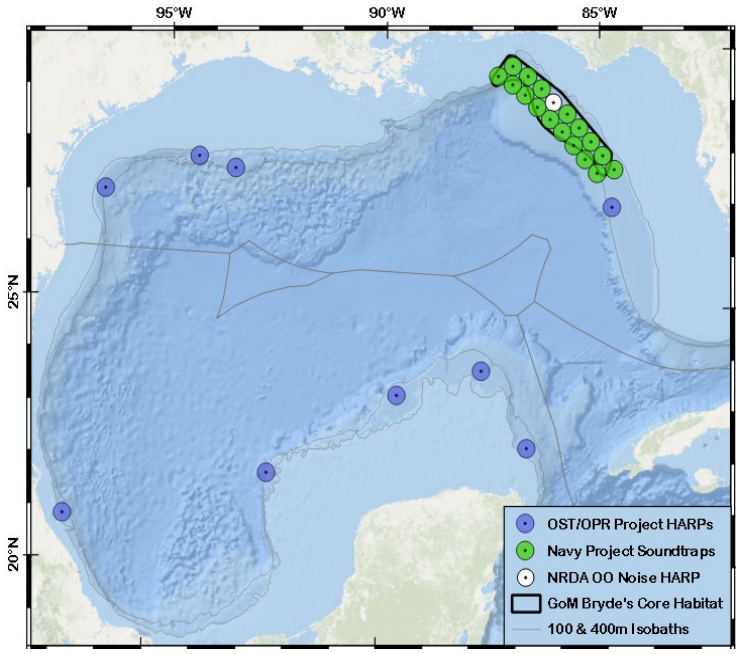
Distance Analysis Detection Function: Included 91 on-effort sightings



- 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

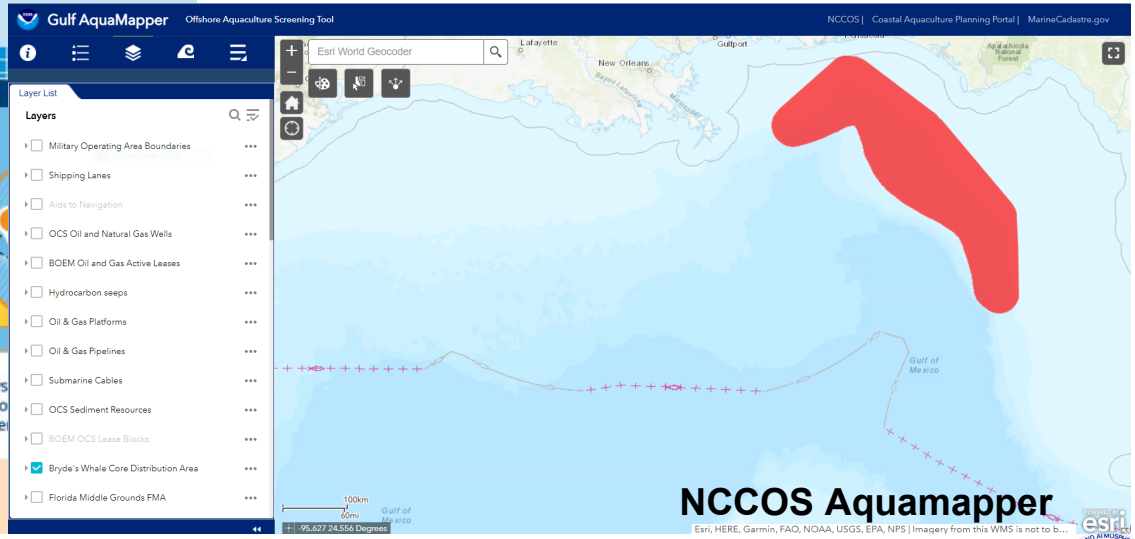




- Sonobuoy data collected during 2018-2019 surveys used to validate Rice's whale calls
- Western Gulf PAM studies identified variation in call types
- PAM studies planned to evaluate habitat use and occurrence throughout the Gulf

Applications: Aquaculture

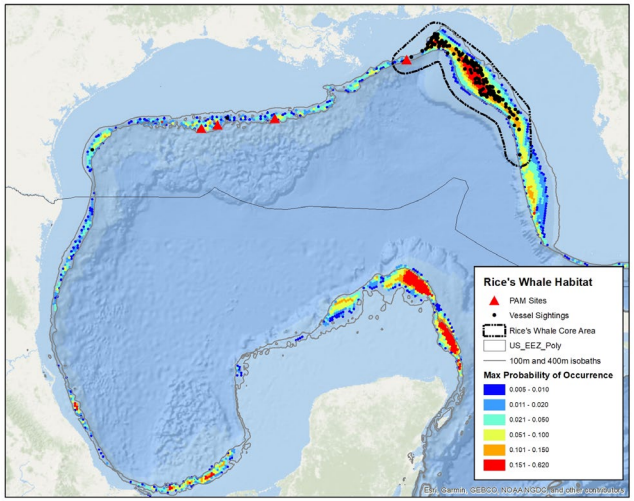
- **Habitat information used to inform scoping for Aquaculture Opportunity Areas**

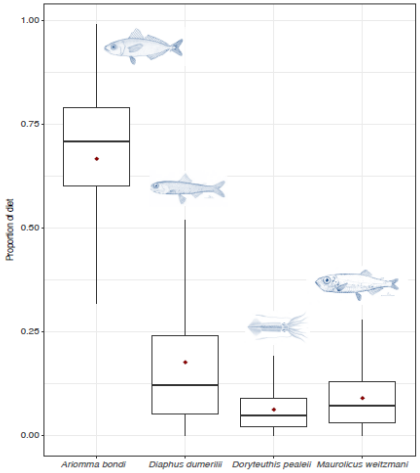


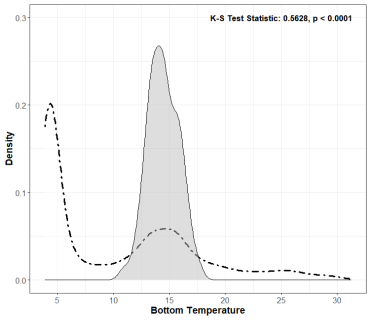
- Spatial planning effort to evaluate possible areas for aquaculture siting
- Evaluate potential impacts to protected species based on spatial information
- Core habitat provided to Aquamapper spatial planning tool

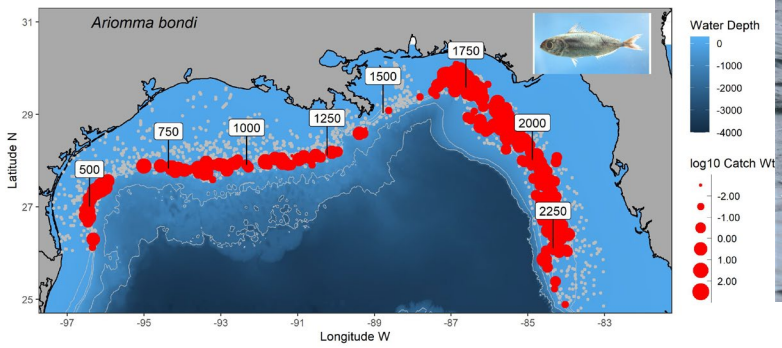
Applications: Critical Habitat

- **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.**

NOAA FISHERIES
Southeast Regional Office

RECOVERY OUTLINE

RICE'S WHALE

The Rice's whale (*Balaenoptera ricei*), originally listed as the Gulf of Mexico Bryde's whale (*Balaenopera edeni*; a subspecies of Bryde's whales), was listed as endangered under the Endangered Species Act (ESA) on April 15, 2019 (84 FR 15446). In 2021, a published study in a peer-reviewed journal (Rosel *et al.*, 2021) provided evidence for and described an entirely new species (not just subspecies) of baleen whale. The taxonomic change and that recommendation received independent acceptance by the Society for Marine Mammalogy Committee on Taxonomy (https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies). Consequently, NMFS also changed the common name from Bryde's whale (Gulf of Mexico subspecies) to Rice's whale, and changed the description of the listed entity from Bryde's whales that breed and feed in the Gulf of Mexico to the entire species (86 FR 47022, August 23, 2021). The species status and legal protections under the ESA remain despite these changes.

The National Marine Fisheries (NMFS) will develop a recovery plan for this species. In the interim, NMFS has developed this recovery outline to provide a preliminary strategy for conservation of the Rice's whale. The recovery outline guides initial recovery actions while ensuring that future recovery options are not precluded due to a lack of interim planning. As such, this outline is meant to serve as an interim guidance document to direct recovery efforts, including recovery planning, for the Rice's whale until a full recovery plan is developed and approved. A preliminary strategy for recovery of the species is presented here, as are recommended high priority actions to stabilize and recover the species.

Endangered and Threatened Species; Announcement of Workshop To Inform Recovery Planning for ESA Listed Rice's Whale (Balaenoptera Ricei)

A Notice by the National Oceanic and Atmospheric Administration on 10/05/2021

PUBLISHED DOCUMENT

AGENCY:

National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION:

Notice.

SUMMARY:

We, NMFS, are convening a workshop to solicit information from experts to inform recovery planning for Rice's whale (*Balaenoptera ricei*) under section 4(f) of the Endangered Species Act (ESA). This workshop will be open to the

DOCUMENT DETAILS

Printed version:
PDF

Publication Date:
10/05/2021

Agencies:
National Oceanic and Atmospheric Administration

Dates:
Workshop dates and information: We will hold the recovery planning workshop for the Rice's whale virtually over the course of 5 sessions in October and November 2021.

Acknowledgements

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

Gulf Coast Ecosystem Restoration Science, Observation, Monitoring and Technology Program

NOAA RESTORE Science Program

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

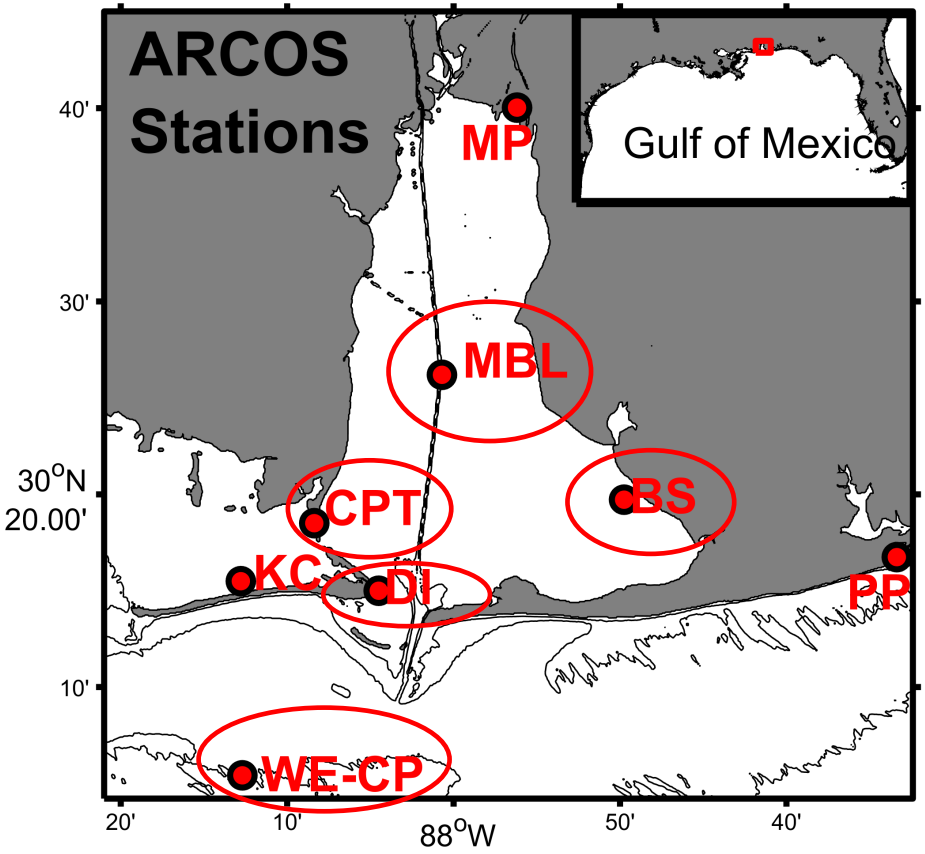
- **Objective:** Augment a decide-support tool that provides system-wide information necessary for accurate guidance in event response, restoration, conservation, and fisheries management

- 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)

Select a station from the list.

Select a station

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

: Operated by DISL. : Operated by partners.

Weather and water quality data

Data Sharing Partners

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

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)

Advancing GoMx understanding

nature COMMUNICATIONS

Marine Heatwaves and Hurricane Intensity

Courtesy of weather.com

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:

National Geographic ,The Guardian, The New York Times

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

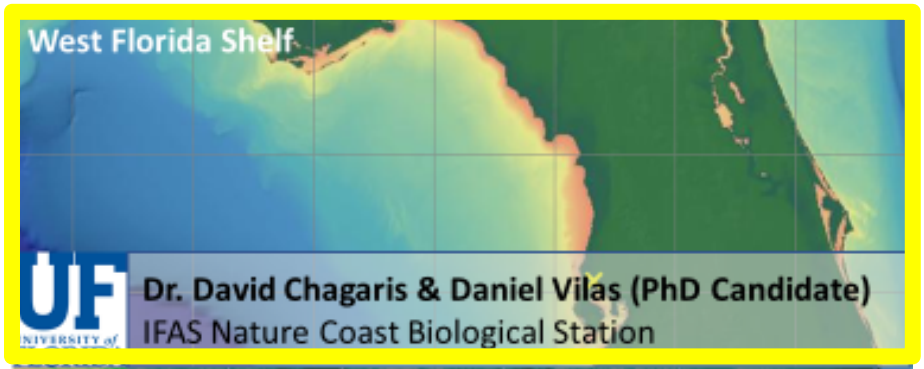
Gag Grouper
Mycteroperca microlepis

Gulf Menhaden
Brevoortia Patronus

Ecosystem Models

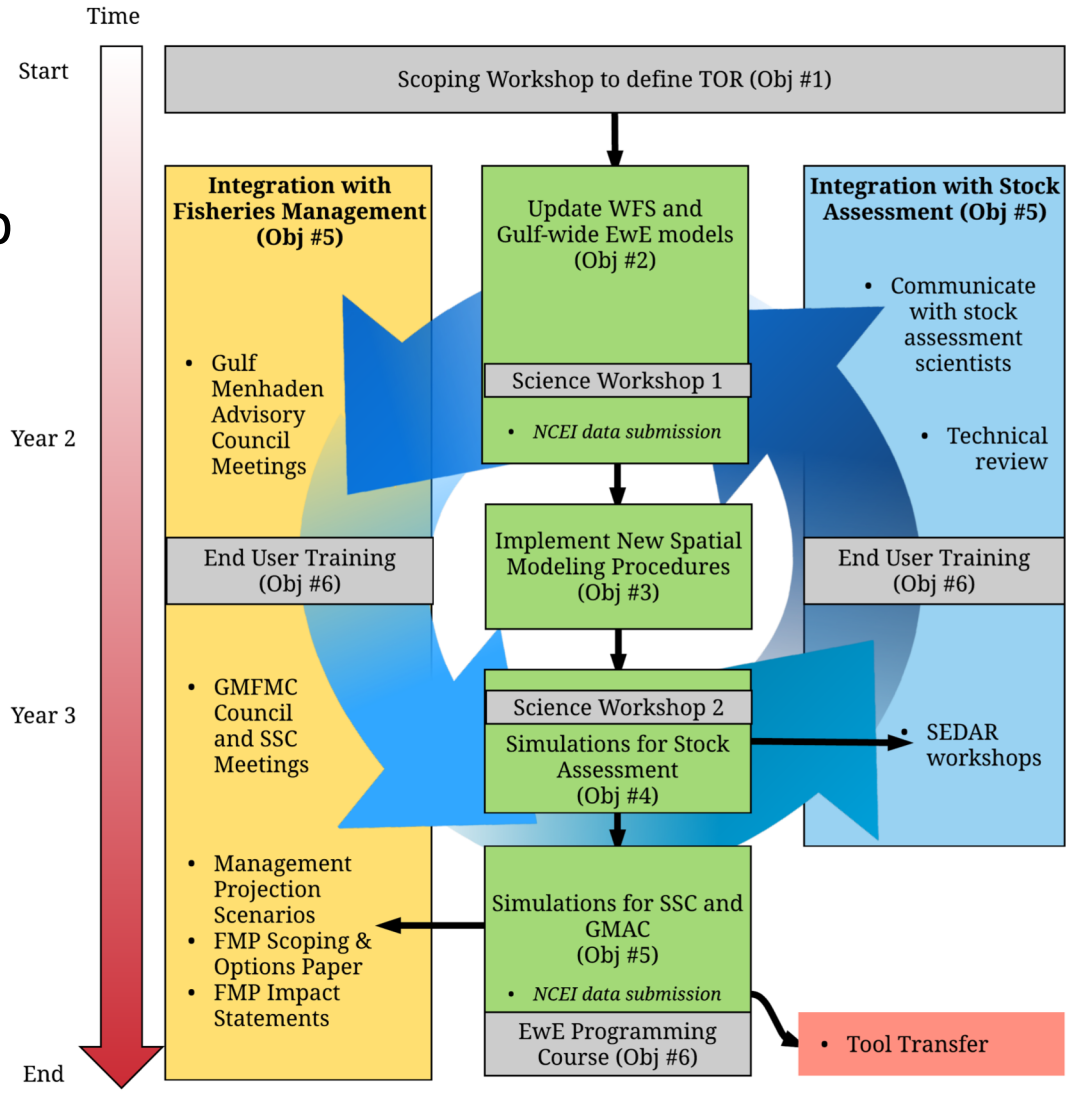
- West Florida Shelf (WFS) model
  - Red tide mortality application
- U.S. Gulf of Mexico model
  - Gulf Menhaden application
- Northern Gulf of Mexico model
  - Supported by NOAA NGOMEX funds
  - Gulf menhaden application (spatial, environmental)

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



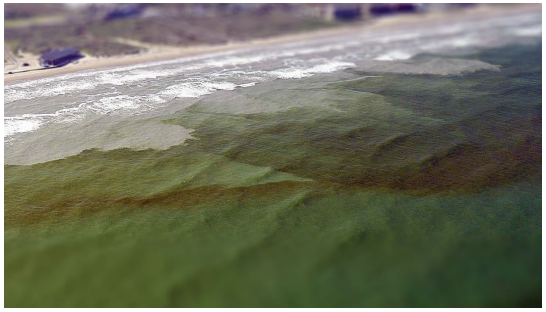
End User Engagement

- Project Scoping Workshop
- Stock Assessment Workshops
- Scientific & Management Advisory Committees
- 1-on-1 communications
- Data visualization app development & training



Application: West Florida Red Tides

Red tides routinely occur on Florida's Gulf coast, causing fish kills and creating challenges for fisheries stock assessment and management

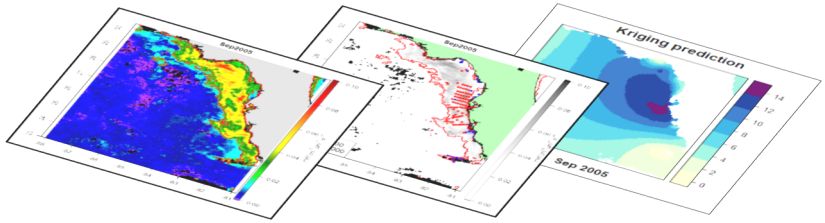


Data Needs to Support Fisheries:

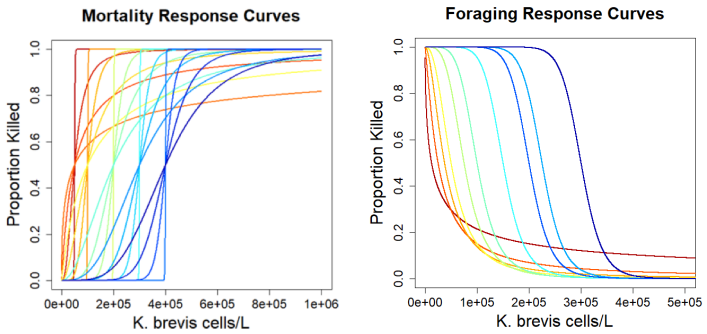
1. Historical estimates of red tide mortality for use in stock assessments

2. Contemporary (near-real time) estimates of red tide impacts to inform decisions on allowable catch

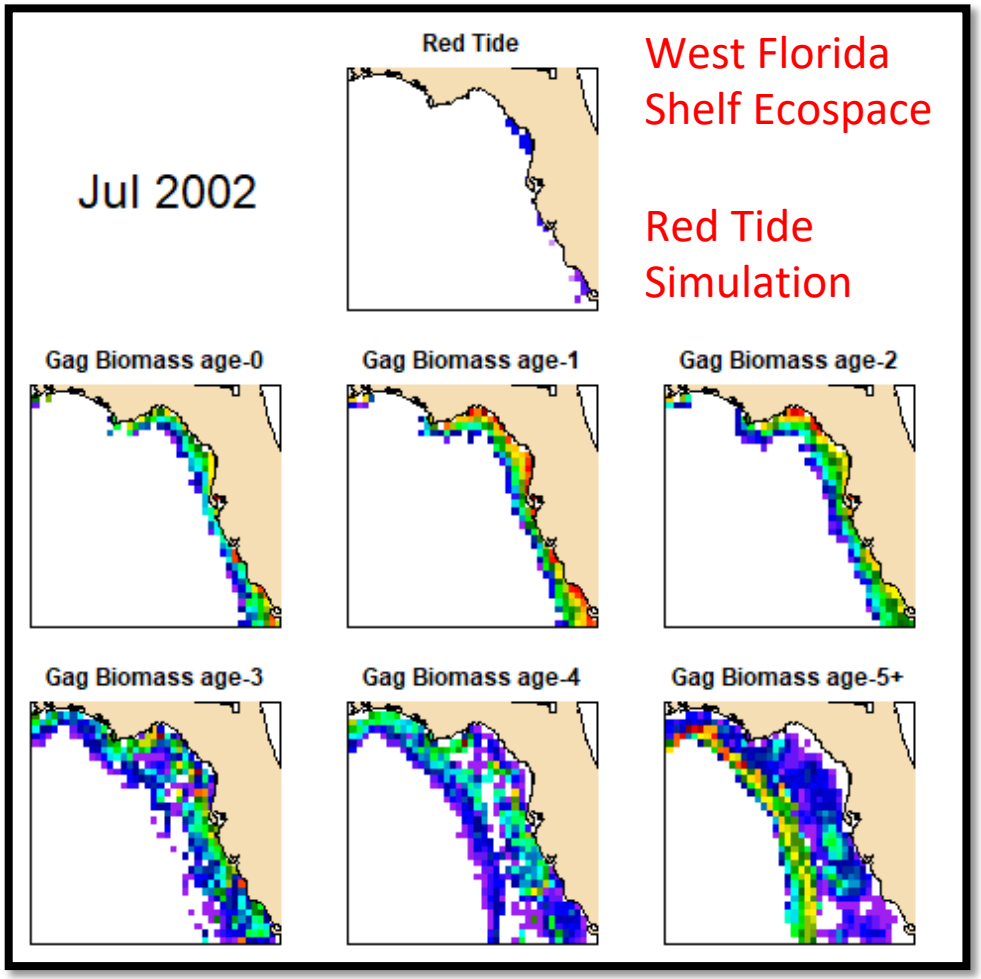
Simulating Red Tides in WFS Ecospace



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

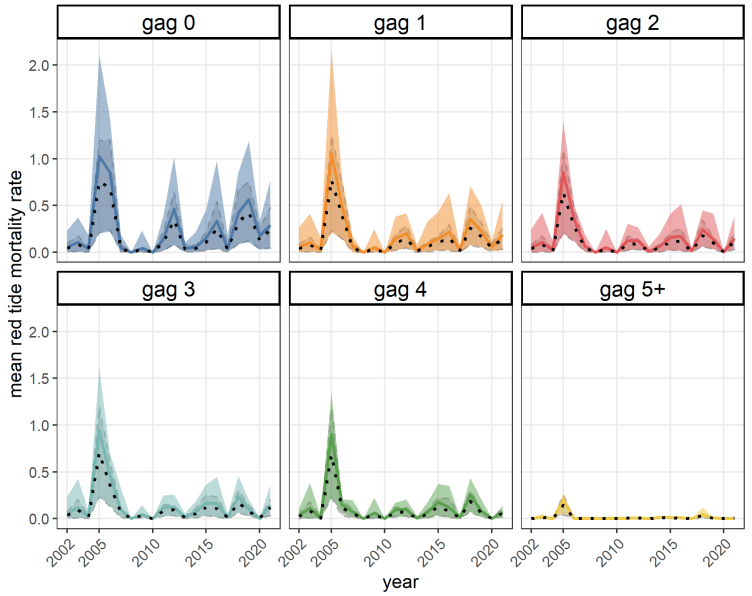


Response functions used to drive mortality, foraging, and movement

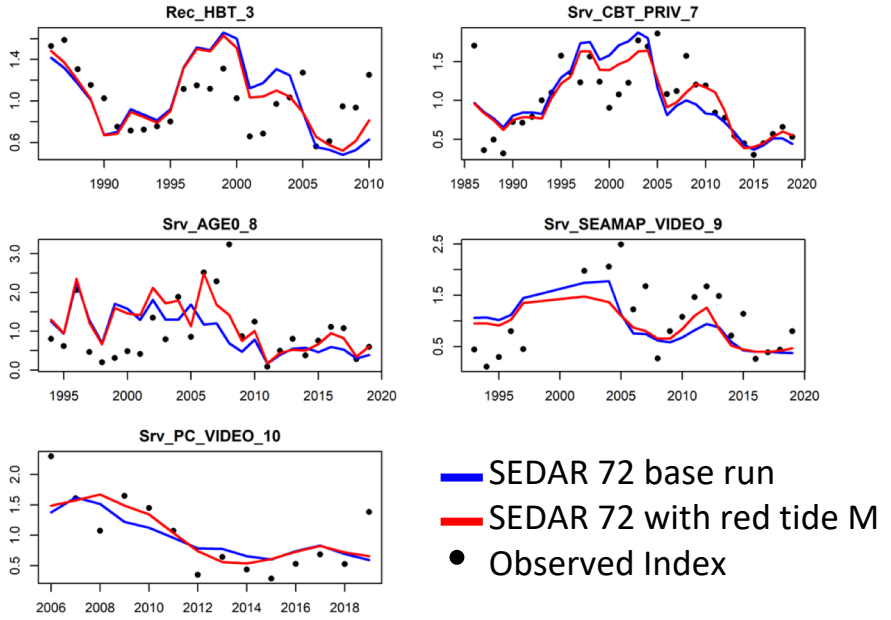


- ✓Spatial overlap
- ✓Bloom duration and severity
- ✓Direct mortality
- ✓Sub-lethal effects
- ✓Avoidance
- ✓Food web effects

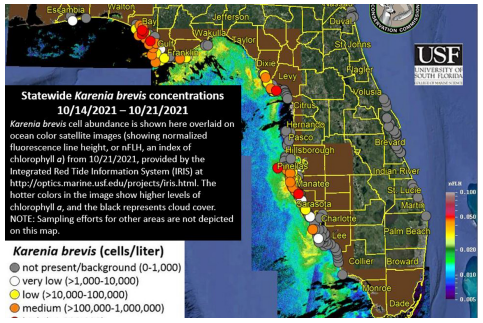
Informing Assessment & Management



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

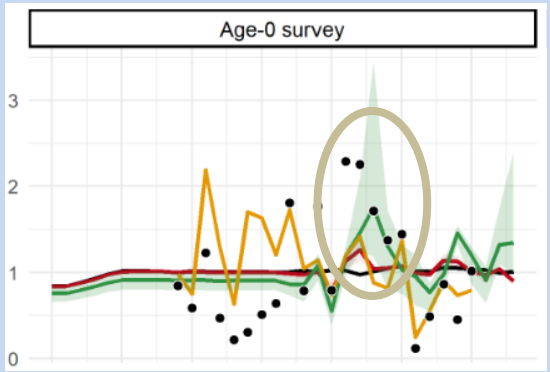


Stock Assessment Inputs: Red tide mortality vectors led to improved fits to index data when included in the gag stock assessment



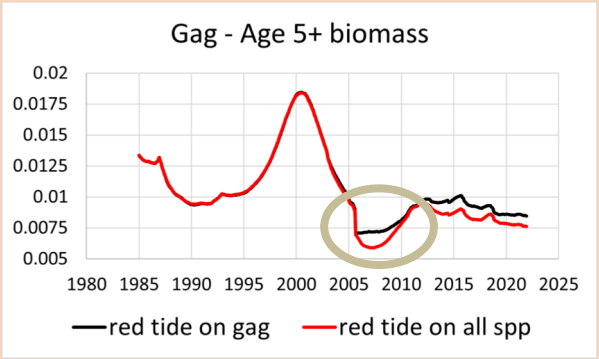
Informing OFL and ABC projections: Near real-time estimates of 2021 mortality to be used in catch projections

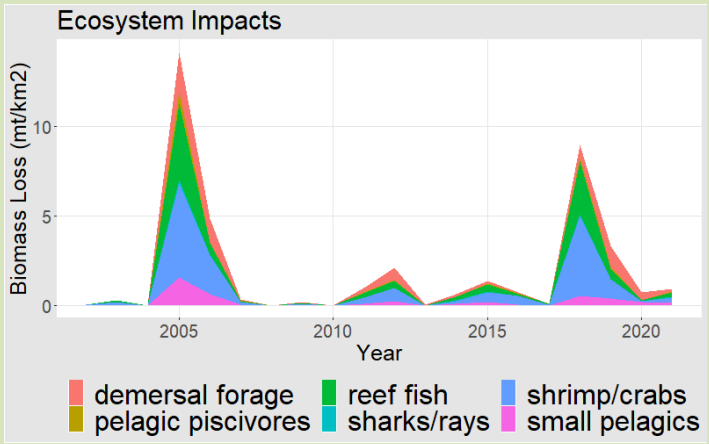
Insights on Ecosystem Dynamics



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

Acknowledgements

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

RESTORE SCIENCE PROGRAM

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

RESTORE SCIENCE PROGRAM

Funding

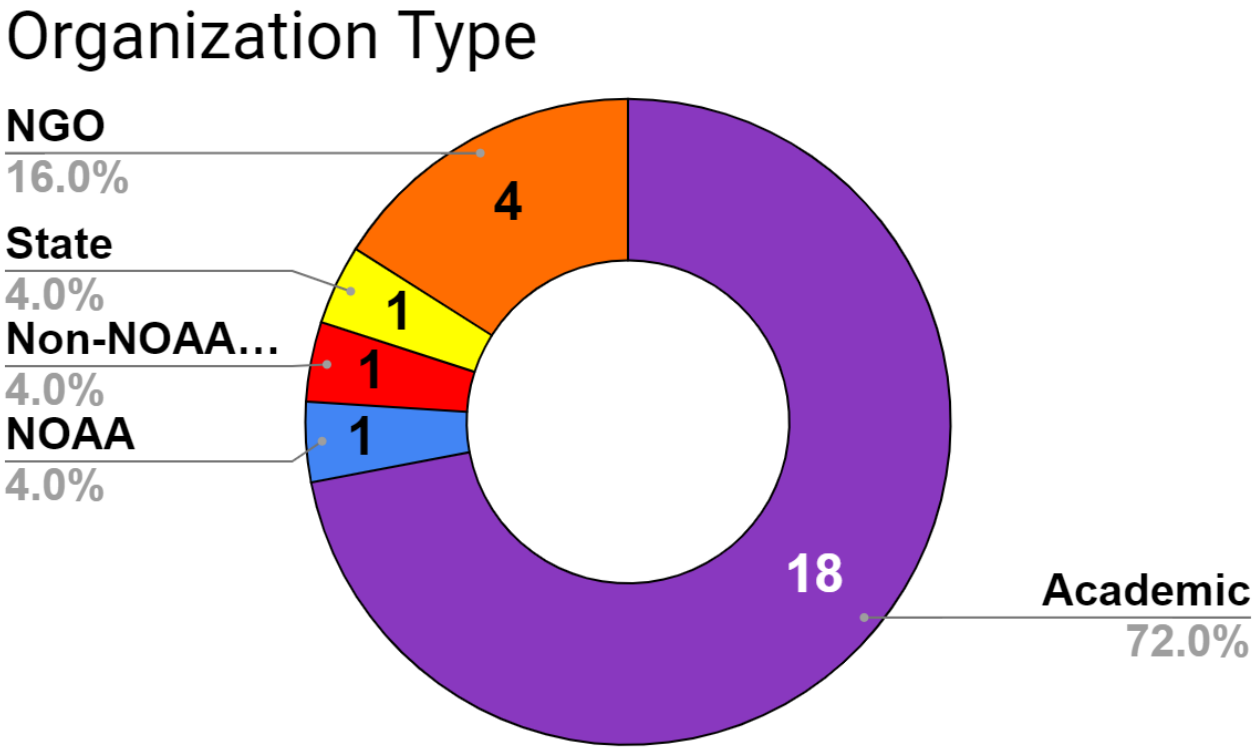
	Announced	Awarded
Number of awards	~6	5
Amount available	~$15M	$19.3M
Minimum award	$500K	$2.79M
Maximum award	$7.5M	$6.02M
Length of awards	5 years	5 years
Start date	Sep 2019	Sep 2019 (1 project, Jan 2020)

Review Process

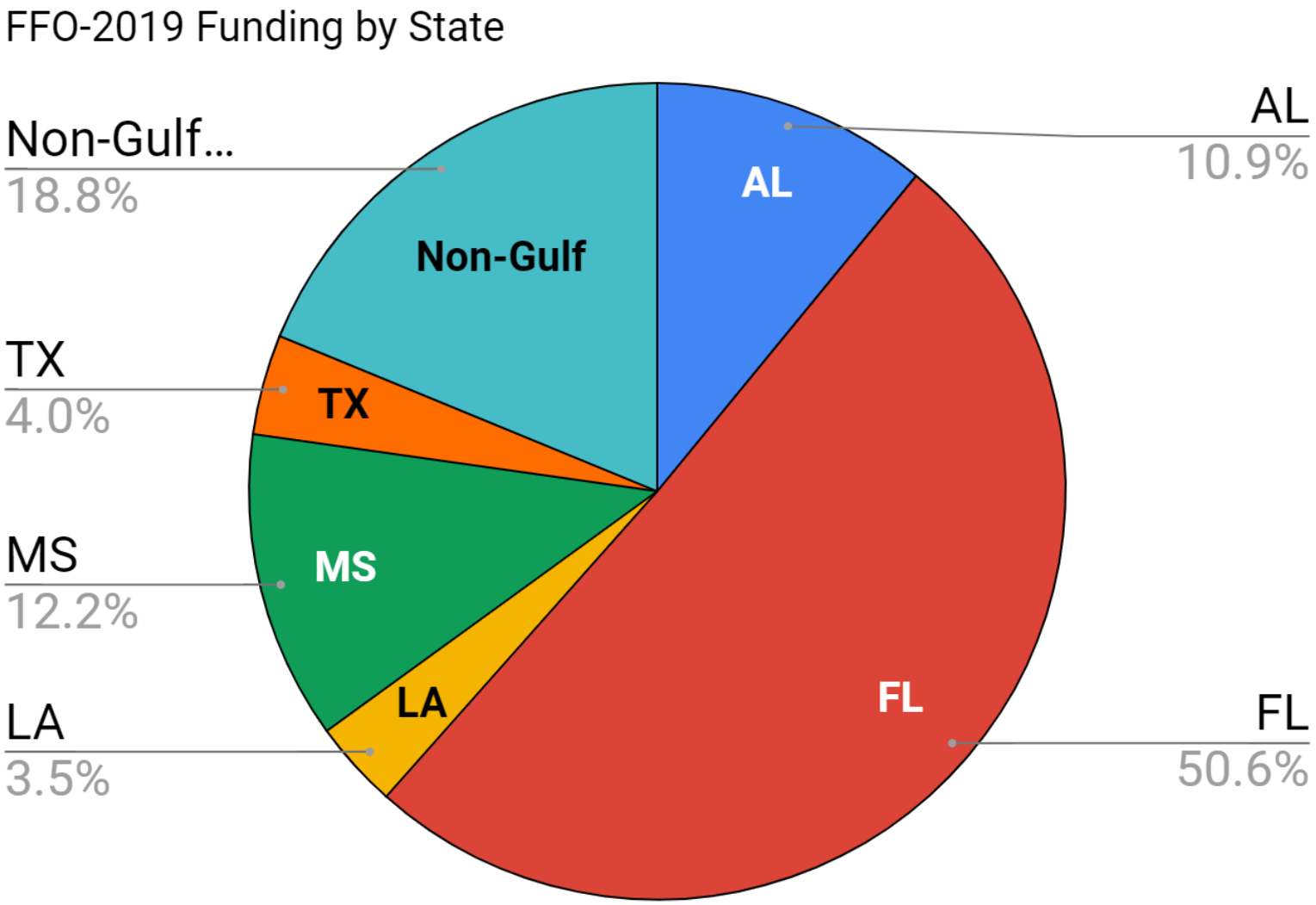
Stage	Pre-proposals (5 page limit)	Full applications	Awards
Total count	163	68	5
Strongly encouraged	11	11 (100%)	1
Encouraged w/minor modifications	56	51 (90.1%)	3
Discouraged w/out major modifications	40	3 (7.5%)	1
Discouraged	56	3 (5.3%)	0
Success rate (%)	---	---	7.4%

Awards by the Numbers

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



Awards by the Numbers



Projects

Title	Lead (Institution)	$K
Building resilience for oysters, blue crabs, and spotted seatrout to environmental trends and variability in the Gulf of Mexico	John C. Lehrter (University of South Alabama)	$2,887
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	Theodore Switzer (Florida Fish and Wildlife Conservation Commission)	$6,019
Assessing Long-term Trends and Processes Driving Variability in Cetacean Density throughout the Gulf of Mexico using Passive Acoustic Monitoring and Habitat Modeling	Melissa Soldevilla (NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center)	$3,589

Projects

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

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:

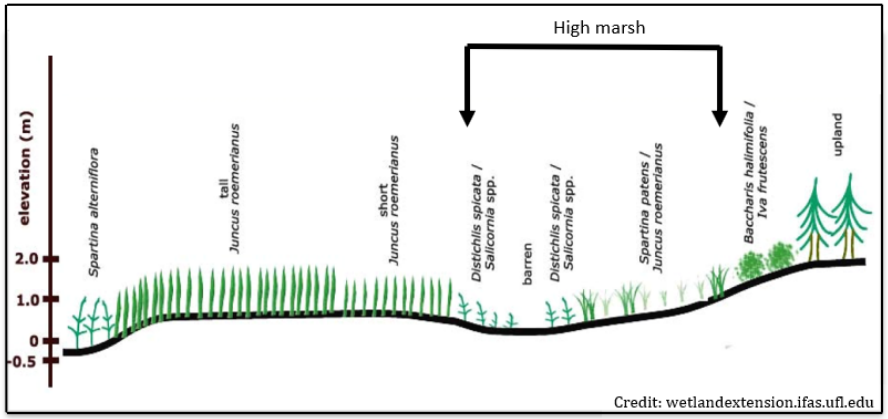
Fire Effects in Gulf of Mexico Marshes: Historical Perspectives, Management, and Monitoring of Mottled Ducks and Black and Yellow Rails

Auriel M.V. Fournier

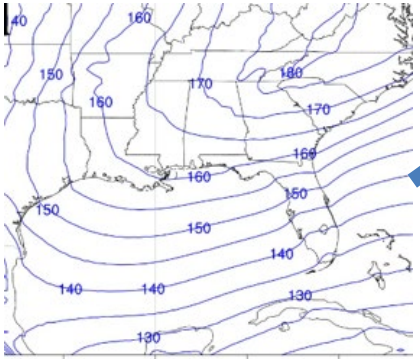
November 16, 2021

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

Region	Type Preference/ Avoidance							
	a	b	c	d	e	f	g	h
Laguna Madre	0	-4	-0.5	-1.5	-0.5	3.5	0	3
Texas Mid Coast	0	-3	-2.5	4	-1	1.5	0	1
Chenier Plains	-2	-1	-3	-2	1	4	-1	3
MS River Coastal Wetlands	-1	0	1	-0.5	0.5	-2	1	0
Coastal MS AL	0.5	-0.5	-2.5	1.5	2.5	0	-1	-1.5
Florida Big Bend	0	0	0	-1	-1	2	-1	0
Tampa Bay	-0.5	0	0.5	0.5	1.5	-2	2	-3

Indicates avoidance strength (more positive number = stronger avoidance)

Indicates preference strength (more negative number = stronger preference)

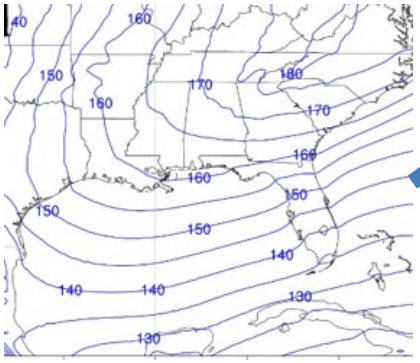
No change in frequency over time

Regional selection

Data inconsistent with hypothesis, leading us in new directions

Stakeholder feedback on this at last annual project meeting was key

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?

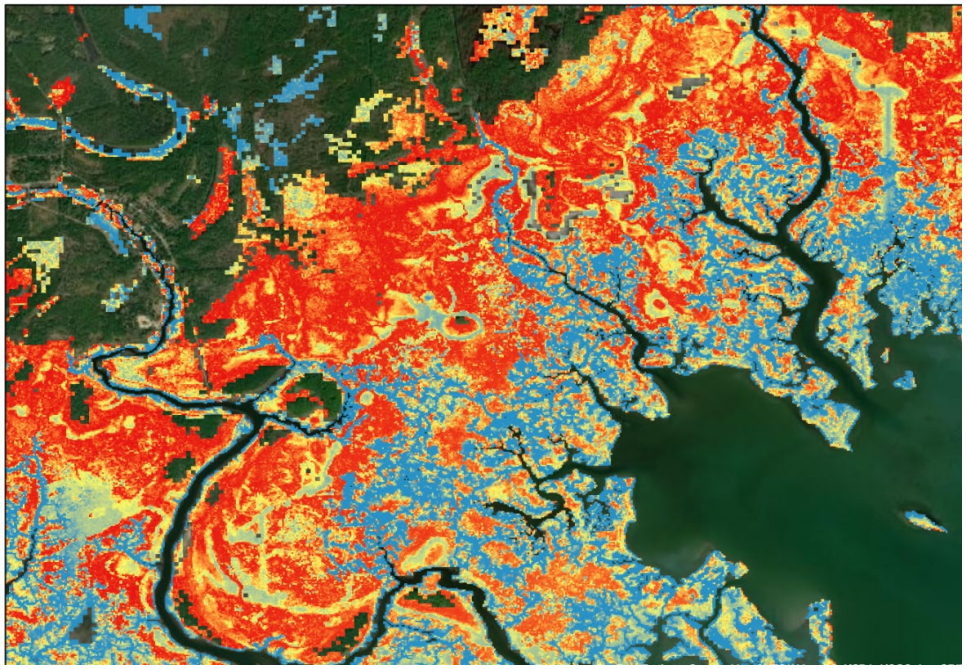
Where is the high marsh?

Mapping

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

Sentinel information for sea level rise

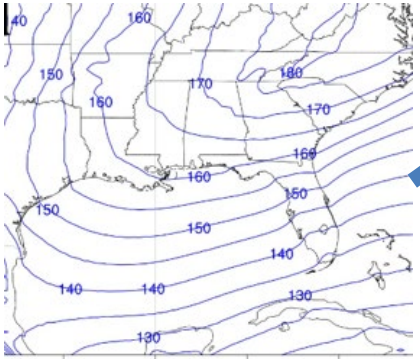
Ecotone for rare plants



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?



Prediction about fire bird relationship

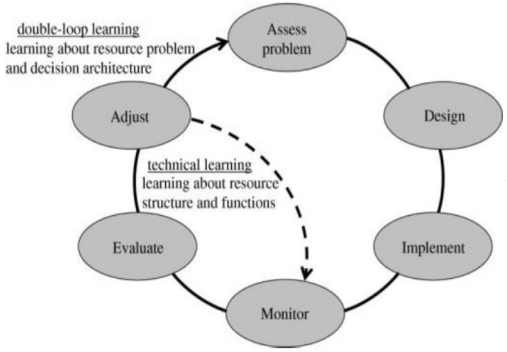


Figure 1 - Adaptive Management Double Loop Process

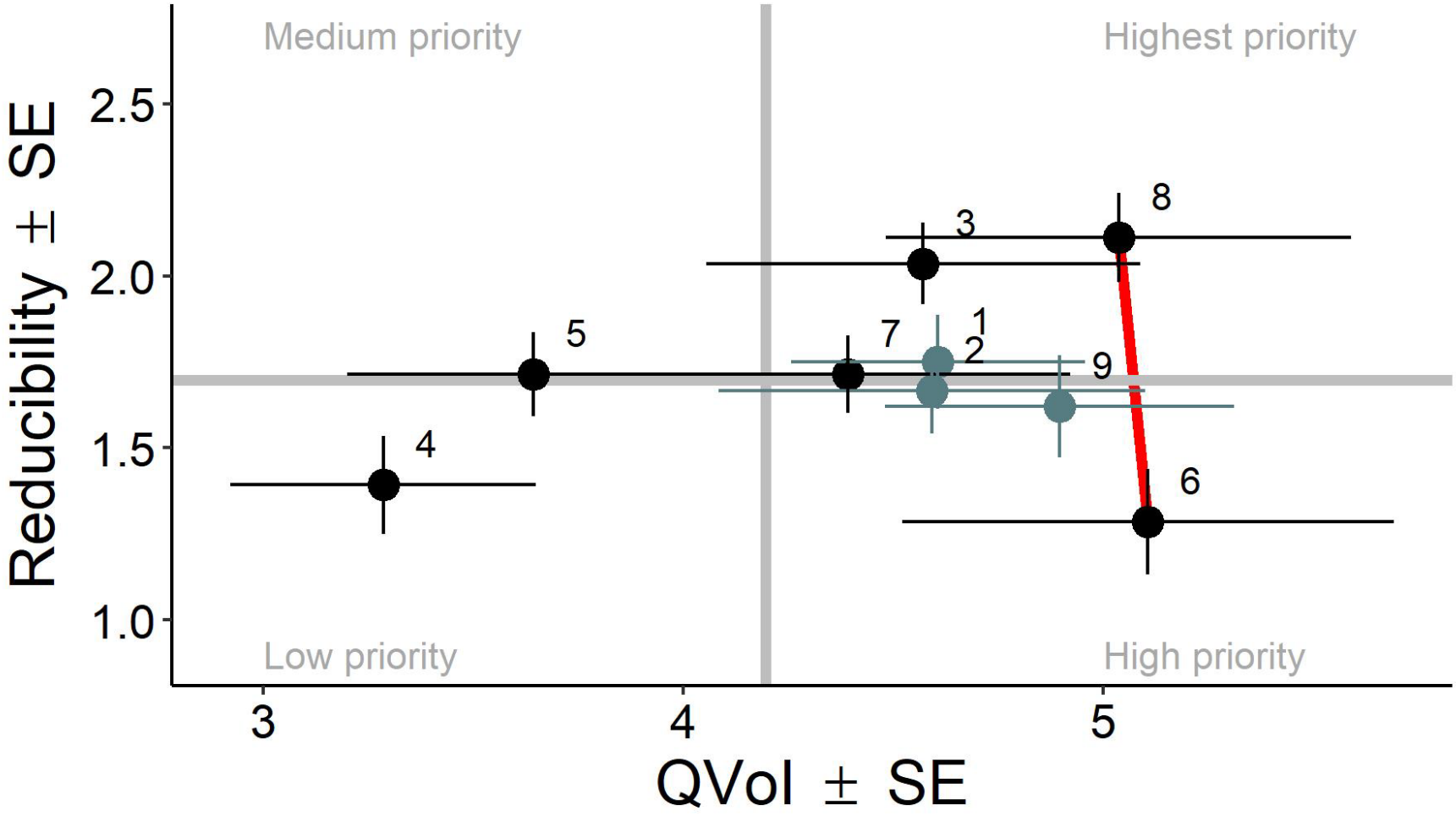
Winter and Breeding season focal species data collection

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:

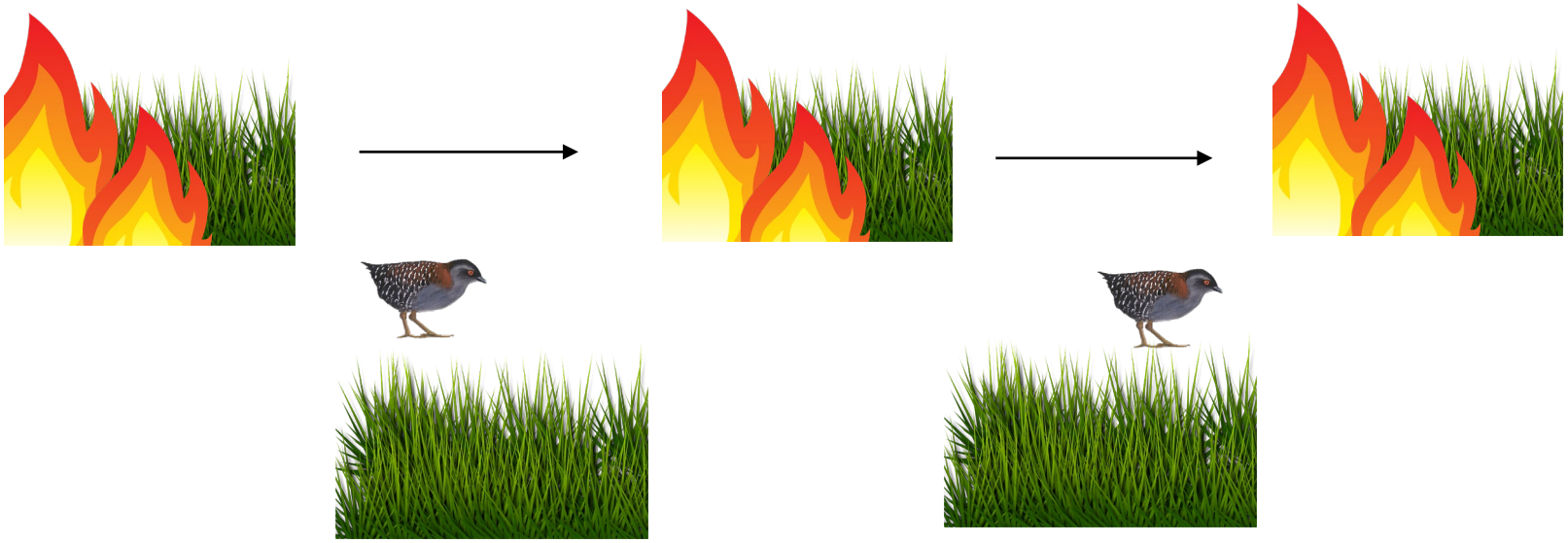
Florida Fish and Wildlife Conservation Commission
Alabama Dept of Conservation and Nat Resources
Mississippi Dept Wildlife Fisheries and Parks
Louisiana Dept Wildlife and Fisheries
Texas Dept Parks and Wildlife
USFWS
  two regions
  ecological services
  national wildlife refuges
Audubon Delta
Gulf Coast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


Medium priority
Highest priority
Low priority
High priority
Reducibility ± SE
QVol ± SE
2.5
2.0
1.5
1.0
3
4
5
1
2
3
4
5
6
7
8
9

Experimental study

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)

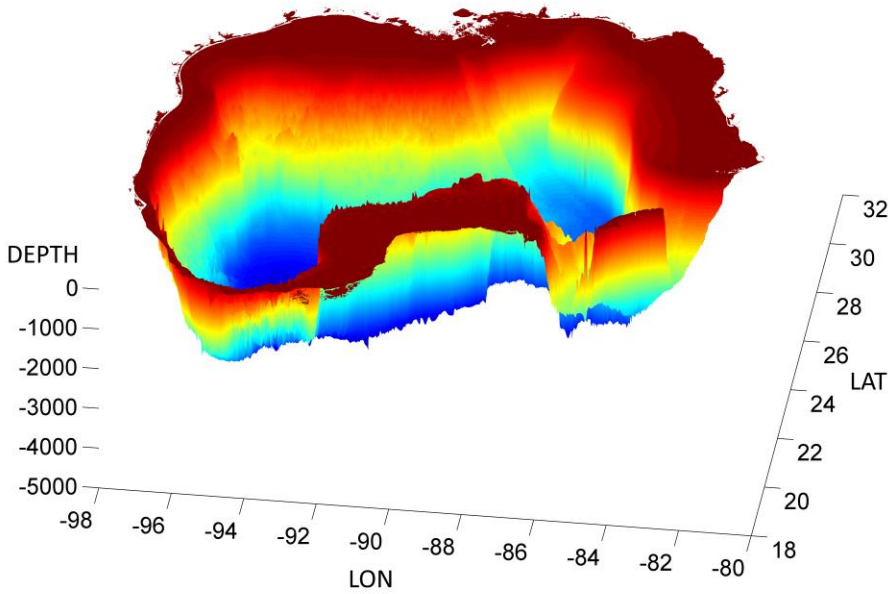
Tracey Sutton

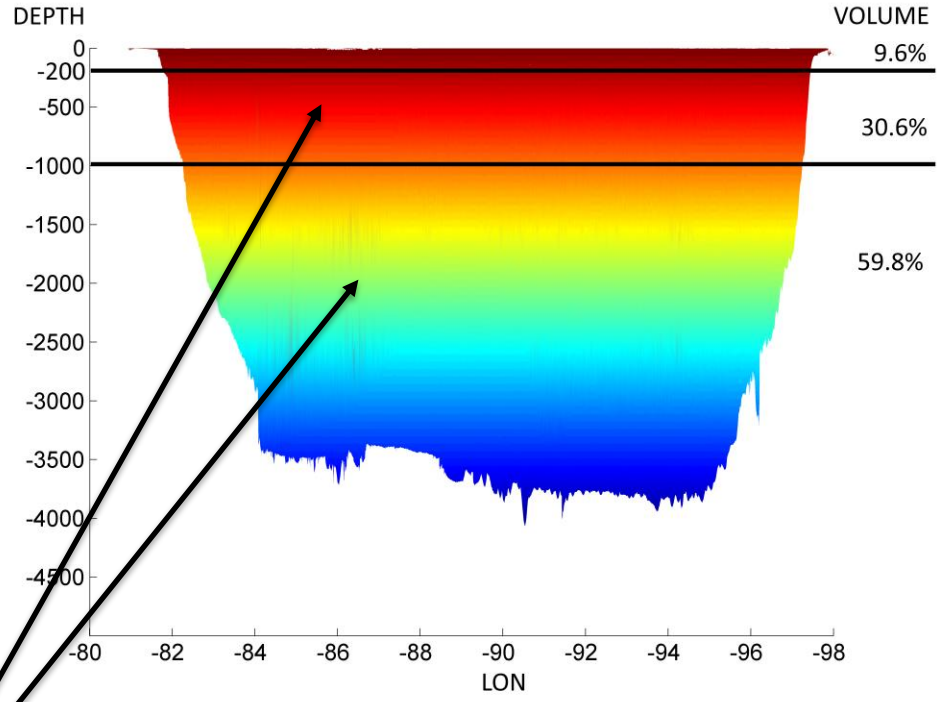
November 16, 2021

NOAA RESTORE Science Program – Review

The offshore pelagic domain

The Gulf deep-pelagic domain



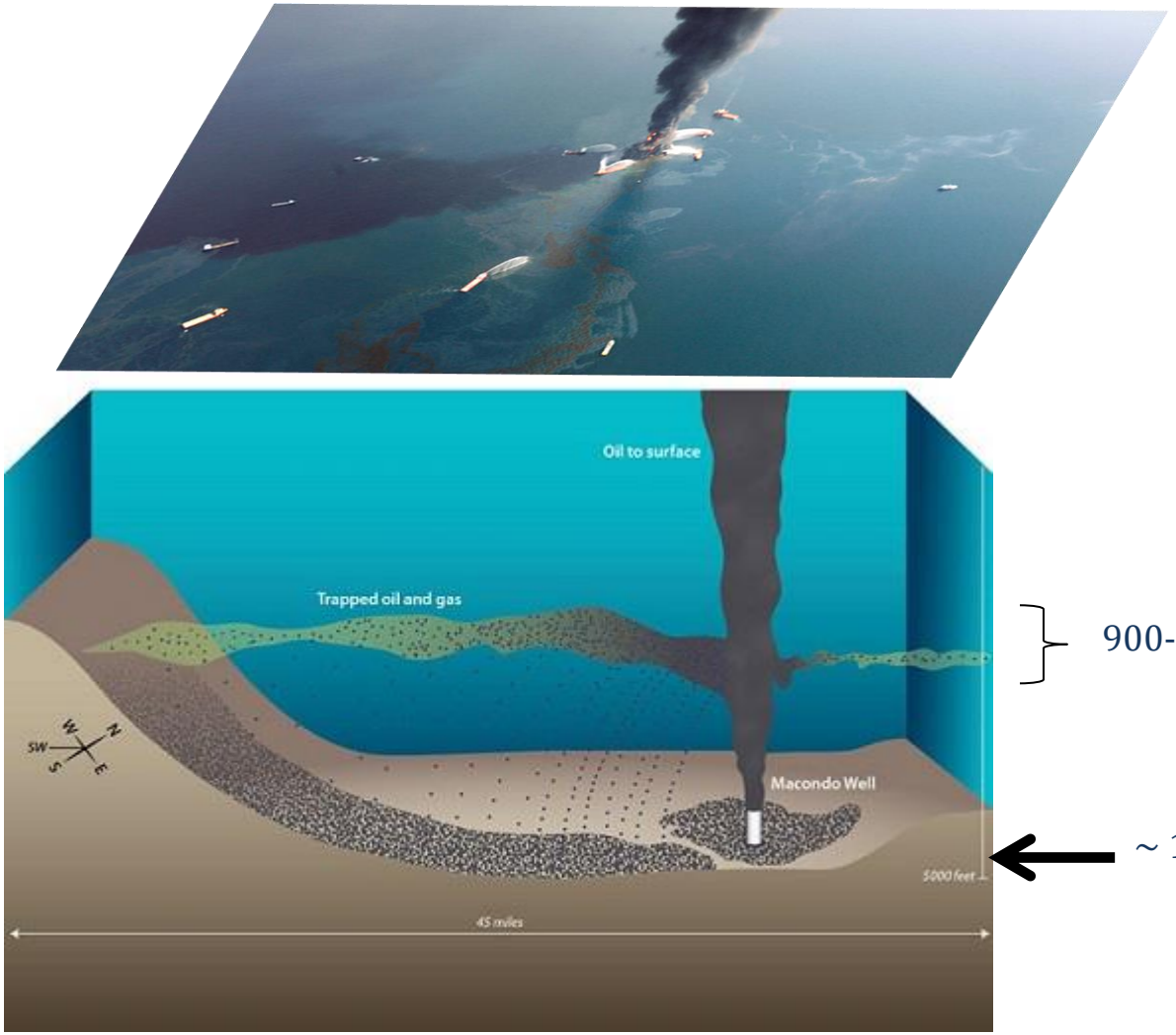


Sutton et al. (in review)

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



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

DEEP PELAGIC NEKTON DYNAMICS OF THE GULF OF MEXICO

2015-2019 (GoMRI) 2019-2024 (2029?) RESTORE

What is DEEPEND?

(Deep-Pelagic Nekton Dynamics)

PIs: 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

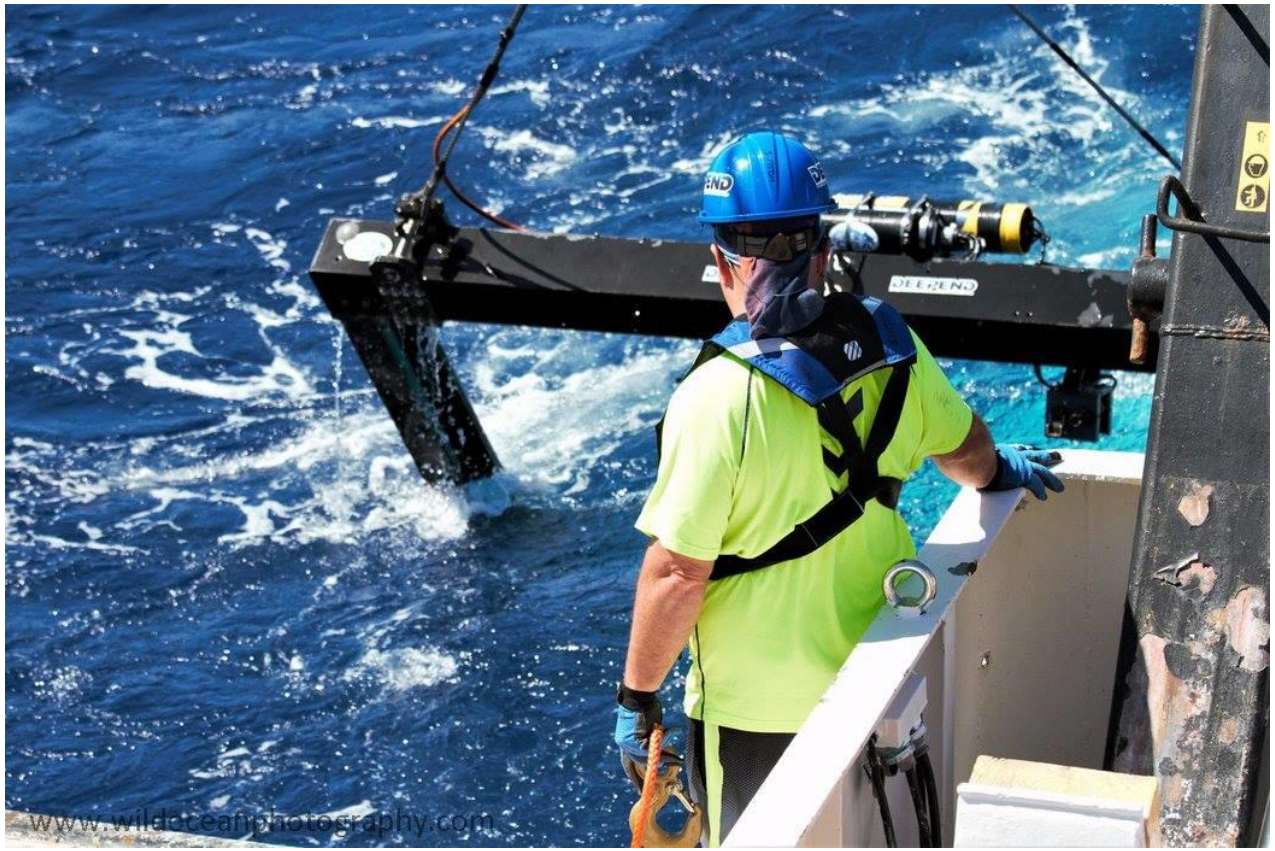
Tracey Sutton
Project lead

The focal taxa: pelagic nekton

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

The time series

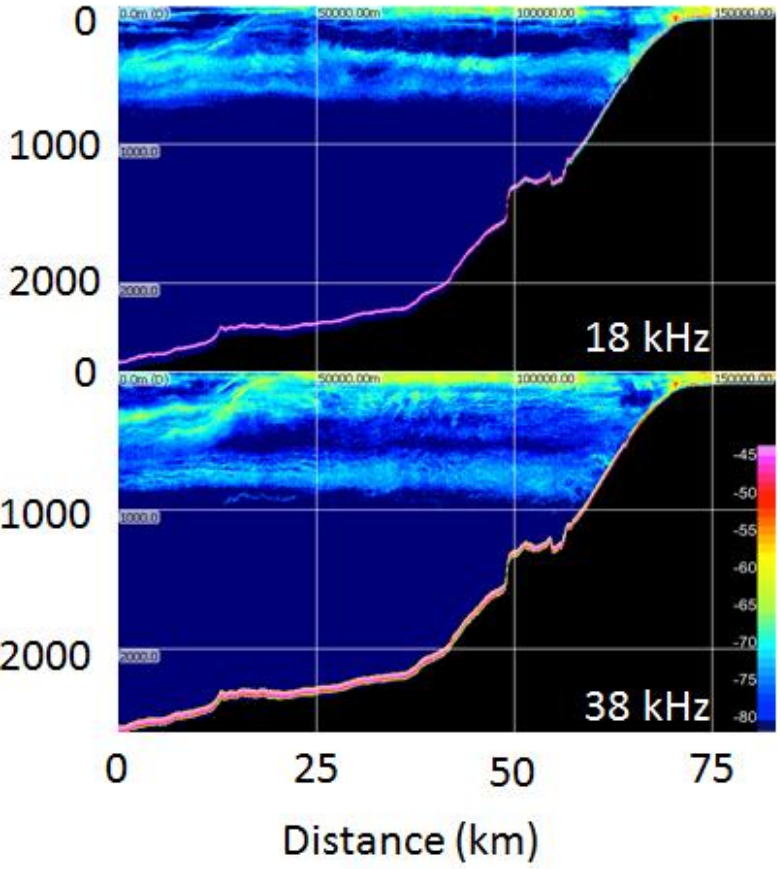
Discrete-depth sampling (0 – 1500 m): 2011-2021

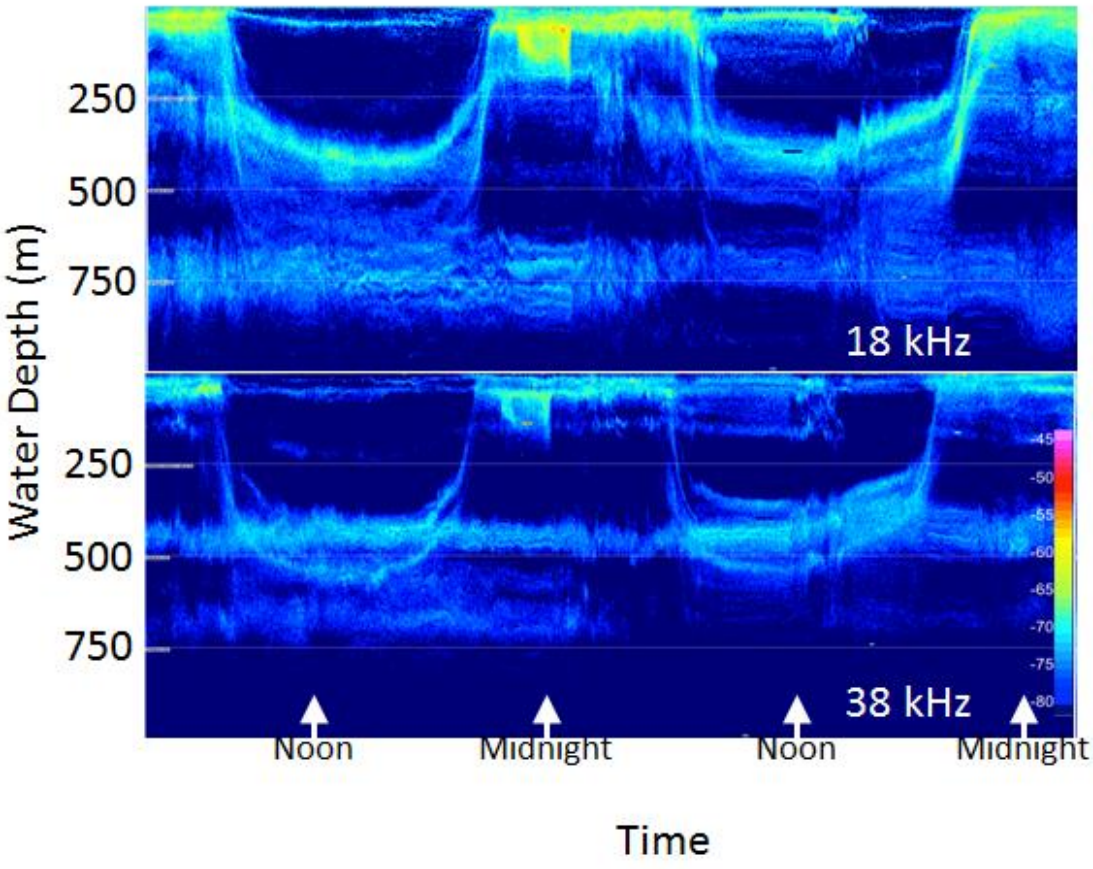


- 10-m^2 multiple-net trawl that can be opened and closed at depth
- ~2400 trawl samples

The time series

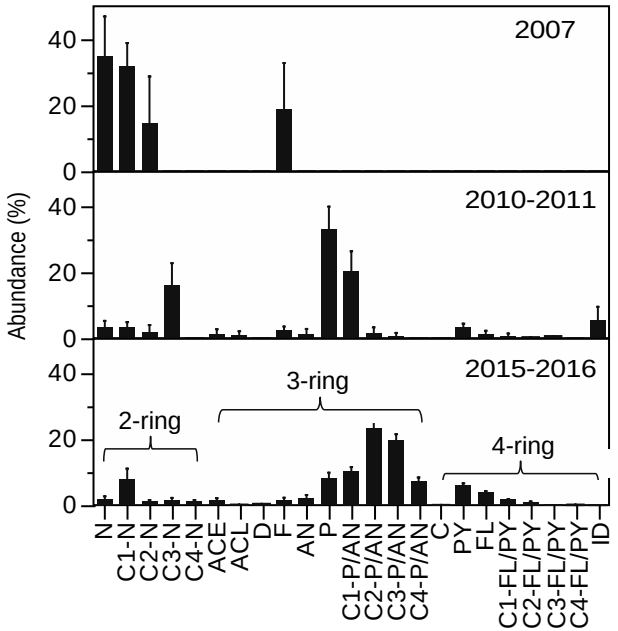
Multi-frequency bioacoustics



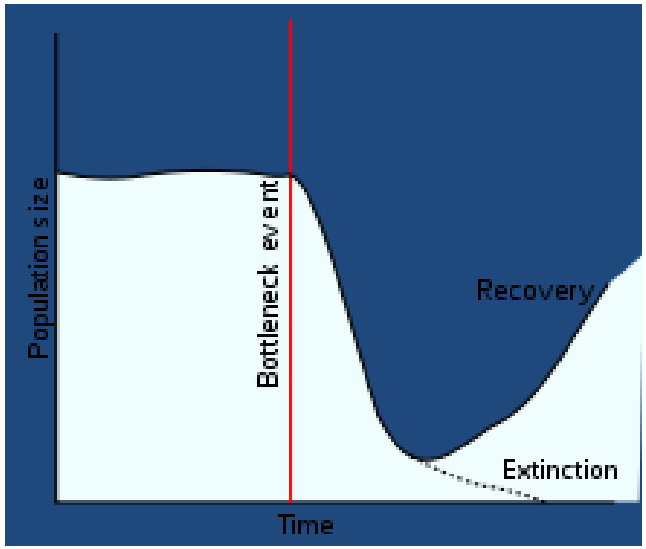


"Connectivity of the domains"

The time series



Petrochemical contamination



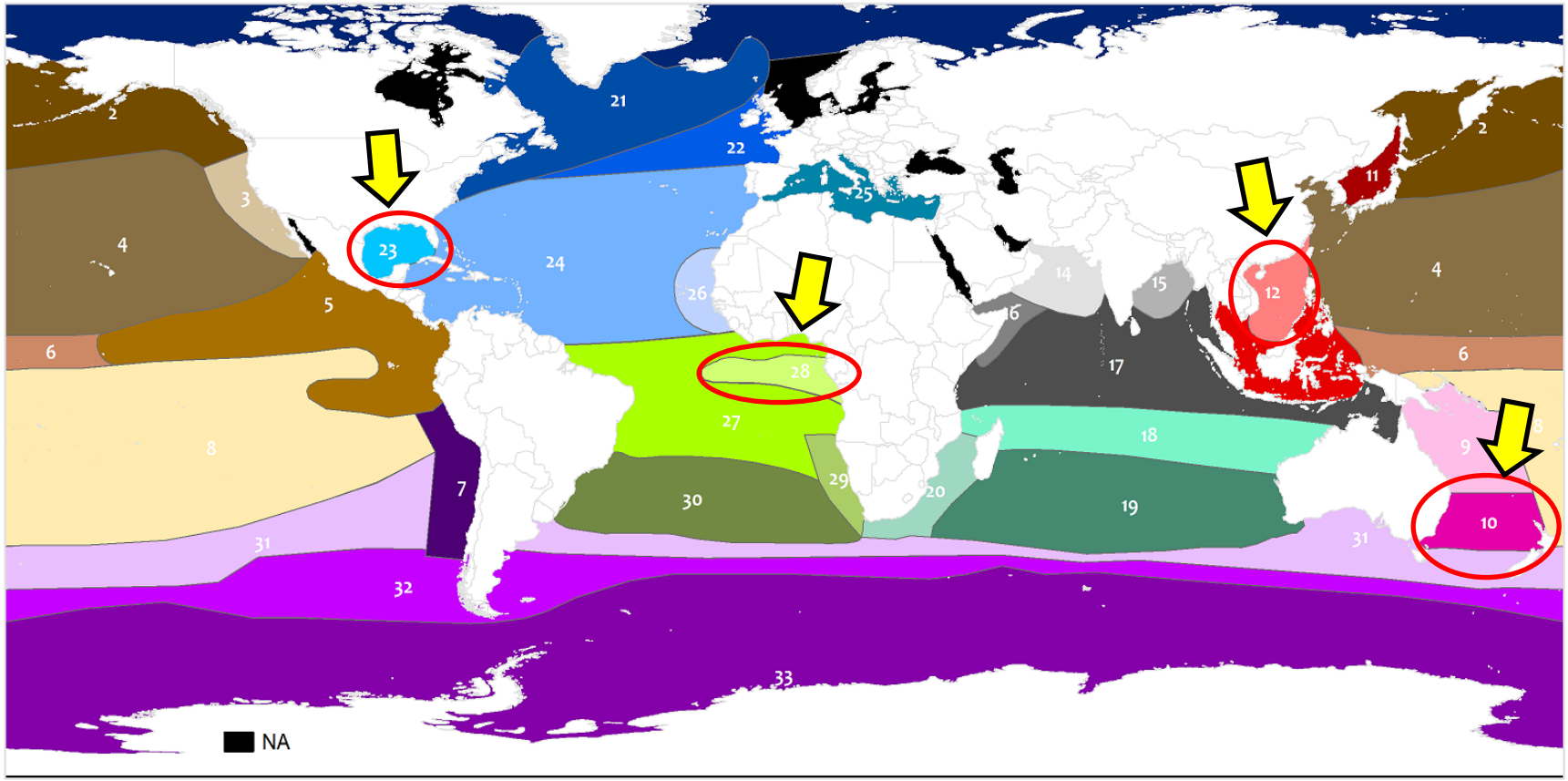
Population genetics

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

Science
AAAS

Submitted Manuscript: Confidential

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

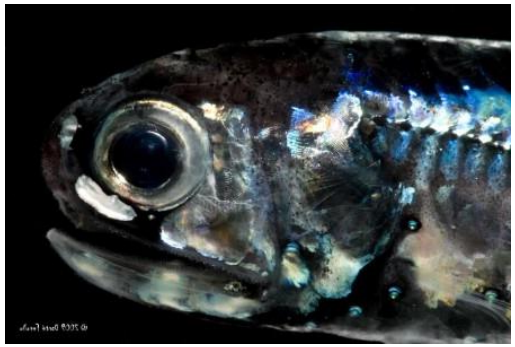
Authors: Tracey T. Sutton[1,*], Rosanna J. Milligan[1], April B. Cook[1], Kevin M. Boswell[2], Marta D'Elia[2], Tamara Frank[1], Heather Bracken-Grissom[2], Daniel R. Hahn[3], Matthew W. Johnston[1], Heather Judkins[4], Jon Moore[5], Nina M. Pruzinsky[1], John A. Quinlan[6], Isabel C. Romero[7], Michael Vecchione[8], Joseph D. Warren[9]

Major findings

Lanternfishes have declined 85% since 2011

Major findings

Euphausiids (“krill”) have declined 92% since 2011

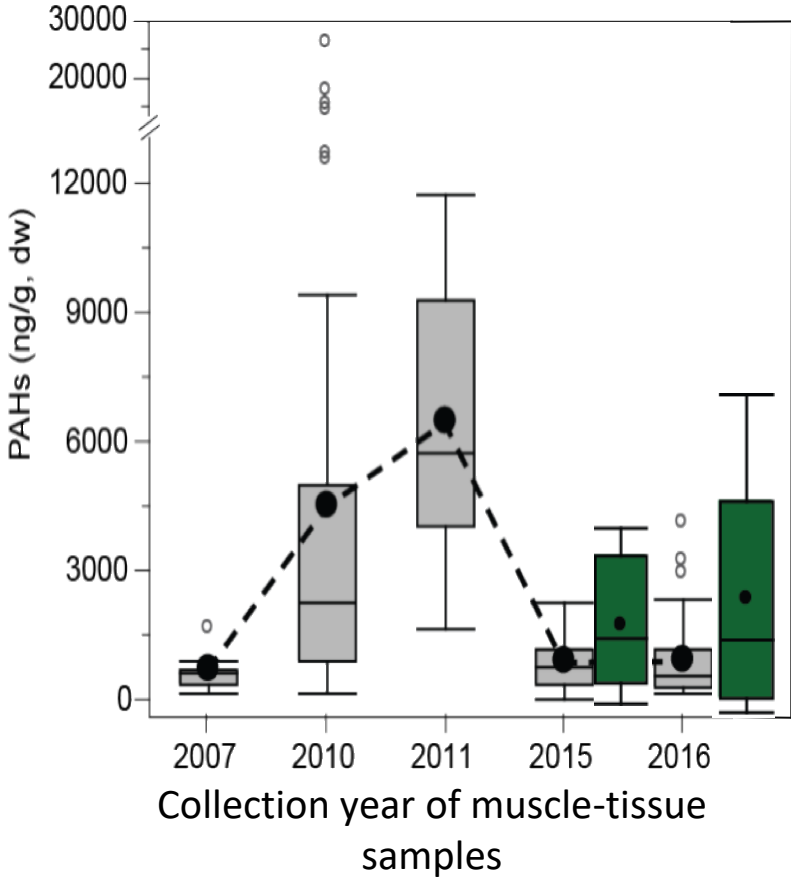


Major findings

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

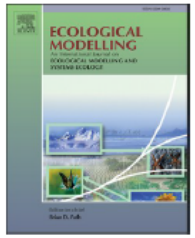
Major findings

Ecological Modelling 445 (2021) 109509

Contents lists available at ScienceDirect

Ecological Modelling

journal homepage: www.elsevier.com/locate/ecolmodel



An early warning sign: trophic structure changes in the oceanic Gulf of Mexico from 2011—2018

Matthew S. Woodstock [a,*], Tracey T. Sutton [b], Tamara Frank [b], Yuying Zhang [a]

- 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

Resource management applications

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

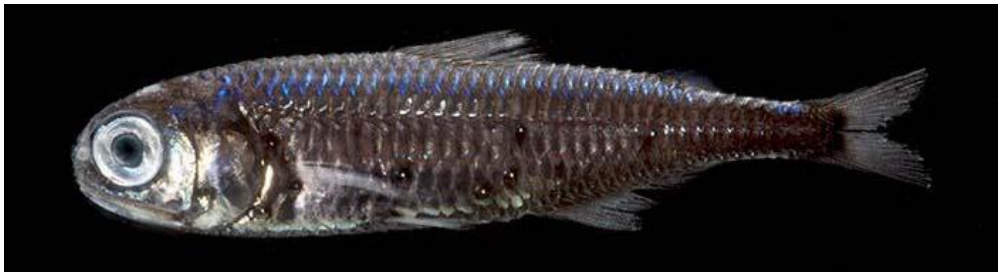
Example: a “lanternfish index” of offshore prey availability for the CETACEAN Project

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

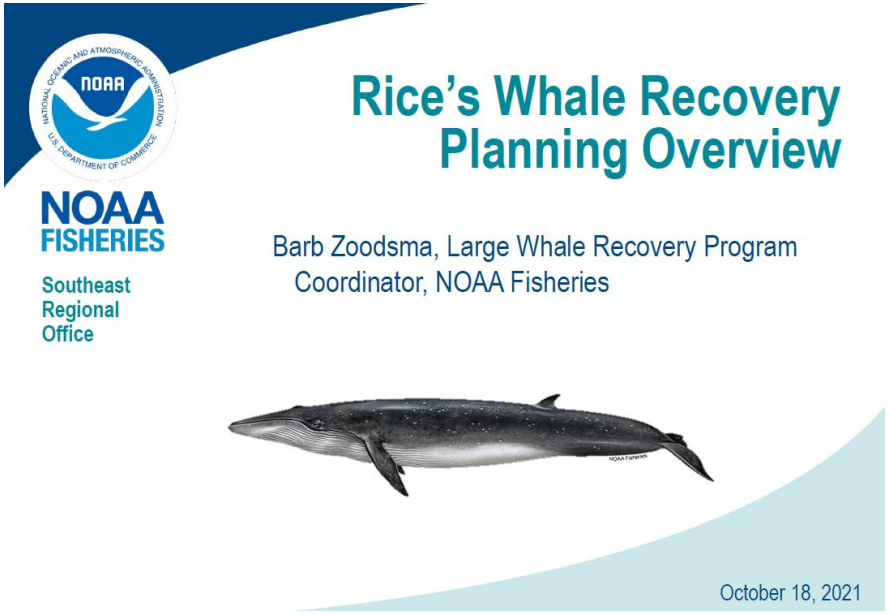
– funded by NOAA Open Ocean Restoration TIG

– 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.



Resource management applications



DEEPEND providing subject matter expertise on mesopelagic prey of critically endangered species

Resource management applications

DEEPEND is:

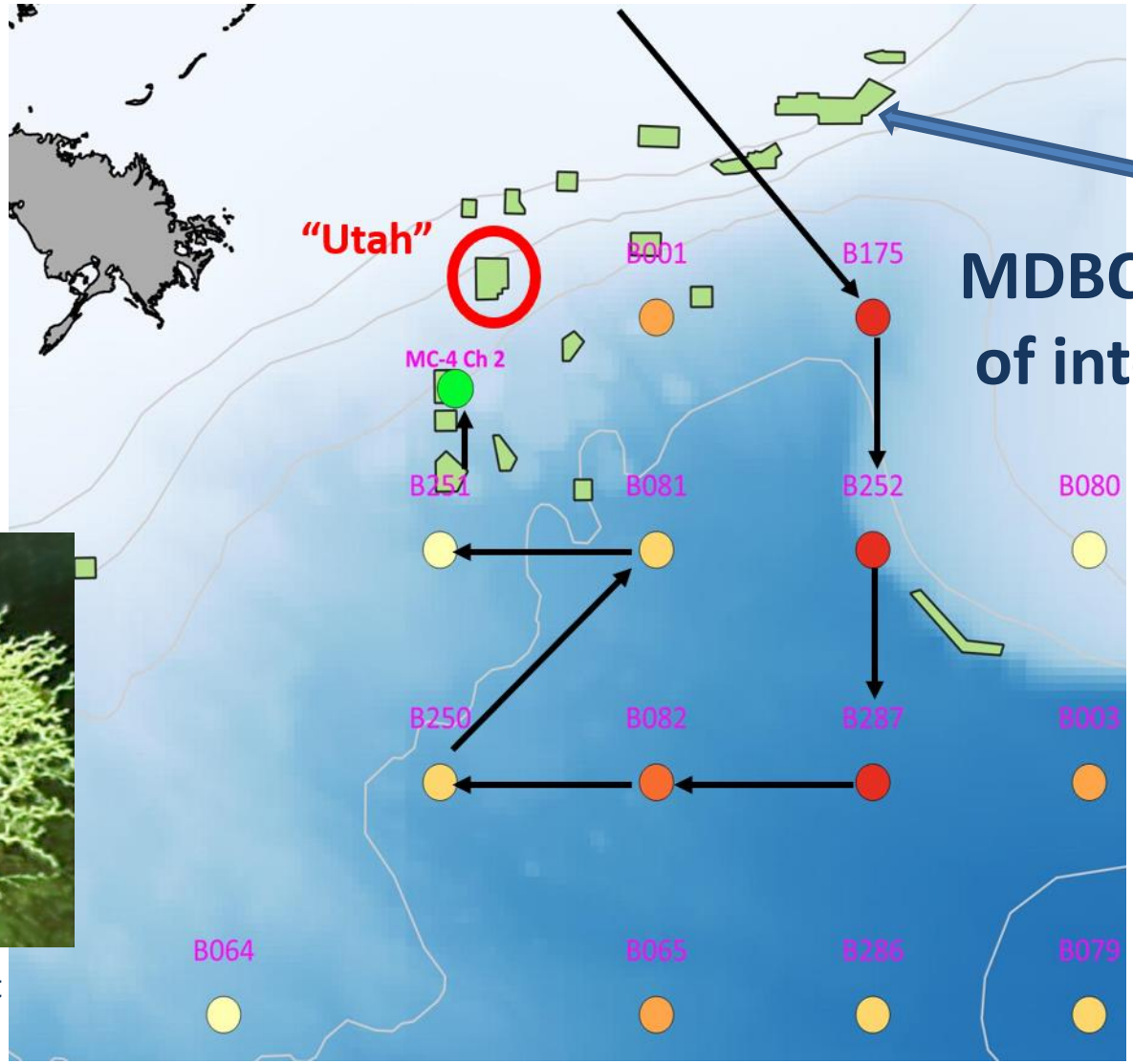
1) providing subject matter expertise for restoration planning, and

2) tailoring field work to investigate important ecological processes

Resource management applications

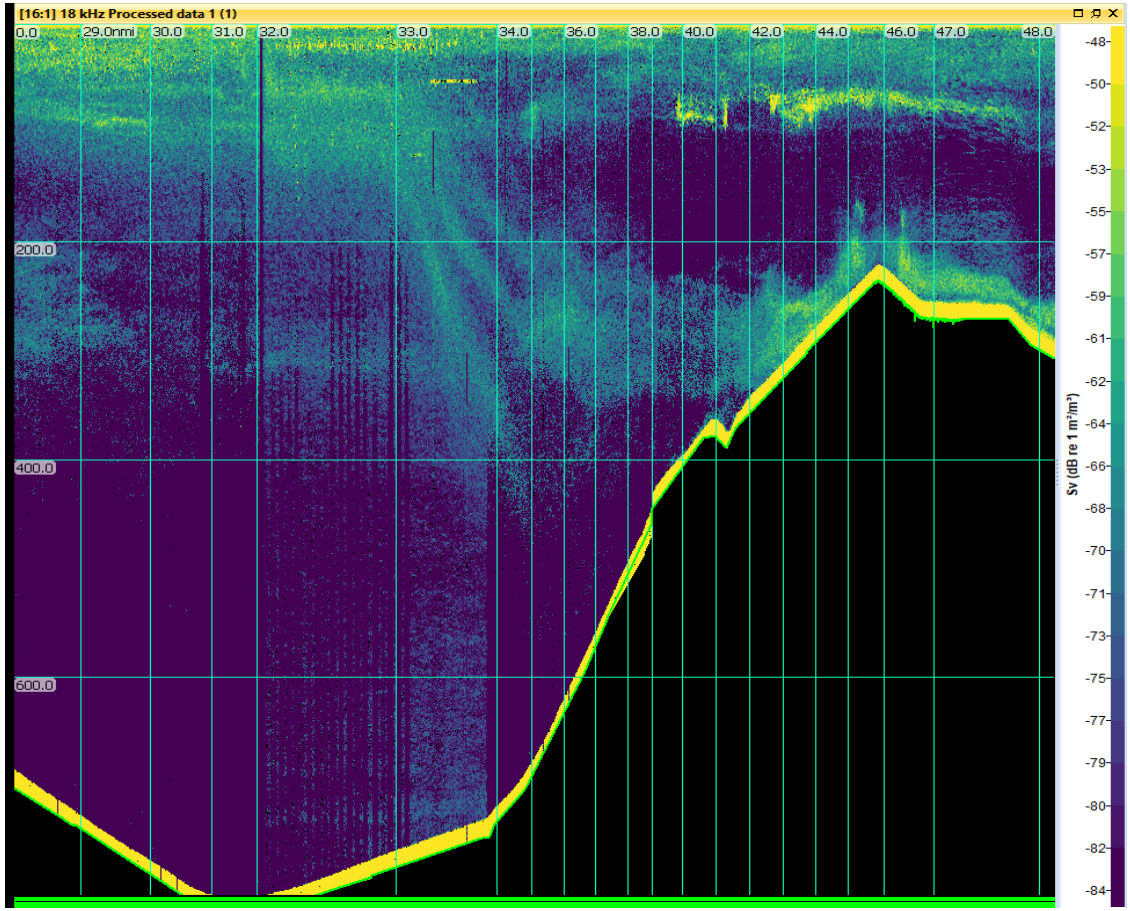
DEEPEND cruise DP07; Apr-May, 2021

Viosca Knoll *Lophelia* thicket



MDBC sites of interest

Resource management applications



04:00 Local Time 11:00

MBC? Would be first in Atlantic

DEEPEND|RESTORE

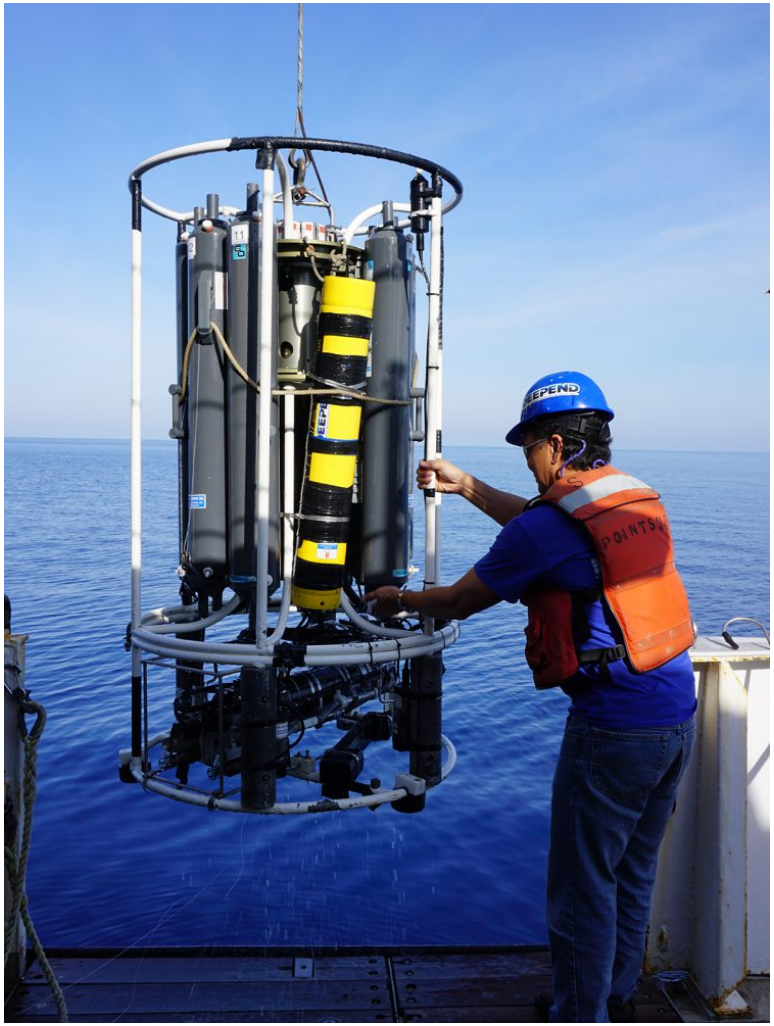
Roundtable Discussion

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.