

GTM Research Reserve Technical Advisory Group (TAG)

February 22, 2023

Meeting Notes

Focus: Fish

Objectives:

1. Discuss and learn from stakeholders and subject matter experts about the status of fish within the GTM Research Reserve boundaries and actions needed to maintain the health of the estuary.
2. Assist the GTM Research Reserve with the development of management needs and/or research questions related to fish (nekton).

Attendees:

| Name | Affiliation |
|--------------------|--|
| Abigail Kuhn | GTM Research Reserve |
| Allix North | GTM Research Reserve |
| Anna Braswell | University of Florida/Florida Sea Grant |
| Ben Williams | Wetland Preserve, LLC |
| Brad Mahanes | GTM Research Reserve Volunteer |
| Cheryl Clark | Office of Resilience and Coastal Protection |
| David Birchim | City of St. Augustine |
| Diane Downing | GTM Research Reserve Volunteer |
| Edward McGinley | Flagler College |
| Ellen Reed | Friends of the GTM Reserve |
| Ely Brooks | Self, GTM Research Reserve Volunteer |
| Esther Mahanes | GTM Research Reserve Volunteer |
| Ginger Feagle | Florida Fish and Wildlife Conservation Commission |
| James Richardson | Jacksonville Environmental Protection Board |
| Janet Koehler | GTM Research Reserve Volunteer |
| Jeff Beal | Ducks Unlimited |
| Jen Lomberk | Matanzas Riverkeeper |
| Jessica Spencer | US Army Corps of Engineers |
| Jimmy Liao | Whitney Lab for Marine Bioscience |
| Joe Kvapil | Flagler Sportfishing Club |
| Josephine Spearman | GTM Research Reserve |
| Justina Dacey | University of Florida |
| Kaitlyn Dietz | GTM Research Reserve |
| Kathy Russell | City of Fernandina Beach |
| Kirstin Thompson | GTM Research Reserve |
| Kristie Perez | University of Florida |
| Kurt Foote | Fort Matanzas Nat. Monument, National Park Service |

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| Leslee Keys | Keys and Associates, LLC. |
| Lia Sansom | GTM Research Reserve |
| Margo Moehring | Northeast Florida Regional Community Institute |
| Marilyn Wiles | Enterprising Women's Leadership Institute |
| Michael Shirley | Florida Department of Environmental Protection |
| Mike Alyea | Blue Ocean Sails |
| Mike Sullivan | Premium Seafood, Inc. |
| Neil Rashba | Private Citizen |
| Nicole de Venoge | Private Citizen |
| Nikki Dix | GTM Research Reserve |
| Richard Thomas | Coastal Conservation Association |
| Rick Gleeson | University of Florida, retired |
| Ron Brockmeyer | St. Johns River Water Management District |
| Russell Brodie | Florida Fish & Wildlife Conservation Commission |
| Sam Baker | SOL Margin Fishing and Conservation Foundation |
| Sarah Miller | Florida Public Archaeology Network /Flagler College |
| Scott Eastman | Florida Department of Environmental Protection |
| Shannon Dunnigan | GTM Research Reserve |
| Shirley Baker | University of Florida |
| Silas Tanner | GTM Research Reserve |
| Steve Brown | Retired NOAA, GTM Research Reserve Volunteer |
| Steven Kidd | Timucuan Ecological and Historic Preserve, National Park Service |
| Todd Osborne | University of Florida, Whitney Laboratory |
| Tricia Kyzar | University of Florida, Center for Coastal Solutions (UF, CCS) |
| Will Hinton | Florida Fish & Wildlife Conservation Commission |

The morning session consisted of a roundtable discussion to determine the knowledge and data gaps of fish in the GTM Research Reserve watershed and how answers to these questions would benefit the estuary.

- **What are the questions about fish in the GTM Research Reserve watershed and why is it important to know the answers?**
 - Population and community dynamics
 - Species abundance, distribution, and diversity- What are the different species of fish (current and historic) residing in the GTM boundaries?
 - There is a gap in specialized analysis and there is a need for better techniques to ID
 - What are the important recreational and commercial fishing species that live there?
 - Known species: Redfish, trout, flounder, and snook stock assessment (are species populations increasing or decreasing?)
 - If fish are declining in the estuary, are they declining elsewhere?
 - If fish populations are changing, what are the causes of decline/increase?
 - How do we keep these fish populations sustainable?

- What prevents success of stable populations?
 - What are the implications of the changes we are seeing?
 - Changes in population size/structure
 - Migration of fish due to warming
 - E.g., northern expansion of species (snook)
 - What are the indicator species? What is the overall health of species/individuals? (size, lifespan)
 - What are the status and trends of all nekton and commonly fished species?
 - Can bird foraging habitat be an indicator for fish populations?
 - What are the food sources in the estuary?
- Life span
 - How can juveniles be protected?
 - Identify juvenile cohorts to predict adults moving into the fisheries
 - Where are juvenile recruitment and settlement hotspots (Year 1)?
 - Study maturity/reproduction of fish in the estuary
- Movement
 - What are the fish migration patterns?
 - Where are the fish? How do they use inlets/tributaries?
 - Questions pertaining to water depth/lake management for fish movement
- Habitat
 - Nursery grounds
 - Which fish are using the estuary as a nursery ground?
 - Where are nursery hot spots?
 - What are successes and failures of nursery habitats?
 - Habitat availability and connectivity for fish
 - Which habitat is the most ideal quality (oysters, marshes, mangroves, or hard shorelines/docks)?
 - What are environmental conditions that make better habitat?
 - How does habitat restoration affect juvenile recruitment?
 - Collecting fisheries information is generally difficult, how should it be done in an open estuary? Perhaps targeted approach by habitat “sentinel site approach”
 - Do creeks on East Tolomato River (Capo, etc.) connect with Guana River at high tides?
 - Compare upstream with downstream- what are the differences in estuary versus surrounding waters?
- Threats/Stressors
 - Water Quality
 - How does water quality impairment effect fish?
 - What are the correlations between water quality and fish species?
 - What are the effects of red tide on fish populations?
 - What are the different water quality parameter needs of different juvenile fish such as redfish, penaeid shrimp, sea trout, and snook?
 - Development

- What are the impacts of dredging? What is the change in benthic habitats due to dredging using bathymetry maps?
 - Estuary condition index and land use change
 - What is the impact of development on fish?
 - Can you correlate watershed development rates with fish population trends, especially Palencia/Nocatee?
 - Climate Change
 - How does ocean acidification affect fish?
 - How do warming water temperatures affect fish?
 - We are seeing more snook with warming
 - Bait fish are salinity and temperature tolerant
 - How will hydrological connections change with sea level rise and an increase in storms?
 - What is the effect of hurricanes/storms on fish?
 - Pollution
 - How does the closure of a processing plant impact the community?
 - Where are sources/sinks of pollutants (nutrients/contaminants)?
 - What is the role of toxicology in trophic dynamics?
 - What are the impacts of nutrients, mercury, and per-and polyfluoroalkyl substances (PFAS)?
 - What is the effect of microplastics on fish?
 - What is the effect of vegetation overgrowth on fish?
 - How quickly do fish bounce back after perturbation events?
 - How do we get ahead of next perturbation event and prevent problems? (e.g., fish kills)
 - What are the invasive species in the estuary and what is their effect on fisheries? Are lionfish negatively influencing our ecosystems?
 - What is the mangrove northern migration effect on fish?
- Management
 - What data is currently available and how much is being utilized for management and education?
 - What is the goal of studying fish? How do we know if we've been successful?
 - What attracts fish here? Can we replicate or augment? (Structure, water quality) What do the fish need?
 - If there are issues with fish populations, what is there to do about it? If so, who should be involved? Who will be impacted if/when we do something? What's the time frame?
 - What are landscape BMPs (Best Management Practices) that support fish health?
- Regulations
 - With the change in redfish bag limit, is there any impact?
 - What are the fishing/hunting seasons (length and what goes into that decision)?
 - Leverage policy with management needs and facilitate research that benefits the estuary
 - How are GTM fishing regulations informed by data from other areas?

- What is the political relationship to fish in this region?
- Economic
 - Which species are of economic value to the community?
 - What is the catch per unit effort of fisheries compared to years past? What is the best way to compare data when metrics change?
- Social/cultural
 - Information about cultural practices beyond consumption (tools, medicinally, bait, equipment)
 - Fish consumption survey
 - Which species are most valued by people in the community? (e.g., spotted sea trout, snook, flounder)?
 - What are the cultural impacts/benefits to fishing and fishing regulations?
 - Social science- ask fishermen, past and present for oral histories
 - What are you fishing for?
 - What did you catch?
 - How big are the fish?
 - How has this changed?
- **List of knowledge gaps**
 - Population and community dynamics
 - Life histories of local fish will inform spatial/temporal distributions with changing freshwater/saltwater
 - Stock assessments
 - What prevents optimum stock and perpetuation of species?
 - Fish maturity
 - Seasonal and spatial distribution patterns of finfish and selected invertebrates in coastal lagoons of northeast Florida
 - Ecological
 - A comprehensive ecological understanding of the whole system
 - Local indicator species (e.g. mullet run = productive season, shrimp run)
 - Start at the base of the food web for monitoring to get an ecosystem perspective
 - Habitat connections
 - Ecosystem connections
 - Social/cultural
 - Recreational and commercial fishing data
 - Social science
 - Anecdotal information (YouTube, social media)
 - Recreational fisher education to improve best practices/sustainability
 - Ethnographic data (similar to BP oil spill efforts)
 - Oral history programs
 - Archeological reports
 - Folklore (stigmas, ancestors)
 - Collecting historic information and photos from communities
 - Potential for contracting watermen/women to collect data
 - Clearinghouse of commercial observations

- Economic
 - Economic science
- Fish identification
 - Estuary specific species identification
 - Juvenile fish identification in the estuary
 - Prey species identification
- Monitoring
 - Formalized long-term finfish monitoring in the region
 - Sentinel sites- can fisheries aspects be added into the research in these creeks and marshes?
 - Fisheries surveys – doing an annual inventory and using standardized protocols
 - Collecting different data sets with different methods, timeframes, targets
 - Using existing long-term infrastructure (System-Wide Monitoring Program, St. Johns River Water Management District) to guide monitoring efforts
 - Return interval (every 5 years- finfish, zooplankton, wetland/habitat assessment); Mandates are a problem and long-term funding is not practical
 - Long term modelling of fish data
 - WIN/data base GTM fisheries
 - Indicator and target for restoration (living shorelines)
 - Data base building
 - Use of acoustic telemetry and/or hydrophones
 - Recreational and commercial fishing data
 - Regular Fisheries Independent Monitoring (FIM) long-term all year classes
- Threats/Stressors
 - Climate change induced temperatures and effect on fish habitat and range expansion
 - Data on emerging contaminants in water, fish and shellfish (microplastics, metals, hormones, perfluoroalkyl and polyfluoroalkyl substances (PFAS), pesticides, pharmaceuticals) and potential human health impacts
- Outreach/education
 - Citizen science data from recreators/fishers- use of QR codes to share or submit information
 - Can we use social media to present data in unique ways to reach legislators and the public? For example @fishcodestudios YouTube has an existing audience in anglers.
 - What do community members need to have critical conversations with decision makers?
 - The Friends of the GTM Reserve and other nonprofits have a role to play in advocating for the estuary. Captains for Clean Water and other similar nonprofits lobby on behalf of the issues.
 - A natural resources or conservation round table is needed, comprised of each environmental organization. Invite in people from fisheries, state environmental groups, Audubon, Sierra Club, etc.
- Historical data
 - What existing data do we have? Establish the baseline data.

- There is a lack of analysis on data that does exist- habitat use, biocriteria, ecosystem and ecotone management, reconnection, fisheries utilization
- Primary and Secondary historical resources
- Environmental
 - Water flows from tributaries like USGS in Pellicer Creek
 - Water/weather/monitoring data
 - Tide gauges
- **List of suggested resources/partners**
 - Federal/State partners for data
 - National Weather Service Jacksonville
 - Florida Department of Environmental Protection
 - Statewide Ecosystem Assessment of Coastal Aquatic Resources (SEACAR)
 - Local government water quality and discharge data
 - Department of Health- mercury levels and fishing advisories
 - NOAA fisheries-
 - Dr. Dianna Hoskins-Brown, Fishery Biologist, Southeast Fisheries Science Center, dionne.hoskins-brown@noaa.gov
 - USGS Report
 - St Augustine to Ponce Inlet
 - [Seasonal and Spatial Distribution Patterns of Finfish and Selected Invertebrates in Coastal Lagoons of Northeastern Florida, 2002–2004 \(Turtora and Schotman, 2010\)](#)
 - Synoptic sampling
 - NGO partners for advocacy
 - St. Johns County Civic Roundtable
 - St. Johns and Matanzas Riverkeepers
 - Regulatory entities
 - Recreational fishing regulations
 - St. Johns River Water Management District
 - Northeast Region FWC
 - Outreach/education
 - Citizen science (eBird, iNaturalist, Florida Wildlife Pro Angler App)
 - Academia
 - University of Florida Institute of Food and Agricultural Services (UF-IFAS)
 - Academic institutions
 - Florida Atlantic University monitoring at Bings- may be willing to add more locations
 - Matt Brown and Ed McGinley co-teaching Flagler College capstone projects
 - St Johns River Report
 - Matanzas River Report
 - Publications/Presentations
 - [Distribution and Abundance of Fish Assemblages and Select Macroinvertebrates From the Lower St. Mary’s River Basin in Northeast Florida \(Solomon, 2006\)](#)
 - [Seasonal and Spatial Distribution Patters of Finfish and Selected Invertebrates in Coastal Lagoons of Northeast Florida, 2002-2004 \(Tortora and Schotman, 2010\)](#)

- [A trophic cascade triggers collapse of a salt-marsh ecosystem with intensive recreational fishing \(Altieri et al., 2012\)](#)
- [The Spatial and Temporal Community Structure of Ichthyoplankton in a Northeast Florida Estuary : A Study of Ingress at a Faunal Boundary \(Korsman, 2013\)](#)
- [Habitat Value of Restored Intertidal Shoreline for Fish and Macrobenthic Communities in Northeast Florida \(Shannon Dunnigan, 2015\)](#)
- [Analysis of the Nearshore Fish Community in a Northeast Florida Estuary \(McGinley et al., 2016\)](#)
- [Spatial and temporal variability in ichthyoplankton communities ingressing through two adjacent inlets along the southeastern US Atlantic coast \(Korsman, 2017\)](#)
- [Estuarine Nekton Assemblages along a Marsh-Mangrove Ecotone \(Kimball and Eash-Loucks, 2021\)](#)
- [Quantifying the Response of an Estuarine Nekton Community to Coastal Wetland Habitat Restoration \(Mahoney et al., 2021\)](#)
- [Detection and population genomics of sea turtle species via noninvasive environmental DNA analysis of nesting beach sand tracks and oceanic water \(Farrell et al., 2022\)](#)
- [Comparing eDNA metabarcoding primers for assessing fish communities in a biodiverse estuary \(Kumar et al., 2022\)](#)
- [Movement Patterns and Habitat Use of Young-of-the-Year Scalloped Hammerhead Sharks \(*Sphyrna Lewin*\) in the Tolomato River Nursery \(Matthew Bernanke, State of the Reserve poster, 2023\)](#)
- [Environmental \(e\)DNA-Based Wildlife Monitoring & Human Effluent Quantification \(David Duffy, State of the Reserve presentation, 2023\)](#)
- [Pollutant Exposure in GTM shark \(Jim Gelsleichter, State of the Reserve poster, 2023\)](#)
- [Recruitment of American Eels \(*Anguilla rostrata*\) to a Northeast Florida Estuary: Effects of a Changing Climate on Early Life History \(Eric Johnson State of the Reserve presentation, 2023\)](#)

The afternoon session provided an opportunity to refine the management needs and research questions identified from the first session and to outline the next steps. Eight themes were identified from the first session: 1) status and trends, 2) habitat associations, 3) water quality, 4) indicator species, 5) human health, 6) history/stories, 7) education/outreach, and 8) drivers of change.

1. **Status and Trends** Lead: Scott Eastman and Allix North

Takeaway statement: "We are lacking quantitative fisheries data AND this information is vital to understanding the health and function of our estuary, THEREFORE we need a standardized fisheries assessment program that operates on a regular temporal interval."

- Action items and ideas
 - Hire FWC Fisheries Independent Monitoring (FIM) Program to monitor in GTM Research Reserve (Average cost per/net \$500)
 - Monthly randomized sampling for holistic approach
 - 4-person crew, 16 trips a month

- Getting the data is the easy part, the QA check is the hard part
- Use the smallest management unit – the program works best for regions
- It is necessary to have long-term datasets so changes in different populations can be seen, because changes that might be good for one species may not be good for another species
- Need data collected using the same protocols for consistency
 - Early in the FIM Program they looked at different survey methods and refined what they were doing so it was easily standardized, easily implemented, easily repeated, and easily analyzed
- Timing –catch all seasons, at least quarterly, to establish a baseline and potentially decrease monitoring
- Water Management District funded USGS to conduct monitoring using FIM protocol
 - This monitoring was done at the same time as the FIM monitoring
 - Repeat this monitoring again – every 10 years conduct monthly monitoring for three years of sampling periods
- Who should be involved?
 - FWC
 - GTM Research Reserve (GTM has similar equipment to what is used by FWC)
 - Volunteers

2. **Habitat Associations** *Lead: Nikki Dix*

Takeaway Statement: “Healthy fisheries depend on healthy habitats AND habitats are changing due to various drivers BUT there is no comprehensive dataset connecting habitat types, conditions, and biodiversity. THEREFORE, we need a collaborative approach for habitat assessments and data sharing to inform management actions (e.g., land acquisition, watershed improvements, and education).”

- What exactly is the management need/question and why is it important for estuary health?
 - Habitat loss leads to a decline in fish populations, which can be measured by habitat mapping (estuary scale and strip transect or sentinel sites with drones)
 - Fish life histories- which habitats do they need when?
 - How does habitat impact fish?
 - How does sea level rise, invasive species, and warming impact fish?
 - Use indicator metrics for habitat study and fish interactions
 - Landscape scale- South Atlantic Salt Marsh Initiative (SASMI); conservation lands and watershed
 - St Johns County Land Acquisition and Management Program (LAMP) property evaluation criteria- species habitat biodiversity quantification to inform prioritization
 - Intertidal benthic habitat changes related to fish
- How would it inform action?
 - Storm restoration
 - Education

- Acquisition prioritization
- Landowner land management
- Conservation easements
- Who else should be involved/potential partners?
 - Visiting scientists- could we leverage their field time to collect standard metrics?
 - Map Direct- Natural resource inventory needs to be corrected
 - Citizen science (given standard protocols with quality assurance; app like eBird but eFish
 - Mangrove migration
 - Invasive species pictures and locations (or natives moving)
- Potential conflicts
 - Public opinion about importance of habitat; develop a “trace tour”- watershed tour opportunity to show people how upstream actions affect downstream
- Potential funding opportunities
 - NERRS Science Collaborative
 - Total Maximum Daily Load (TMDL) grants- state and federal
 - Resilience, blue Carbon, fish habitat- NOAA, Infrastructure Investment and Jobs Act (IIJA)
 - South Atlantic Salt Marsh Initiative/PEW Charitable Trusts for marshes
 - The Nature Conservancy
 - FWC
 - State Wildlife Grants
 - For water quality, Environmental Protection Agency Office of Wastewater Management- important to determine impairment first
 - Resilient Florida
 - Riverkeeper
 - St. Johns River Water Management District
 - Fishing clubs, tournaments, Coastal Conservation Association
 - Ducks Unlimited

3. **Water Quality** Lead: *Silas Tanner*

Takeaway Statement: “Many regulatory agencies oversee water quality within the GTM estuary, BUT collaboration, communication, and data sharing are lacking, THEREFORE there is a need to foster collaboration in regard to potential emerging contaminants and their impact on fisheries within and upstream of the watershed.”

- Management Need:
 - Identifying contaminants hot spots
 - How effective are wastewater treatment plants at removing pollutants?
 - Increasing sampling sites within estuary
 - Determine contaminant most harmful to fisheries and possibly humans
 - Data collection in tributaries not currently being sampled
 - Communication with Department of Health
- Partners:

- City of St. Augustine
- St Johns County
- St Johns River Water Management District
- Department of Environmental Protection
- Department of Health
- FWC
- Florida Department of Agriculture and Consumer Services
- Potential conflicts:
 - Public Perception of water
 - Lack of communication between agencies

4. **Indicator Species** Lead: Shannon Dunnigan

Takeaway Statement: "We have historic datasets of fish communities in the area (USGS, Flagler College, GTM) AND we know specific requirements for specific life stages of species that can serve as indicators BUT we need to do synoptic (large-scale) sampling like identifying hot spot areas, THEREFORE building the ability to identify status and trends."

- What is the management need/question and why is it important to estuary health?
 - Understanding early life stages
 - Specifically, juvenile (YRI) snook
 - Results of changes in climate (temperature) and low DO
 - In regard to salinity- juvenile redfish present in upper reaches of tidal creeks
 - Creating an index of biotic integrity
 - An indicator of change and patterns of species biodiversity
 - Restoration
 - "flagship" in place of "indicator"
 - Identifying what species may be indicators
 - Ecosystem productivity: spotted seatrout
 - Frequency and abundance as indicators of "sentinel sites"- revisit the same areas/ hot spots
 - Penaeid shrimps, wetland footprint relates to penaeid abundance; pattern found worldwide
 - Use high frequency and longterm data to identify indicator species
 - Still need large scale sampling (USGS, Ed McGinley?)
 - Should we study a few sites more often or more sites less often?
 - Types of fish present
 - Forage fish- mullet, anchovies
 - Benthic and pelagic fish
 - Flatfishes- flounders
 - General taxa and group subsample
- Who should be involved/potential partners?
 - FWC (seining protocols (75 ft, 50 ft))
 - Academia

- Citizen science

5. **Human Health** Lead: Abby Kuhn

Takeaway Statement: "The GTM estuary is an important local research and recreational resource AND we are currently studying the impact of water quality and nutrient dynamics on local species BUT we do not understand the level or presence of contaminants, THEREFORE baseline contaminant data are needed across the estuary, including contaminant bioaccumulation and its effect on trophic dynamics. Once we have the baseline data we can eventually look at human health impacts."

- What is the management need/question and why is it important to estuary health?
 - Bioaccumulation
 - Trophic dynamics
 - Emerging contaminants (mercury, water treatment plants, PFAs)
 - Socio-economic data
 - Mental health
- What are some action steps?
 - Regulations on water treatment
 - Fishing advisories
- Who else should be involved/potential partners?
 - Water management districts
 - Florida Department of Agriculture and Consumer Services
 - University Partners
 - Local Governments
 - FWC- to examine population dynamics
- Potential Conflicts:
 - Seafood distributors
 - Local subsistence fishermen
 - Commercial fishermen
 - Tourism councils or travel agents
- Potential funding opportunities:
 - Sea Grant
 - National Institute of Health
 - NOAA
 - NERR Science Collaborative

6. **History/stories** Lead: Kirstin Thompson

Takeaway Statement: "Fish nurtured, fed, and provided income historically AND we need to protect the resource to continue this into the future, BUT we are lacking oral and cultural histories about fish in the region, THEREFORE we propose a series of partnerships to capture these histories that translates into civic tourism, ecosystem knowledge, and cultural and economic value of the region."

- Why is history and stories about fish important for estuary health?
 - Provides context to other research questions (fish populations, water quality, etc.)
 - Resiliency/adaption over time- if you have a species decline, you could uncover why/if they bounced back
 - Fisheries are an economic driver throughout history
 - Opens up dialogue to different points of view beyond science (e.g., descendent communities)
- What are some action items to address this need? How can we understand fish through stories?
 - Obtain oral histories from fishermen and descendent communities
 - What makes this area important for coastal heritage?
 - What do they care about or want to do/know?
 - Use language/terms relevant to who you are talking to
 - Go to where they are (meet at boat ramp, etc.)
 - Capture emotions to inspire people to care
 - Obtain pictures of artifacts
 - Label fish/oysters at restaurants/markets as local
 - Create brochure or QR code at local restaurants on the menu that indicate where the fish/oyster came from
 - Engage in civic tourism- the tourism industry from the perspective of civic values that consider the social and environmental impacts of tourism development
 - Make it easier for fishermen to sell their products directly to the consumer
- Who are some partners that should be involved?
 - Florida Public Archaeology Network; People of Guana Project
 - St Augustine Historical Society
 - St Johns Cultural Council
 - Seminole Tribe of Florida
 - Gullah/Geechee Nation
 - State of Florida Division of Historical Resources
 - Minorcan descendants
 - Idea for a Cultural Resource Committee to be formed at GTM
- Potential conflicts?
 - Balancing privacy and trust with histories from fishermen and the descendent communities
 - What was acceptable/admirable 50 years ago may not be today

7. **Education/outreach** *Lead: Ellen Leroy-Reed*

Takeaway Statement: "GTM has years of data/studies AND we know this information impacts fisheries, BUT we do not yet have targeted communication and outreach programs in place for the fishing stakeholders. THEREFORE, we need to create education and outreach programs that are targeted based on the audience and begin building relationships with them now (in anticipation of the results of this TAG meeting)"

- Discussion questions/comments:

- What audiences are you trying to reach? Prioritize the messages for different audiences
- Understand the purpose of the summer boat ramp program at GTM Research Reserve- is the purpose to reach fishermen or families?
- It is important to use science in interpretation and education
- Does the GTM Research Reserve have an annual communications plan?
- There are two types of fishermen- fishermen trying to put food on the table and recreational fishermen/charter captains (catch and release)
 - Often the short term need to feed your family overtakes the long term need to manage the fish populations
- Nutrient/pesticide pollution- We should not go to the subsistence fishermen who are victim of the problem (pollution) to solve a problem created by someone else (runoff from Ponte Vedra homes). If we're pretty sure the problem is a nutrient related issue, then we should speak to the people creating the nutrient issue.
- Does GTM Research Reserve have strong enough data to support any fish related messaging or programming?
 - There is enough water quality data to form a message, but not about fisheries specifically
- It is important to maintain communication with sports fishermen groups so we build rapport
- Where to provide influence:
 - Where you buy your fishing license, provide handouts or use QR codes that share useful information about GTM Research Reserve
 - Add a link to buy your fishing license on the GTM Research Reserve website.
 - Create a 30 second elevator pitch to provide to boat captains
 - Charter boat associations and fishing clubs
 - Fishing newsletter
 - Handouts at bait shops
 - YouTube videos
 - Boat dealers
 - Charter boat surveys
 - Fun fact Friday for Guana fishermen with their big catch

8. **Drivers of Change** *Lead: Kaitlyn Dietz*

Takeaway Statement: "We know that eutrophication can negatively impact fish populations AND land use/cover contributes to negative human impacts to estuaries, BUT we do not know how this impacts fish within the reserve, THEREFORE we need to study and analyze how land use, water quality, and fish populations have changed over time."

- What is the management need/question and why is it important for estuary health?
 - Land use impacts
 - Water quality impacts
 - Eutrophication (runoff, nutrients, water quality)

- Establish baseline data (DO, turbidity, temperature, PH, nitrogen, phosphorus, bacteria, Chl- α , plankton, bacteria)
 - Storm events
 - Pharmaceuticals and personal care products (PPCPs) chemicals and their effect on fish histology, behaviors, sex
 - Fish sampling (population, juvenile)
 - Understanding overfishing impacts
- Who else should be involved/potential partners
 - Sportfishers
 - County
 - NOAA Coastal Change Analysis Program (C-CAP)