

2017 Fish GIT Funding Proposals

Proposal Title: Comparison of Monitoring Methods on Shell and Alternative Substrate Oyster Reefs

Estimated Cost: \$50,000

Proposal: The Chesapeake Bay Oyster Metrics report calls for restored reefs to be monitored three years, and again six years post-restoration, to determine whether or not the reefs meet the Oyster Metrics success criteria (15 oysters per square meter, presence of multiple year classes, etc). Typically, reefs constructed from stone or crushed concrete base substrate are monitored using divers, while reefs restored using a shell base, and those treated only by planting juvenile oysters, are monitored with patent tongs. Diver sampling is appreciably more expensive than patent tong sampling, while patent tongs do not collect well on stone or crushed concrete substrate. A 1992 paper by Chai et al (1) shows no statistical difference between collections done with patent tongs vs divers; however, this work was done on unrestored reefs that were commercially fished. I propose a GIT-funded research project to compare the oyster collection efficiency of divers and patent tongs on restored oyster bottom, including stone and crushed concrete substrate. This information is critical to understanding whether or not reefs are meeting the Oyster Metrics success criteria, and for comparing the success of different reef-building substrates. Shell, stone and crushed concrete are all currently used in restoration projects toward the Chesapeake Bay Agreement oyster outcome.

1. Chai Ai-Ling, Homer Mark, Tsai Chu-Fa, Gouletquer Philippe (1992). *Evaluation of oyster sampling efficiency of patent tongs and an oyster dredge. North American Journal of Fisheries Management*, 12, 825-832.

Fish GIT Outcomes Supported: Fish Habitat, Oyster Restoration

Rationale for Supported Fish GIT Outcomes: Oysters: will help accurately determine which oyster reefs meet the pre-established Chesapeake Bay Oyster Metrics success criteria, and indicate which restoration treatment are most effective. Fish habitat: will help accurately evaluate effectiveness of various oyster reef restoration treatments, which in turn proved critical fish habitat.

Additional Outcomes Supported: WATER QUALITY GIT (Forest Buffer, Tree Canopy, 2017 and 2025 Watershed Implementation Plans, Water Quality Standards Attainment and Monitoring, Toxic Contaminants Research, Toxic Contaminants Policy and Prevention)

Rationale for Additional Supported Outcomes: Thriving, densely-populated oyster reefs can positively impact local water quality; this work would allow practitioners to accurately determine which restoration treatments are most effective and result in the highest densities of oysters.

Proposal Title: Citizen Science Forage Monitoring

Estimated Cost: 50,000-70,000

Proposal: Citizen Science Forage Monitoring.

An important data gap exists for forage abundance in the SAV and Marsh habitats of the Chesapeake System. We now know that invertebrate forage is as important as fish forage in this system, but only have fish forage abundance over time on clean (unvegetated) beaches. Moreover, the Chesapeake Bay Program cannot pay to implement an additional survey in the important habitat areas where no data currently exists. The use of citizen science data collection may be a viable way forward for the CBP to begin collection of information that will fill this important gap, at little to no ongoing costs to the program.

To close this data gap, we propose to both (1) refine the river organization pilot study underway this year for forage fish (currently under Habitat-GIT funding), and (2) initiate high school science class data collections through local public school partnerships. The data collection can be added to existing

curriculum through or provide additional curriculum on the importance of forage in the Chesapeake Bay.

The proposed project has many cross-GIT benefits and will (1) support the SFGIT Forage Action Team's efforts to assess the forage fish base available as food for predatory species of the Chesapeake Bay, while (2) providing critical information for the Fish Habitat Action Team's efforts (SF-GIT/H-GIT) to assign relative importance and priority of the different physical habitats available in the Bay that support forage, (3) fill a critical data gap for STAR, and directly benefit the Chesapeake Monitoring Cooperative.

Fish GIT Outcomes Supported: Fish Habitat, Forage

Rationale for Supported Fish GIT Outcomes: See above proposal

Additional Outcomes Supported: HABITAT GIT (Black Duck, Brook Trout, Fish Passage, Stream Health, SAV, Wetlands), STEWARDSHIP GIT - Citizen Stewardship, Local Leadership, Diversity, Protected Lands, Public Access Site Development, Student, Sustainable Schools, Environmental Literacy), SCIENTIFIC, TECHNICAL ASSESSMENT and REPORTING TEAM - Climate Change Monitoring and Assessment, Climate Change Adaptation

Rationale for Additional Supported Outcomes: See above proposal

Proposal Title: Synthesis of Shoreline Condition Impacts on Forage and Blue Crab Populations

Estimated Cost: This will likely require 2 years, at \$60-80K/year

Proposal: Effective aquatic resource management requires a better understanding of the impacts of shorescapes and watershed development on aquatic communities. Questions addressing habitat quantity and quality and associated production of forage taxa are critical gaps hampering implementation of Ecosystem Based Fishery Management in Chesapeake Bay. A synthesis of existing long-term datasets on shoreline condition and forage fish/blue crab populations will allow examination of the effects of altered shorelines on forage species relative abundance, mean size, and biomass; effects on forage community composition can also be examined.

Fish GIT Outcomes Supported: Blue Crab Abundance, Fish Habitat, Forage

Rationale for Supported Fish GIT Outcomes: This will address the critical link between development and alteration of shorelines and nearshore forage fishes and blue crabs in terms of water quality, suitable habitat, and fish/crab production. As such, this work addresses the outcomes of an adequate forage base and protection of critical aquatic habitats.

Additional Outcomes Supported: HABITAT GIT (Black Duck, Brook Trout, Fish Passage, Stream Health, SAV, Wetlands), HEALTHY WATERSHEDS GIT - Land Use Methods and Metrics Development, Land Use Options Evaluation , Healthy Watersheds)

Rationale for Additional Supported Outcomes: Identification of threats to habitats used by forage fish/blue crabs and delineation of critical habitat areas; identification of shoreline development practices (e.g., hardening of shorelines) that negatively affect aquatic communities.

Proposal Title: Development of a Comprehensive Forage Survey for Chesapeake Bay

Estimated Cost: \$50,000-\$60,000

Proposal: Title: Developing a comprehensive forage survey for Chesapeake Bay.

The project would first analyze the literature and existing data from current and historical surveys of Chesapeake Bay to document how best to sample for certain forage groups, where and when to sample, and what gears to use. Alternative survey plans emphasizing certain forage groups would be developed and tradeoffs, benefits, constraints and costs of each alternative plan determined.

Fish GIT Outcomes Supported: Forage

Rationale for Supported Fish GIT Outcomes: A baywide perspective is lacking in present surveys that confounds rigorous spatial analysis and limits ability to associate key forage resources with habitats. We believe that this project is critically needed to progress from recent forage research to a proposal that designs plans for appropriate survey options to target knowledge gaps and recommend survey designs for management.

Additional Outcomes Supported: HABITAT GIT (Black Duck, Brook Trout, Fish Passage, Stream Health, SAV, Wetlands)

Rationale for Additional Supported Outcomes: The project we envision could be tied into the Habitats GIT by including various habitats and regions in the plan and survey design. Targeted sampling of different habitats would allow habitat-specific analysis of local forage communities and support efforts to link habitats to important ecological functions (i.e., fisheries production through trophic interactions).

Proposal Title: Development and Construction of artificial fish spawning/nursery habitat and oyster reef habitat for Diadromous fish

Estimated Cost: \$75,000

Proposal: The project involves the planning, construction, and placement of artificial fish spawning/nursery habitat and restored oyster reef habitat in support of recovery efforts for federally endangered Atlantic Sturgeon and other diadromous fishes. Native hard-bottom habitats, including oyster reefs, are linked to successful recruitment by sturgeons and other anadromous species, but have declined dramatically in regions of the Chesapeake Bay, compared to historical conditions. The project includes engagement with the riverine community in reef-ball construction, spat-on-shell production, and education outreach activities, and use existing acoustic telemetry arrays to evaluate post-placement success.

Fish GIT Outcomes Supported: Fish Habitat, Oyster Restoration, endangered species recovery

Rationale for Supported Fish GIT Outcomes: The proposed work will enhance sturgeon habitat and expand oyster reefs in the tidal James River and will serve as a pilot study for similar habitat restoration activities in other Chesapeake Bay tributaries.

Additional Outcomes Supported: WATER QUALITY GIT (Forest Buffer, Tree Canopy, 2017 and 2025 Watershed Implementation Plans, Water Quality Standards Attainment and Monitoring, Toxic Contaminants Research, Toxic Contaminants Policy and Prevention), STEWARDSHIP GIT - Citizen Stewardship, Local Leadership, Diversity, Protected Lands, Public Access Site Development, Student, Sustainable Schools, Environmental Literacy)

Rationale for Additional Supported Outcomes: Atlantic Sturgeon are a sentinel species for ongoing water quality improvements in Chesapeake Bay and new oyster reefs will provide ecosystem services related to water quality. We will use this project to engage students, citizen scientists, and other stakeholders on a wide range of Bay stewardship issues.

Proposals submitted without details

1. Develop implementation strategies from previously funded forage projects
2. Investigate the potential effects of near-future climate changes on forage
3. Investigation of Water Quality Challenges Limiting Oyster Hatchery Production in the Chesapeake Bay
4. Habitat Workshop (based on research by Dan Obenour – NC State)
 - a. Habitat Prioritization tool, other resources