Annual Report

Project #69: Apalachicola Bay System Initiative (ABSI)

Awardee: Florida State University

Reporting Period: March 15, 2019-March 14, 2020

ABSI leadership team:

Dr. Sandra Brooke (Principle Investigator)

Dr. Felicia Coleman (Co-Principle Investigator)

Dr. Gary Ostrander (Vice President for Research)

Summary

The ABSI project comprises a number of objectives, each of which has a timeline for completion over the 5 year duration of the award. These objectives are summarized in Table 1 below. This report presents each Year 1 objective and describes progress to date, together with an explanation for any discrepancies between target and completed deliverables. In addition, there is a section on personnel hires and other items that are not directly associated with the specific objectives.

Table 1: Summary of timeline for project deliverables.

Project Deliverables Timelines	Yr-1					Yr-2					Yr-3					Yr-4					Yr-5				
Assess temporal and spatial changes in status of oyster communities																									
Construct a pilot-scale oyster hatchery																									
Bio-physical modeling																									
Monitoring of oyster communities and their environment																									
Oyster population genetic structure																									
Experimental ecology																									
Coupled Ecosystem-Life History model																									
Management and restoration plan development																									
Targeted outreach to the community																									

Project objectives for Year 1

1. **Assess temporal and spatial changes in oyster communities in Franklin County**

The first objective involves extensive mining of historical and contemporary sources for data on oyster reef distribution, reef associated fish and invertebrate communities, oyster ecology and biology, and environmental conditions within Apalachicola Bay and adjacent waterways.
The initial analysis will provide a 'starting point' from which to evaluate changes observed during ABSI, and help generate target metrics for future restoration and management decisions

Deliverables for this component include a database with information on spatial and temporal changes in oyster reef distribution, productivity and environmental conditions. Digital GIS-based maps and reports will be available through the project website and updated annually.

Progress to date

More than 250 reports, peer-reviewed manuscripts, maps and data sets have been assimilated and catalogued into a number of different categories (ecology, ecosystem services, environmental conditions, genetics, hydrodynamics etc.). Historical environmental data, oyster population data, and fisheries independent monitoring data for non-oyster species have been obtained from different sources (ANERR, FDACS, FWRI, manuscripts and reports) and will be presented through an interactive website. Open source (those available to the public without subscription) materials will be linked to the ABSI website through subject-specific information sections. This deliverable is still in development as we are continuing to locate and obtain relevant information, and to develop a compelling, intuitive and interactive framework that will provide public access to a large quantity of complex information.

Discrepancies between proposed and actual deliverables

The optimal approach for this objective is the ArcGIS-based Story Map platform (https://storymaps.arcgis.com/), which can be used to combine maps with text, images and data. To accomplish this, FSUCML required access to an online ArcGIS account, which has now been accomplished. The ABSI team will work with the FSU information technology department to create the ABSI Story Map as a priority deliverable for the next quarter.

2. Construct a pilot-scale oyster hatchery

The construction of a small oyster hatchery is a critical component of the ABSI. The hatchery will be used to maintain adult oysters from local sub-populations, and will provide a source of larvae and juveniles for experimentation, and development of best practices for large-scale oyster reef restoration and aquaculture. This facility will include algal culture, controlled temperature tanks for brood-stock (adult oysters) conditioning and spawning, larval culture tanks, settlement tanks for seeding restoration materials. In addition to the science objectives, the ABSI hatchery will serve as a demonstration facility for an internship program to increase local workforce capacity.

Deliverables for this objective include the construction of a research hatchery, which we estimate will take > 2 years. In the interim, the FSU matching infrastructure funds covered the cost of an interim hatchery that will support initial operations while the permanent hatchery is being constructed.

Progress to date

The interim hatchery will be housed in a 50 x 30 ft greenhouse that can withstand wind gusts of 127 mph (hurricane category 3); however, the real threat down here on the coast is storm surge. The greenhouse is therefore constructed with breakaway lower panels and side-doors that can be rolled up in the event of a storm to allow water to flow through rather than destroy the building. Because we will be using live micro-algae to feed the oyster larvae, FDACS regulations required us to install a drain-field to ensure the algae is not being released directly into the Gulf. Construction on the greenhouse began in November 2019, and substantial completion of the building was signed off in February 2019. At this point we began equipping the hatchery with tanks, filtration systems, plumbing and two environmental chambers to conduct physiological experiments. Progress on the hatchery was documented at each stage and can be viewed on the ABSI website (https://marinelab.fsu.edu/absi/research/hatchery/). An air-conditioned room in the main laboratory building was re-fitted to house and condition oyster brood-stock, and our mesocosm deck will support settlement tanks. Once the permanent hatchery is built, all this equipment will be relocated to the new building.

Discrepancies between proposed and actual deliverables

The hatchery was on schedule to be operational for the spring oyster spawn (late March); however, due to the Covid-19 restrictions, completion of the hatchery has slowed considerably due to staff and purchasing limitations. The hatchery will be completed as soon as we are able to resume normal working conditions. We are planning to be operational before the fall spawning period.

3. Bio-physical modeling

Oyster population distribution is governed by larval dispersal and post-settlement survival, and the distribution of oyster larvae is strongly influenced by local hydrodynamics. A major component of the hydrodynamic model is freshwater inflow into the estuary. Our consultant, Dr. Steve Leitman, will use a Stella river-basin model, to define a range of freshwater flow scenarios under varying climatic regimes and management practices. Freshwater dynamics will be combined with near-shore coastal hydrodynamic models to create a composite physical flow model for the ABSI region and beyond. Physiological experiments on oyster larvae (produced by the hatchery), will provide information on how environmental conditions influence survival, larval lifespan and settlement rates. This biological data will be incorporated into the physical oceanography model, to create a powerful tool for estimating dispersal pathways and predicting connectivity among oyster populations.

The ultimate deliverable for this objective is an integrated model that combines habitat distribution, water flow and larval dispersal data to predict oyster recruitment patterns under different climatic regimes. Interim products include models of freshwater flows under management and climate scenarios, and hydrodynamic models of water flows into, around and out of the ABSI area.

Progress to date

Freshwater flow dynamics is being addressed by Dr. Steve Leitman, an environmental scientist who has worked in the Apalachicola basin for over 40 years on water management related research (https://marinelab.fsu.edu/absi/people/). A consultancy contract was initiated in July 2019, for two years with the following objectives: 1) Develop a set of metrics to define optimal management of the watershed with regards to sustainable ecological productivity of both the river and estuarine aquatic resources; 2) Examine potential modifications to the current Water Control Manual

operations, taking into account the metrics developed in objective 1; 3) Test current and proposed revised operations against alternative climate scenarios with regard to changes in both the volume of water being delivered to the river and estuary and the timing of rainfall events; 4) Encourage an adaptive management approach based on the outputs from the objectives above.

Dr. Leitman is coordinating with the U.S. Army Corps of Engineers on calibrating his model (ACF-STELLA model) with the Army Corps of Engineers (ACOE), Mobile District and the U.S. Fish and Wildlife Service (USFW), Panama City Area Office. The two models are very close to being fully calibrated with each other (i.e. in close agreement), but progress was delayed because the Corps of Engineers reservoir management staff were focused on preparing an Environmental Impact Statement on the adjacent Alabama-Coosa-Tallapoosa watershed. The two models show close coordination at median flow, low flow (75% exceeded) and an extreme low flow (90% exceeded) for each day of the year for a 73-year model run. Similar comparisons show close coordination between the models for reservoir elevations and reservoir outflow for the principle storage reservoirs in the watershed (Lake Lanier, West Point Lake, W.F. George Lake and Lake Seminole). Within the next month the calibration exercise should be finished and the STELLA model can tested using alternative management approaches and alternative climate scenarios. While waiting for the Corps of Engineers, Dr. Leitman conducted a forensic analysis to determine why the STELLA and ACOE models diverge at certain times, prepared a summary paper on issues associated with gauge readings for the Apalachicola River at Sumatra. The Sumatra gauge issue is important because that is the gauging site that will be used to define freshwater inflow to the estuarine model. Dr. Leitman has also submitted a review of alternative performance metrics from the model outputs that can be used to evaluate management options.

Bio-physical modeling of the ABSI system will be conducted by Dr. Steven Morey, a physical oceanographer at Florida Agricultural and Mechanical University (FAMU), who specializes in modeling the effects of climate variability on estuarine and marine systems, and interactions between physical and biological processes (https://marinelab.fsu.edu/absi/people/). A 2-year sub-award was established with Dr. Morey in July 2019. Specific objectives of this work are: 1) Configure a hydrodynamic model for the lower Apalachicola River, Apalachicola Bay and the surrounding coastal and inner shelf regions (including Cape San Blas through Cedar Key, FL) based on the latest bathymetric and topographic data; 2) Run hindcast and future climate and management scenario simulations, incorporating flow inputs from Dr. Leitman's model; 3)

Perform analyses of the simulations to characterize the variability of hydrographic properties throughout Apalachicola Bay; 4) Using a numerical particle tracking approach to simulate oyster larvae, conduct and analyze larval transport simulations to quantify factors such as larval recruitment, retention and inter-estuarine exchange.

Dr. Morey has configured a hydrodynamic model for the Apalachicola Bay region based on a Finite Volume Coastal Ocean Model (FVCOM) simulation that was used previously for storm surge studies by Dukhovskoy and Morey (2011). This model was adapted from simulation of a homogeneous ocean, to a thermodynamic simulation including stratification and freshwater flux. The simulation was run for two time periods to demonstrate the modeled response of the Bay to different flow regimes: 1998 (wet year) and 2000 (dry year). These simulations have been posted on the ABSI website (https://marinelab.fsu.edu/absi/research/biophysical-models/)

In preparation of configuring a more detailed high-resolution hydrodynamic model for the region, new coastal topography and bathymetry from NOAA at 1/9 arcsec (for the bay and nearshore region and over land) and 1/3 arcsec (for the shelf area) has been obtained and analyzed. Work is ongoing in merging the coastal relief and bathymetry datasets for use in the model grid. An individual has been identified for the postdoc position and hiring paperwork is underway at FAMU. The postdoc is expected to be hired in July, 2020.

Discrepancies between proposed and actual deliverables

No significant discrepancies exist between proposed and actual deliverables.

4. Monitoring of oyster communities and their environment

Several academic and management entities, including Florida State University (FSU), Florida Fish and Wildlife Research Institute (FWRI), University of Florida (UF), Apalachicola National Estuarine Research Reserve (ANERR), Department of Agriculture and Consumer Services (DACS) and the Florida Department of Environmental Protection (FDEP) are currently conducting research and/or monitoring in Apalachicola Bay. These efforts include studies of oyster recruitment, growth rate and survival, adult abundance, and prevalence of predators, parasites and diseases. These efforts differ spatially, temporally and in the type of data collected making comparisons of data sets challenging. Many studies focused on commercial reefs, leaving important data gaps in other areas. ABSI field work can help fill spatial gaps as well as address

additional aspects of oyster ecology. One of the strengths of ABSI is the flexibility and capacity to address information needs as they arise, either directly through Triumph funding or from external grants to FSU faculty.

Through ABSI, a suite of data-logging instruments will be deployed within and outside Apalachicola Bay to expand the number and spatial distribution of instruments similar to those supported by ANERR, FWRI and FDEP. High-resolution, environmental data will be incorporated into the bio-physical model and will provide context for the ecological observations and experiments. ABSI will contribute information to FWRI's oyster integrated mapping and monitoring program (OIMMP), to help them develop a State-managed monitoring program.

Deliverables from this objective include (but are not limited to): 1) databases containing environmental data; 2) monitoring data (including recruitment rates, juvenile survival and growth, adult size and abundance, and incidence of predators, parasites, and diseases) from a series of locations throughout Franklin County. Digital reports on oyster status will be produced annually and posted on the FSUCML ABSI website

Progress to date

The FWRI and FDEP are monitoring subtidal oyster reefs in Apalachicola Bay as part of their post-restoration survey program. It did not seem necessary, or a prudent use of resources, for ABSI to repeat their efforts. Unlike subtidal oysters, which have been surveyed by a number of entities (FDACS, FWC, FDEP), intertidal populations have had very little attention, despite being a potentially valuable source of larvae. The subtidal populations are so depleted that conducting experiments and *in situ* studies is very challenging. In the Apalachicola Bay System (ABS), intertidal reefs can harbor healthy, adult oysters, are not typically commercially harvested, provide ecological services, and are a potential spat source for the rest of the bay. The lack of intertidal oyster reef monitoring was identified as a knowledge gap that could be addressed by ABSI. We plan on collecting monitoring data for the inter-tidal populations that are similar to the data collected from the subtidal areas. This will give a more comprehensive overview of oyster populations in the ABSI study area.

Field work for the ABSI project started in August 2019 with Indian Lagoon, East Cove, the Carrabelle River mouth, and Alligator Harbor identified as priority zones for intertidal oyster reef monitoring. These sites had a greater area and density of intertidal oyster reefs relative to the

rest of the ABS, as indicated by satellite imagery (Alligator Harbor, Carrabelle River Mouth) and GIS layers provided by the Florida Fish and Wildlife Conservation Commission (East Cove, Indian Lagoon). In August of 2019, the ABSI team ground-truthed random points within areas identified as intertidal oyster reefs by verifying that oysters were present within 2m of the point. From December 2019 through March 2020, 5 random sites within each priority zone were sampled for oyster size, density and condition, reproductive status and disease (dermo) prevalence. Sampling will be repeated each spring and fall. To monitor spat settlement rates, spat traps were deployed during March 2016, and will be checked and redeployed monthly henceforth. These spat traps are the same design as those used by FWC and ANERR, so our data will complement theirs and provide coverage beyond the Apalachicola Bay.

Maps of intertidal areas had been generated using satellite imagery, and ground-truthed to verify the areas were actually live oyster beds (Grizzle et al 2018); however this information did not provide reef elevation maps or information on oyster density and distribution. These data can be obtained from field surveys, but this work is slow, time-consuming and limited by tidal height. An alternative approach was to use an unmanned aerial vehicle (UAV) to rapidly collect geo-referenced high resolution digital images of the intertidal areas. During the extreme low tides of January and February of 2020, the Duke University Remote Sensing Group visited FSUCML to conduct UAV surveys of all intertidal oyster priority monitoring zones. Within ~ 5 days of surveys, they were able to obtain high resolution (2.5cm / pixel), three-dimensional imagery of the target areas, and create digital terrain models of the reefs at ~ 5 cm bathymetric resolution. An example of these products, and an animated 'fly through' of Alligator Harbor can be found on the ABSI website (https://marinelab.fsu.edu/absi/research/maps/). Clusters of oysters are readily visible from the images, and we are working with scientists from Duke University and University of Florida to develop machine learning algorithms to quickly assess density from the images. This approach is an example of how technology can augment traditional research approaches and significantly increase the speed and quality of data production.

Table 2. Summary of field data collections. Glossary of terms: Ground truthing = verifying information from remote sensing data such as satellite imagery to confirm presence of oysters. Spring Monitoring = sampling for density, size, condition, reproduction and disease. Drone survey = aerial surveys for intertidal mapping. Monthly sampling = collection of 15 oysters per site for condition index, reproduction and disease. Spat traps = monthly deployment/recovery of spat traps to assess recruitment

Date	Area/site	Activity
8/22/2019	Carrabelle River Mouth	Ground Truthing
8/23/2019	Alligator Harbor	Ground Truthing
8/28/2019	Indian Lagoon	Ground Truthing
9/10/2019	East Cove	Ground Truthing
12/2019 - 01/2020	Alligator Harbor	Spring Monitoring
01/2020	Carrabelle River Mouth	Spring Monitoring
01/06/2020	Alligator Harbor	Drone Survey
01/07/2020	Carrabelle River Mouth	Drone Survey
02/2020	East Cove	Spring Monitoring
2/8 - 2/9/2020	Indian Lagoon	Drone Survey
2/10/2020	East Cove	Drone Survey
3/9/2020	Alligator Harbor	Spat Traps, Monthly sampling
3/10/2020	Carrabelle River Mouth	Spat Traps, Monthly sampling
3/30/2020	Indian Lagoon	Spat Traps, Spring Monitoring

Discrepancies between proposed and actual deliverables

The monitoring program began later than anticipated as we were waiting for an FWC Special Activity License (SAL) to collect oysters. Instrument deployment has been delayed as we are waiting for permits from the ACOE. The instruments are ready to deploy as soon as the permits are approved.

5. Oyster population genetic structure

Past research on population genetic structure of the eastern oyster indicated significant differentiation among sites across the Gulf of Mexico; for example, the northeast Gulf population (Anclote Keys to Mississippi River, approximately 800 km) is considered genetically different from the other regions of the Gulf. On a smaller scale, studies of oysters off North Carolina identified differences among populations north and south of the Pamlico Sound, a distance of less

than 100 km. Within-region population structure has not been studied for the northern Gulf of Mexico but population differences are possible given the large number of embayments in the region. This component of the ABSI is intended to help identify distributions of oyster sub-populations, which has a number of important applications. Distinct sub-populations may have characteristics that enhance survival under particular environmental conditions. and thus could be used as different genetic lines of broodstock for restoration and aquaculture. With the expansion of aquaculture and importation of seed from elsewhere in the Gulf, it is important to understand local population structure so that genetic integrity (and therefore local adaptation) can be maintained. Analysis of population distribution will also help groundtruth connectivity predictions generated by the bio-physical model.

The deliverables for this objective will be genetic data on oyster population structure throughout Franklin County waters, and identification of local genetic strains or subpopulations for future experiments. Novel genetic codes or primers will be submitted to appropriate gene repositories.

Progress to date

Project has not been initiated

Discrepancies between proposed and actual deliverables

This project was supposed to begin in the 4th quarter of year 1 (January 2020); we are behind schedule primarily because of the severe depletion of subtidal oysters in Apalachicola Bay. With oyster populations at such a low level, it will be challenging to find sufficient individuals within each study site to conduct an adequate investigation. The spring spawn may generate sufficient numbers of juveniles this summer to conduct the study, so our new target start date for this study is summer 2020.

6. Targeted outreach to the community

The ABSI includes significant stakeholder engagement and public outreach components, as well as providing educational and training opportunities for residents of the region. These components include (but are not limited to) development of a community advisory board, stakeholder working groups, public events showcasing ABSI research, and an ABSI website that hosts data and

information such as project updates, news and outreach events. Training opportunities include hatchery internships for local residents to increase workforce capacity for the expanding aquaculture industry. Given the considerable oyster restoration planned for the region, oyster shell is a precious commodity. Through the ABSI, we will investigate the viability of a shell recycling program in Franklin County and the potential for development of a shell recycling business.

In addition to these structured deliverables, outreach efforts will include a number of public events at the FSUCML and partner institutions, public presentations, interactive website development and social media posts

Progress to date

Community outreach for the ABSI project is being pursued through a number of mechanisms, including stakeholder membership in a community advisory board, public meetings, a virtual presence on the web, a physical presence at the FSU Coastal and Marine Lab, and active participation in community events. ABSI also provides volunteer opportunities to involve community members in the project. Below is a summary of the accomplishments under the overarching outreach objective

In May 2019, the Florida State University *Florida Conflict Resolution Consortium* (FCRC) Consensus Center was awarded a two-year contract to convene an ABSI Community Advisory Board (CAB), organize and facilitate bimonthly CAB meetings, and organize public workshops. The objective of the CAB was to develop and agree on overall ABSI goals, objectives, and timelines; to seek consensus on actions and options informed by science for restoring the health of the Apalachicola Bay ecosystem; and agree on an overall management and restoration plan for the Apalachicola Bay system.

The Community Advisory Board was selected through a comprehensive interview process conducted by the FCRC team (Jeff Blair and Robert Jones), and the CAB membership was established by September 2019. The 24 members represent stakeholders who have a vested interest in the health of the Apalachicola Bay System and the agencies responsible for the management and conservation of the region. The ABSI CAB web page contains detailed information on the CAB membership (https://marinelab.fsu.edu/absi/people/community-advisory-board/).

Community Advisory Board Membership summary

Agency personnel: Lee Edmiston *(Retired)* - Apalachicola National Estuarine Research Reserve, Former Reserve Manager*;* Jim Estes - Florida Fish & Wildlife Commission Division of Marine Fisheries, Department Deputy Director*;* Tom Frazer - Chief Science Officer for the State of Florida*;* Jenna Harper - Apalachicola National Estuarine Research Reserve, Reserve Manager*;* Erik Lovestrand - Florida Sea Grant, Extension Director for Franklin County*;* Alex Reed - Florida Department of the Environment, Director of Office of Resilience and Coastal Protection*;* Portia Sapp - Florida Department of Agriculture and Consumer Services Division of Aquaculture, Director*;* Paul Thurman - Northwest Florida Water Management District, Environmental Scientist

Local government: Anita Grove - Apalachicola City Commissioner; Smokey Parrish - Franklin County Commissioner

Local business: Chuck Marks - Acentria Insurance, Vice President; Vance Millender - Millender & Sons Seafood; Mike O'Connell - Saint George Island Civic Club, 2025 Vision; Steve Rash - Water Street Seafood, Owner; John Solomon - Apalachicola Chamber of Commerce; Cary Williams - Apalachicola Oyster Company, Owner

Non-governmental organizations: Georgia Ackerman - Apalachicola Riverkeeper, Executive Director; Chad Hanson - PEW Charitable Trusts, Fisheries Science and Policy Analyst

Non-profit organizations: Frank Gidus - CCA Florida, Director of Habitat & Environmental Restoration; Chadwick Taylor - Riparian County Stakeholder Coalition

Watermen: Chip Bailey - Peregrine Charters, Owner; Shannon Hartsfield - Waterman, Franklin County Seafood Workers Association; Roger Mathis - Waterman, R.D.'s Seafood; TJ Ward - Buddy Ward & Sons Seafood

CAB Meetings

All meetings to date have been held at the ANERR conference room in Eastpoint, FL. Documents from each meeting have been posted on CAB website, including meeting agendas copies of meeting presentations (https://marinelab.fsu.edu/absi/cab/absi-cab-documents/), and meeting summaries

- October 30, 2019 presentations: 1) ABSI overview (S. Brooke, FSUCML)

- December 18, 2019 presentations: 1) Apalachicola River Slough Restoration (G. Ackerman, Apalachicola Riverkeepers), 2) Oyster Fishery and Harvest Statistics (F. Coleman, FSUCML), 3) ABSI Research Update (S. Brooke, FSUCML), 4) Apalachicola Bay Oyster Restoration Phase II (J. Estes, FWC);
- January 8, 2020 presentations: 1) Oyster Ecology (F. Coleman, FSUCML), 2) Hydrologic Modeling (S. Leitman, FSU), 3) Introduction to Oyster Modeling (E. Camp, University of Florida)
- March 11, 2020 presentations: 1) Current status of Apalachicola Bay (S. Brooke, FSUCML), 2) Aquaculture Leasing Program (P. Sapp, FDACS), 3) Oyster Reef Management in Apalachicola Bay (J. Brucker, FDEP, 4) Oyster Futures Stakeholder Process (J. Blair, FCRC).

Note: The March meeting was the first to be recorded, in an effort to expand information dissemination to the public. Video and/or audio will be made available through the ABSI website. All future meetings will be recorded and posted.

A benefit of community engagement natural resource management is the potential for shifts in attitudes and/or beliefs of participants, specifically with respect to the role of science in management. Our ABSI partner, Dr. Ed Camp (University of Florida) has designed an evaluation tool to assess change in CAB member attitudes over time, with respect to science and management of natural resources. Pending approval from the University review board, the survey will be implemented at the next CAB meeting and used to track attitude changes over the remaining of the CAB process.

On-site outreach at FSUCML

After some cosmetic work, the old Reef Fish Ecology building at the FSUCML became the center of ABSI research and outreach operations. The hallway of the ABSI building provides opportunities for visitors to learn about oysters and the ABSI research, including:

- Oyster lifecycle poster (https://marinelab.fsu.edu/media/3484/oyster-life-cycle-2-004.jpg),
- Map of the Apalachicola Bay System highlighting ABSI research
- Whiteboard updated monthly with a calendar of ABSI events, meetings, and field days, as well as photographs of research and outreach activities.

The FSUCML volunteer program has also developed opportunities for the local community to assist with the project (https://marinelab.fsu.edu/outreach_education/volunteer/absi_ops/). Students from the local area have donated many hours to helping with ABSI science objectives.

Online Outreach Initiatives

The primary source of online information is the ABSI website (https://marinelab.fsu.edu/absi/) which contains information on research, outreach, people, and events relative to the project. The website is used for rapid updates of research activities, background information on scientific topics, outreach activities, community advisory board meetings and news items.

In-Person Outreach Opportunities highlighting ABSI and other FSUCML research

- Florida Seafood Festival, November 1-2, 2019: ABSI team members and other FUCML staff hosted a booth that provided interactive information on ABSI and other research being conducted at FSUCML, and the opportunity to interact with the scientists.
- Florida State University Day at the Capitol, February 12, 2020. ABSI and FSUCML outreach personnel hosted a booth.
- Florida Ocean's Day at the Capitol, February 25, 2020. ABSI and FSUCML outreach personnel hosted a booth.
- Osher Lifelong Learning Institute (OLLI), February 29, 2020. FSUCML hosted an all-day class, focused on the ABSI project for the OLLI participants. Activities included presentations, hatchery tour and visit to the FWC/FSUCML oyster restoration project
- Dr. Brooke has given several public presentations on the ABSI project in 2019 and 2020.

Shell recycling program

One of the outreach objectives is to assess the feasibility of developing an oyster shell recycling program that would provide economic development and community engagement opportunities throughout the region. This assessment has been initiated and is ongoing.

Discrepancies between proposed and actual deliverables

There are no significant differences between proposed and actual deliverables

Miscellaneous accomplishments

Scientific Advisory Board (SAB)

The purpose of the SAB is to apply their considerable and varied experience in oyster research, management and restoration to assist the ABSI investigators. The role of the SAB members is to share perspectives on implementation of science objectives, addressing data gaps, communicating science to stakeholders and generally providing advice on all aspects of ABSI science. The SAB was established in September 2019 and the first SAB meeting was at FSU on December 10, 2019.

SAB members (https://marinelab.fsu.edu/absi/people/science-advisory-board/)

- ***Laura Geselbracht*** (The Nature Conservancy), has expertise in resilience and restoration of coastal ecosystems affected by sea level rise, habitat destruction, and other stressors.
- ***Raymond Grizzle*** (University of New Hampshire) has expertise in oyster reef mapping using a variety of remote sensing methods, quantification of ecosystem services provided by oysters, restoration methods for oyster reefs, and oyster and seaweed aquaculture.
- ***Roger Mann*** (Virginia Institute of Marine Science) conducts research on the physiological and population ecology of marine invertebrates; larval dispersal and settlement processes in estuarine and shallow water systems; and ecological restoration of oyster reef communities.
- ***Bill Pine*** (University of Florida) conducts research to assess how riverine and estuarine ecosystems respond to management actions. His teaching and research interests mostly focus on quantitative ecology and using adaptive management to improve natural resource decision making.

ABSI personnel

Project manager: Gina Wells is the project administrator and is responsible for budget management, hiring ABSI personnel, processing purchases and many more administrative tasks.

Marine technician: Chris Matechick is responsible for organizing and supervising ABSI fieldwork, sample processing, data processing and archiving, generating GIS-based data products, assisting with reports and many other tasks associated with ABSI research.

Hatchery manager: Joe Rocco is currently assisting with completing the interim hatchery; ordering tanks, filters and other supplies that the hatchery will need to operate smoothly. Once online, Joe will be responsible for broodstock conditioning, spawning, larval maintenance and spat setting. We are in the process of hiring a technician to help Joe with these tasks.

Graduate students

- *Adam Alfasso,* Ph.D., Earth Ocean and Atmospheric Sciences, FSU: Dissertation topic "Predictive Habitat Modeling for oyster communities in the ABS"
- *Cheston Peterson* Ph.D., Biological Sciences, FSU. Assisted with analysis of FWC Fisheries Independent Monitoring data, to determine its utility for tracking fish populations in the ABS.
- *Barry Walton*, M.Sc., Earth Ocean and Atmospheric Sciences, FSU. Assisted with literature search and building moorings for the ABSI instruments.

Research Faculty

We are in the final negotiations for hiring two new FSUCML faculty that will focus on ABSI research.