FLORIDA INSTITUTE OF OCEANOGRAPHY

Fiscal Year 2020-2021

Annual Report

Date of Submission to Chancellor, Florida Board of Governors:……..November 2021
Reviewed and Approved by Host Institution Board of Trustees:……..August 24, 2021
Reviewed by Council of Academic Vice Presidents:……July 2021
Date of Submission to Host Institution Provost:……June 29, 2021
Date of Approval by FIO Council:……June 25, 2021
Date of Submission for review by FIO Council:……June 15, 2021

For additional information on the Florida Board of Governors, Florida Institute of Oceanography and its Host Institution, the University of South Florida, please visit:

Florida Board of Governors, www.flbog.edu
University of South Florida, Host Institution, www.usf.edu
Florida Institute of Oceanography, www.fio.usf.edu

FIO 2020/2021 Annual Report

Table of Contents

View from the Bridge

Greetings,

Assuming a leadership role for a different organization is always a challenge and joining FIO as its director in January was no exception. The learning curve was steep but with the support from Provost Wilcox, Dr. Garey, the FIO Council and staff, I feel confident in the progress we have made during the last few months.

I am proud to say that, even with the difficulties of the COVID-19 pandemic that fundamentally affected higher education, FIO is more in demand than ever. From working with our Consortium to provide an effective response to the wastewater leak of Piney Point to vessel upgrades to building a more robust subsidized program for the SUS, FIO has remained both fluid and buoyant.

We look forward to implementing key strategic goals around operations, education support, research support, and business engagement support, with a focus on providing access to state-of-the-art technology, equipment and facilities while enabling excellence in marine science to the community.

While COVID has a been a challenge for FIO and the marine industry, the enclosed FIO Annual Report for FY20/21 outlines a few exciting coastal endeavors, missions, and collaborations we have been involved with over the past year. I am excited for what the future holds for FIO, its members, and the state of Florida.

Sincerely,

William (Monty) Graham, PhD
Director

Governance of FIO as an AISO

Established by the Board of Governors (BOG) in 2009 and supported by the SUS Council of Academic Vice Presidents (CAVP), FIO serves the State University System (SUS) by Supporting Excellence in Marine Science, Technology and Education through infrastructure, programs, information and people to its member institutions across Florida.

In November 2018, the BOG revised the AISO regulation 10.014 Academic Infrastructure and Support Organizations, which FIO is mandated to follow. A change in the FIO's By-laws now reflect the following: 'The FIO Executive Committee will consist of five (5) full Council members including the Council Chair and four elected members. **State University System institutions must comprise at least fifty-one percent (51%) of the executive committee and** at least one member of the FIO Executive Committee shall be from the host institution.'

- Eckerd College
- Florida Atlantic University*
- Florida Department of Environmental Protection
- Florida Agricultural and Mechanical University*
- Florida Fish & Wildlife Conservation Commission, Fish and Wildlife Research Institute
- Florida Gulf Coast University*
- Florida Institute of Technology
- Florida International University*
- Florida Polytechnic University*
- Florida Sea Grant
- Florida State University*
- Mote Marine Laboratory
- New College of Florida*
- Nova Southeastern University
- Smithsonian Marine Station
- University of Central Florida*
- University of Florida*
- University of Miami
- University of North Florida*
- University of South Florida*
- University of West Florida

Since 2010, FIO's membership has grown to include Associate and Affiliate members whose missions align with FIO and the BOG.

- Clearwater Marine Aquarium
- Hubbs-Seaworld Research Institute
- Jacksonville University
- Roffer's Ocean Fishing Forecasting Services, Inc.
- Sanibel-Captiva Conservation Foundation
- SRI St. Petersburg
- St. Petersburg College
- The Florida Aquarium
- University of South Florida-St. Petersbu

Administration & Finance

Budget Overview

FIO had recurring operating funds of $2.1M at the onset of FY 20/21, which included personnel support and day-to-day operational costs. Additionally, a total of $1M was available to carry forward to this fiscal year to support activities. The funds also included a reimbursement to FIO by FEMA for expenditures that supported the Keys Marine Laboratory (KML) post Hurricane Irma.

From the $1M, FIO was able to maintain a $400,000 reserve from the carry-forward balance for unforeseen expenditures, however, carry-forward funds have been dwindling and a reduced amount is anticipated to be available for operational support in the coming fiscal year. The "carry forward account" supported large expenditures, including $370,000 supporting the shipyard-based maintenance and repairs for the R/V Weatherbird along with additional expenditures in order for the research vessels to be "mission-ready".

The COVID-19 pandemic caused a reduction in FIO's revenue stream, which normally offsets some of the operational expenses incurred by the auxiliary accounts. FIO has submitted documentation to the USF leadership for potential support that may be available through the CARES Act (CRRSAA) relief. The pandemic ultimately halted the busiest season for marine research but staff have seized the opportunity to perform preventative maintenance on both the vessels. A demand for research vessels usage will be on the rise as COVID restrictions ease.

At KML, staff have been working diligently on the National Science Foundation (NSF) seawater project highlighted in this report. Working with Fish & Wildlife Research Institute (FWRI), the Fish & Wildlife Commission (FWC) Coral Tank Farm Expansion at KML is in progress with a completion deadline in the fall.

Personnel Overview

- The search for FIO's Director concluded January 4, 2021. Dr. William (Monty) Graham was hired. Acting Director, Dr. James Garey, returned to his full time role as Vice Provost.
- October 2020, based on funding challenges, two crew members were laid off; a deck hand on the R/V Weatherbird II and Assistant Engineer on the R/V Hogarth.
- The impact of these furloughs was magnified when the captain of the R/V Hogarth resigned, coupled with the administrative release of the first mate of the R/V Weatherbird II.
- KML's Sr. Biological Scientist resigned and the position's duties were redistributed.
- Temporary and relief crew have been recruited to support the waterfront vacancies.

A detailed organizational chart provided in Appendix A.

Facilities

Infrastructure & Operations

FIO spent the last two quarters of 2020 repairing the research vessels' "busting rust" and paint while conducting additional maintenance that is typically not attempted during what is normally a busy season for research cruises. In addition, the new Marine Superintendent, Bill Walsh, was hired after a 30-year stint with the United States Coast Guard. Bill's first task was to develop guidelines on operational safety amidst the COVID-19 pandemic. After months of formulating procedures based on guidance provided by USF's COVID Task Force, UNOLs, the America Bureau of Shipping and the Coast Guard, FIO commenced research vessel (R/V) operations in July 2020. Initially, students were not permitted to sail and cruises were launched with fewer personnel than normal. FIO's Host Institution, the University of South Florida (USF) has since eased up COVID restrictions and currently, both the R/V Hogarth and R/V Weatherbird II are permitted to carry students, though the R/V Weatherbird II is operating below maximum capacity. During the pandemic, many state university ship users were not able to sail due to their organizations' travel restrictions or their respective missions could not be accomplished in accordance with FIO's COVID policy.

FIO is currently operating in a modified phase II which allows the R/V Hogarth to operate with a full crew and accommodate a full science party, whereas the R/V Weatherbird II is limited to 6 crew and 7 science party members. This difference in science party capacity is due to the different HVAC systems on each vessel. The R/V Hogarth's system is a traditional system that exchanges air, but the R/V Weatherbird II is a type of chilling system that cools existing air without exchanging it for fresh air.

Initially, all cruises conducted during the height of the COVID pandemic were guided by the FIO COVID plan but in December, the USF COVID Task Force began to review each cruise as part of the USF Travel process. For non-USF organizations, FIO submits the required documents to the aforementioned Task Force. This has been an overall seamless and timely process. In order to ensure this continues, FIO requires that all ship users submit cruise plan requests and COVID Task Force requests within 30 days of sail time.

Thankfully, vaccinations are on the rise and COVID cases continue to decline, but for now the USF COVID Task Force requires that all members of the science party (regardless of vaccination status) continue to be PCR tested for COVID within 7 days of their confirmed sail date.

Amidst the pandemic, FIO coordinated vessel support for the Piney Point plant wastewater spill, which included the deployment of the R/V Weatherbird II to collect samples around the outflowing water released from Piney Point's former fertilizer processing plant. Scientists from the USF's College of Marine Science (CMS) and University of West Florida (UWF) worked with FIO to collect data to help Florida's science community assess the potential long-term impacts of the release. Drs. Kristen Buck and Steve Murawski led USF's research efforts, measuring water quality and examining habitats on-site while collecting samples for laboratory analysis. This rapid deployment allowed FIO to provide researchers with a rare opportunity to gather data that could be used to inform an effective response along with mitigation actions.

Samples of the data were also shared with researchers from the Fish and Wildlife Research Institute (FWRI), Eckerd College and Florida State University (FSU). The data and samples collected will help provide a scientific basis for understanding the long-term impacts of nutrient pollution and its contribution to issues like Harmful Algal Blooms (HAB).

In January 2021, FIO began to see a rise in ship users' interest to sail. To date, FIO has completed 81 days at sea in FY 20/21 and billed nearly $469,400.

Table 1 - Ship Users and Revenue FY 20/21

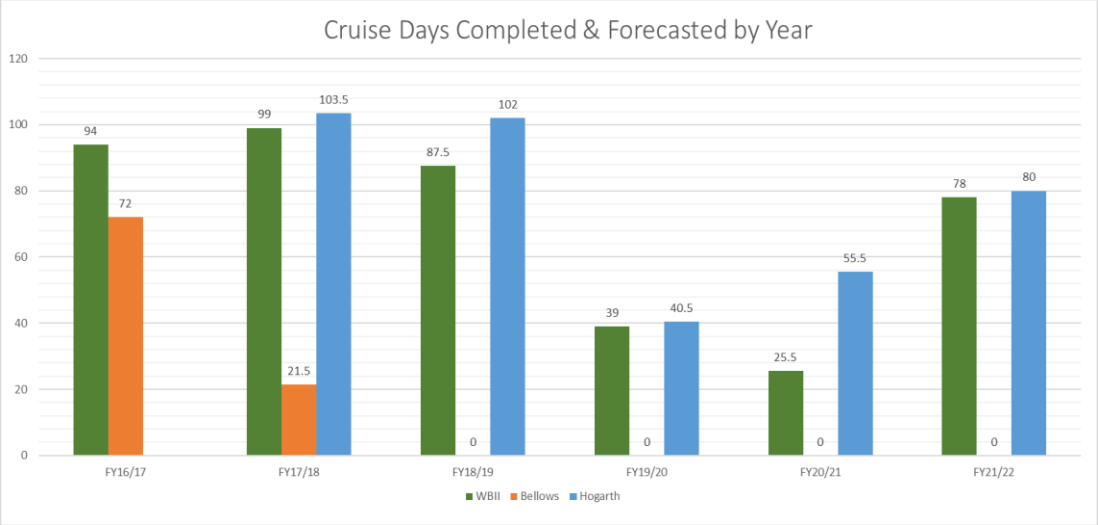
Ship User	Days at Sea	Vessel	Estimate	Month
USF - CMS – Weisberg	3	Weatherbird	$ 26,400.00	Aug-21
FWRI - Garrett-Buck	3	Weatherbird	$ 26,400.00	Sep-21
USF - CMS – Weisberg	0.5	Weatherbird	$ 5,500.00	Sep-20
WHOI-Buck	3	Hogarth	$ 20,100.00	Sep-20
USF - CMS Luther	0.5	Hogarth	$ 3,375.00	Sep-21
USF - CMS Herbert - SUS	4	Hogarth	$ 2,680.00	Oct-20
USF- CMS – Murawski	4	Hogarth	$ 20,335.00	Nov-20
USF- CMS – Murawski	6	Hogarth	$ 47,800.00	Feb-21
USF - CMS – Murawski	5	Weatherbird	$ 44,050.00	Feb-21
CMS – Murawski	4	Hogarth	$ 30,000.00	Feb-21
FIU - Grissom - SUS	3	Hogarth	$ 2,250.00	Mar-21
USF - CMS – Weisberg	1	Weatherbird	$ 11,000.00	Mar-21
Adhikari - FIU - SUS	7	Hogarth	$ 5,250.00	Mar-21
Piney Point	3	Weatherbird	$ 33,000.00	Mar-21
USF - CMS – Muraski	6	Hogarth	$ 63,300.00	Apr-21
Boswell - SUS	4	Hogarth	$ 3,000.00	May-21
USF - CMS - Weisberg - SUS	4	Weatherbird	$ 4,400.00	May-21
FWRI - Garrett-Buck	5	Weatherbird	$ 55,000.00	Jun-21
USF - CMS - Judkins - SUS	1	Weatherbird	$ 1,100.00	Jun-21
FIT – Wood - SUS	6	Hogarth	$ 4,500.00	Jun-21
FIT – Wood	8	Hogarth	$ 60,000.00	6/1/21
	81		$ 469,440.00	

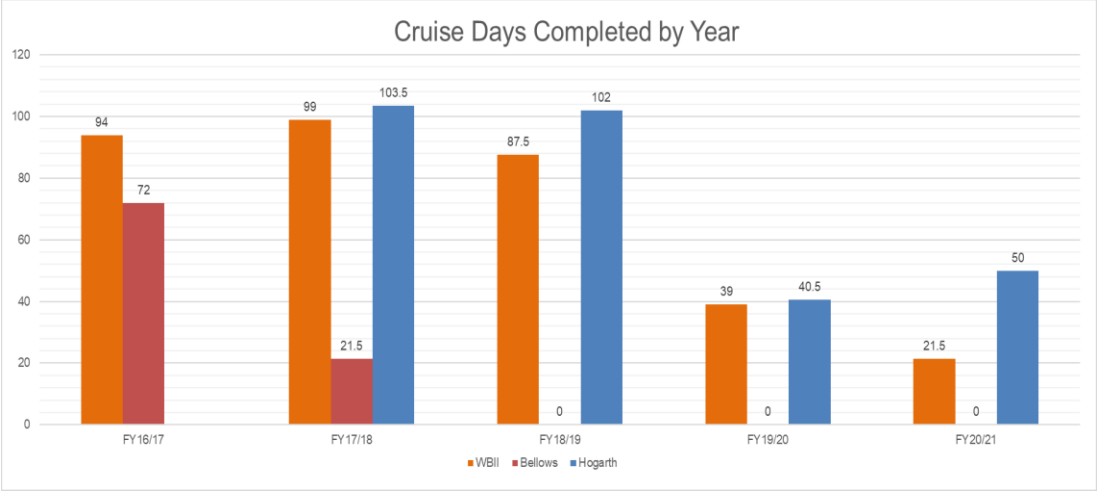
The next Fiscal Year is looking promising as FIO has scheduled 158 days at sea through March 2022 with an expected billing of $1,356,000. This upward trend in vessel reservations is expected to continue.

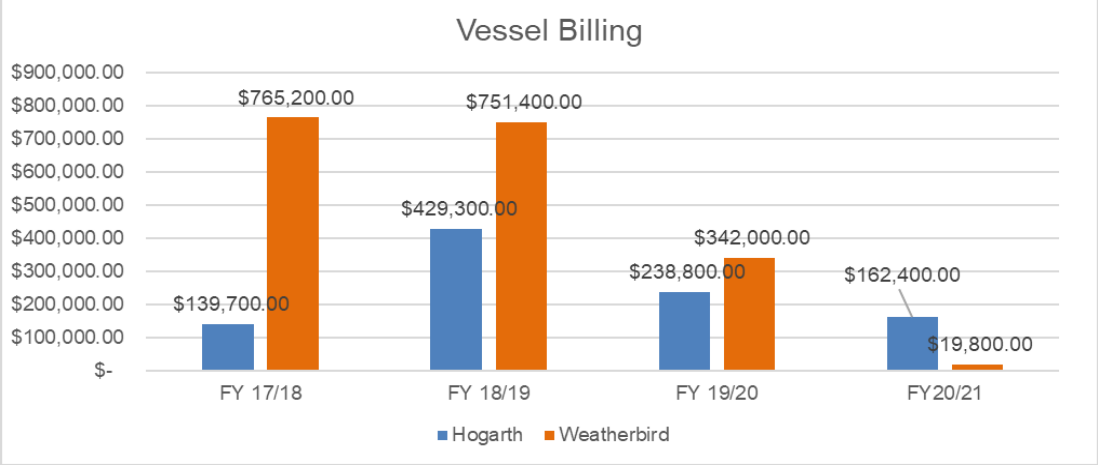
Table 2 - FY 21/22 Vessel Reservations & Anticipated Revenue

Ship User	Days at Sea	Vessel	Estimate	Month
USF - CMS – Murawski	6	Weatherbird	$ 77,000.00	Aug-20
Heil - Mote	10	Weatherbird	$ 110,000.00	Dec-21
HDR-DOD	38	Weatherbird	$ 328,000.00	Aug-21
Woods Hole Inst	10	Weatherbird	$ 105,000.00	Oct-21
NOAA	10	Hogarth	$ 75,000.00	Oct-21
Univ Washington	7	Hogarth	$ 100,000.00	Aug-21
Univ Washington	14	Weatherbird	$ 100,000.00	Sep-21
CMS-Buck	6	Weatherbird	$ 66,000.00	Aug-21
CMS - Law	2	Hogarth	$ 15,000.00	Jul-21
URI - Kovac	16	Hogarth	$ 120,000.00	Mar-22
CMS - Muraski	45	Hogarth	$ 337,500.00	Various

Below, the graphs show vessel usage going back to FY 16/17 and the impact the COVID-19 pandemic had on operations and revenue:







Vessel Updates

R/V Hogarth

FIO staff are currently working through several issues on the R/V Hogarth. FIO continues to make efforts to address the following items:

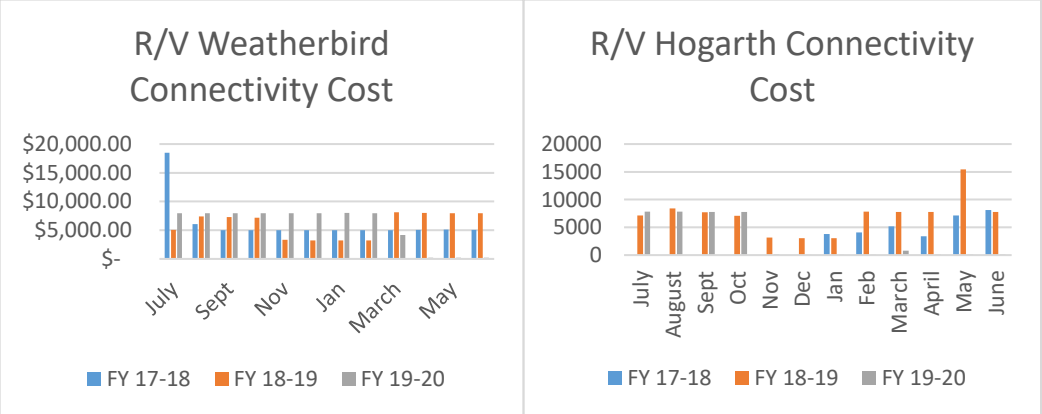
- Degradation of stainless engine room piping due to excessive corrosion.
- Aft pilot house controls; helm, throttle, and thruster controls not positioned for safe winch operations.
- Galley exhaust system not capable of exchanging air when cooking.
- Hydraulic system updates and troubleshooting to accommodate the Dynamic Positioning (DP) system. This has included testing and the rebuilding of all major components (pumps, valves, relief valves, etc) required to allow the DP system to take proper control of the bow thruster.
- Dynamic positioning system – engineering review completed & implementation pending review/ estimate by local shipyard.

R/V Weatherbird II

A Digital Ship

At a time when people can access almost anything and contact almost anyone around the world with the touch of a few buttons from a device in their pocket, FIO's research vessels are capable of only basic browsing, email and light video use. The ability to provide internet access at sea since FY 17/18 to present has cost FIO nearly $382,000 on browsing speeds akin to dial up speeds, a staggering cost that FIO has absorbed as a part of our operational cost.

Tables 3 & 4 - R/V Weatherbird & Hogarth Data Expenses



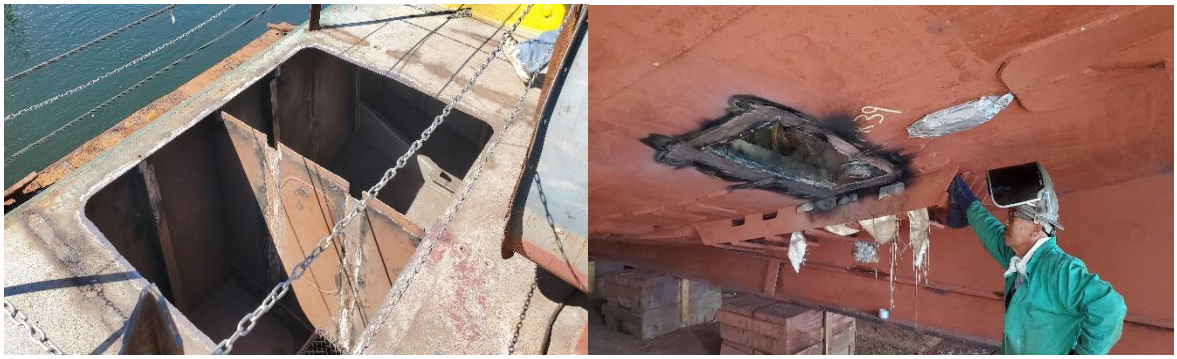
Further illustrating the fragility of the vessels' connectivity and capability, the R/V Weatherbird II's internet satellite system experienced a casualty, its second major issue in the past 4 years. This was not completely unexpected as the system is 12 years old and is comprised of components harvested from a decommissioned FIO research vessel, the R/V Bellows. As user expectations and science mission connectivity require more

robust and ubiquitous connectivity at sea, FIO is preparing to provide more reliable and affordable connectivity. Most video call software uses about 500 kbps (3.75 MB/minute) for a one-way (standard definition) call and as much as 1.8 Mbps (13.5 MB/s) for a one-way high-definition video call. For a two-way video call, there is double the data usage, which is a total of 7.25 MB/minute minimum, 27 MB/minute maximum. In order to support internet needs at sea FIO is exploring two connectivity options.

Aging Vessel - Possible Next Step

The R/V Weatherbird II is quickly approaching 40 years of age, which is the age at which even well-maintained vessels are decommissioned due to rising costs and increased frequency of necessary repairs. Despite the R/V Weatherbird II's age, FIO's lifetime investment of nearly $2.3M has netted $6M in revenue but for research vessels, it is especially challenging to be state-of-the-art when a vessel and most of its science equipment are antiquated. This past January, the R/V Weatherbird II was expected to be in the shipyard for 10 days, but the vessel remained there for an additional 37 days due to significant metal corrosion in one of the aft ballast tanks. As FIO reviewed past maintenance issues and their associated costs, it became apparent that steel replacement has accounted for nearly $320,000 of expenditures during the 2019 and 2021 shipyard maintenance periods. In addition, overall maintenance costs have increased by 154% over the past 5 years, a cost indicative of the age of the R/V Weatherbird II. Years of corrosive salt water and wind, not to mention constant use, takes its toll.

The next major milestone for the R/V Weatherbird II is the 5-year American Bureau of Shipping (ABS) inspection on behalf of U.S. Coast Guard regulations, which is scheduled to take place within the next two years. ABS inspectors have frankly indicated that this inspection will be more thorough than previous inspections due to the vessel's age and condition; retaining the ABS certificate will be a challenge, if not impossible. Though FIO can operate a vessel without the ABS certification, the lack of certification will likely cause already expensive insurance rates to rise and could tarnish FIO's commitment to sustaining the safest at sea operations possible.



To ensure FIO is able to maintain an oceangoing presence in the Gulf of Mexico, FIO is researching numerous options to replace the R/V Weatherbird II. Over the next several months, FIO will begin the process of evaluating ship users' needs by conducting surveys and a comprehensive analysis led by the FIO Ship User Committee.

Keys Marine Laboratory

Infrastructure

Tropical Storm Eta passed directly over Keys Marine Laboratory (KML) in October of 2020 then strengthened to a category 4 hurricane. While no local evacuation was announced, staff prepared for heavy rains and sustained tropical force winds (39-73 mph) throughout the Keys for several days. The laboratory escaped unscathed with no damages.

Despite COVID-19 related closures, work force and construction delays, and supply chain disruptions, work has continued on the 2019 NSF award for infrastructure upgrades and improvements to the aging bay water system. The old 'Shallows' seawater pond has been repaired, resurfaced, and deepened to promote mesocosm-level research and equipment testing. A second degassing tower will supply water to new concrete reservoirs (6,000-gal capacity) to provide temperature-controlled seawater to an additional 30 new shaded experimental tanks that complement the 30 current bay system tanks.

An additional expansion project to fully maximize the current well seawater system has been funded by a partnership with FWC/FWRI. Construction is underway to add fifteen new experimental tanks (3,600-gal volume) adjacent to the existing tanks for the new Coral Tank Farm. These tanks will be used for coral restoration efforts for the Florida Reef Tract in the near future.

Research

KML has contributed to student success through use of dorms, vessels, seawater system, and staff support. Graduate level support included one Master's student (Clemson University) and four PhD students (FSU & UF). These students and associated assistants and faculty members were offered access to KML during the COVID phased re-opening to continue their educational and research goals.

The KML facility has also enabled multiple research activities throughout the year, providing access to dorms, vessels, dry lab space, and the seawater system. Even while at limited capacity, dorms were utilized by several research groups including sawfish tagging and monitoring (FSU), fish microbiome research (Alabama State University & Woods Hole). Day Access to KML supported ongoing materials testing (Atlas) and oceanographic monitoring (USF). Multiple coral restoration projects were facilitated by KML's state-of-the-art seawater system (Florida Aquarium, FWC/FWRI Coral, FWC/FWRI Restoration Ecology, I.CARE).

Additional notable projects conducted at the lab:

- NOAA/FWC - Coral rescue
- FWRI - Coral restoration project
- I.CARE – Staging area for coral restoration
- Sikkel University of Alabama – Cleaner fish microbiome; collaboration with Woods Hole
- FL Aquarium - Coral restoration
- Atlas - Materials testing

Usage

Tables 5-8 - KML Usage & User Demographics FY 19/20 vs. 20/21

	Dorm Use + Day Access				Dorm Use			Day Access		
	Total # groups	Total # people	# SUS	SUS frequency	# groups	# people	# nites	# groups	# people	# days
FY19/20	75	331	8	25	39	183	1022	34	148	516
FY20/21	44	159	7	20	21	116	1367	23	43	1227

KML demographics	Undergrad	Graduate (Masters & PhD)	Faculty/Researcher	Total users
FY19/20	109	60	161	330
FY20/21	52	46	112	210

Fiscal Year	**# FIO members**	**FIO frequency**	**# SUS**	**SUS frequency**	**# groups or organizations**
FY19/20	4	47	8	25	75
FY20/21	4	29	7	19	43

	total # vessel days			**total # people**		
	snorkel trips	**dive trips**	**Total days**	**snorkelers**	**divers**	**Total people**
FY19/20	34	28	62	228	59	287
FY20/21	25	62	109	215	128	343

Dorms

Since reopening in July 2020 (Phase 1) from the COVID-19 emergency closure, KML has housed 116 visiting researchers and students for a total of 1367 nights. Twenty one individual groups included seven different SUS universities. During Phase 1, KML dorms and vessels operated at 25% capacity and groups were limited to research and graduate students only, with a maximum of five per group. KML housed three research groups (9 people for 84 nights) which included one SUS university (table 9). KML transitioned to Phase 2 in July 2020 through the remainder of the fiscal year with 50% capacity in dorms and on vessels, allowing research and education groups but limited to a maximum ten people per group.

Table 9 - Dorm Usage, FY 20/21

			# people in dorms				
Dorm Use	# groups	# SUS	undergrad	graduate	faculty/researcher	total people	# nights
Phase 1	3	1	0	3	6	11	86
Phase 2	18	6	50	31	25	101	1281
FY 2020-21	21	7	50	34	31	112	1367

Day Access

COVID protocols also applied to Day Access groups, which allowed the use of KML vessels and the sea water system when dorms were unavailable. In this way, KML was able to support the continuation of projects for 23 research groups which impacted 43 users (1227 user-days), including 11 graduate students, during the phased COVID reopening (table 10).

Table 10 - Day Access to KML Facilities, FY 20/21

Day Access	# groups	# SUS	# people on site				# user-days
			Undergrad	graduate	faculty/researcher	total	
Phase 1	3	0	0	2	4	6	246
Phase 2	20	0	0	9	23	37	981
FY 2020-21	**23**	**0**	**0**	**11**	**27**	**43**	**1227**

Vessel Use & AAUS Diving at KML

KML vessel use typically averages 115 days on the water per year, including snorkeling and AAUS diving activities. With limited capacity during FY2020-21, a total of 109 day trips for 26 groups were conducted, including 21 snorkel trips and 74 dive trips (table 11). Operating at 25% vessel capacity during Phase 1, two research groups from SUS universities scheduled six vessel days. Vessel capacity increased to 50% during Phase 2 (Oct 2020) which allowed for small education-oriented groups. Twenty four additional groups scheduled vessel use, including four undergraduate education classes.

Table 11 - Vessel Use and Activities, FY 20/21

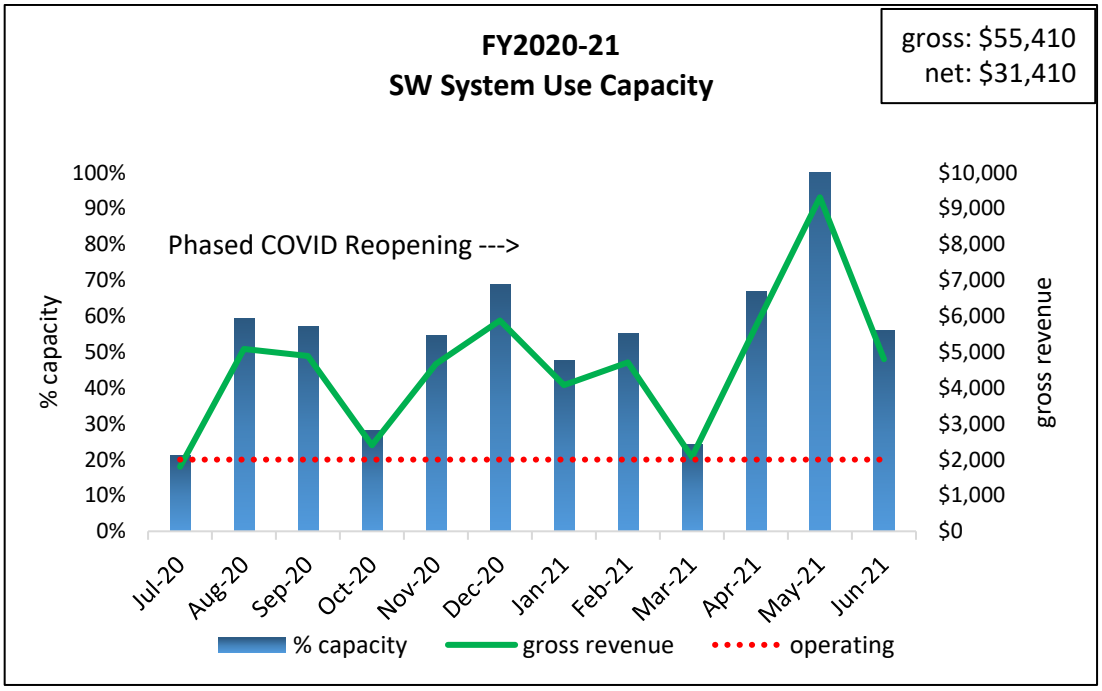
KML Vessel Use	# groups	# SUS	# people on vessels		# vessel days	
			# snorkelers	# divers	# snorkel days	# dive days
Phase 1	2	2	0	4	0	6
Phase 2	24	5	21	7	6	25
FY 2020-21	26	7	215	128	21	74

KML's state-of-the-art well-sourced seawater system is typically utilized by 30-40 different groups each year, including graduate and senior research projects, land-based coral spawning, and coral restoration projects. The KML seawater system was deemed 'essential life support' for the ongoing FWC/NOAA Coral Rescue Project and continued to operate during the COVID closure. All other projects, however, were cancelled. Phase 1 Reopening in July 2020 allowed three small research groups access to the seawater system, including the completion of a Clemson University Master's project. With nineteen tanks available (ranging from 40-gal to 1000-gal volumes), the system operated at 46% capacity during Phase 1 (table 12). The transition to Phase 2 in October 2020 allowed eight additional groups access to the seawater system which included coral restoration projects (FWC/FWRI and I.CARE), fish microbiome research (Alabama State University and Woods Hole), and coral thermal tolerance studies (Northeastern University and Coral Restoration Foundation). In May 2021, KML's seawater system facilitated and enabled the multi-partner reef-wide outplanting and coral restoration

experiment, temporarily housing over 5000 coral colonies (FWC, DEP, Mote, Nova, FAU, CRF, U Miami, Reef Renewal).

Tables 12 & 13, Seawater System Use, Capacity, and Revenue

KML SW System Use	# groups	# SUS	People using SW System		SW Use	
			# grad students	# researchers	# tank-days	% capacity
Phase 1	3	0	2	4	776	46%
Phase 2	8	1	13	19	3095	55%
FY 2020-21	11	0	15	23	3871	54%



Seawater System Updates

The Keys Marine Laboratory seawater system has figured prominently this year in coral restoration projects.

1. The State of Florida Coral Rescue project which began in 2019, has established strong collaborations with FWC, NOAA, and Association of Zoos & Aquariums (AZA). This project was an emergency response to the Stony Coral Tissue Loss Disease (SCTLD) outbreak ravaging the reef and focused on collecting 50-200 replicates of 15 susceptible reef-building coral species ahead of the rapidly advancing disease line. KML's seawater system was used as a transition facility as corals were relocated to land-based AZA-approved nurseries across the country to preserve the genetic diversity of the reef.
2. The genetic rescue of the threatened and now locally extinct pillar coral (*Dendrogyra cylindrus*) began at KML in January 2016, creating a living genetic bank for preservation of this unique species. Multiple

collaborations, including NOAA/NOS, Florida Aquarium, Nova University, FWC/FWRI, Mote Marine Lab, Frost Museum, Coral Restoration Foundation, and Reef Renewal, allowed for the preservation of this species for future restoration efforts. This became the pilot project and proof-of-concept for the larger Florida Coral Rescue project.

3. In May 2021, the KML seawater system was the focal collection and distribution point for 5,000 corals in a multi-partner coral out-planting pilot study, coordinated by FWC/FWRI. Outplanting efforts spanned the entire Florida Reef Tract from Martin County to Key West. Partners included FAU at Harbor Branch, Nova Southeastern University, University of Miami, Coral Restoration foundation, Reef Renewal, and Mote Marine Laboratory. Florida Fish & Wildlife Conservation Commission secured state funding and established a partnership with KML (Fall 2020) to expand capacity of the existing seawater system for future coral restoration. The expansion project will fully maximize the current seawater system and is expected to be complete in September 2021.

Programs

Subsidized Ship Time

Due to COVID-19, all of the subsidized State University System (SUS) ship time awarded for FY 19/20 was cancelled as students were not permitted to get underway. In an effort to honor FIO's commitment to the SUS awardees, FIO made the decision to carry forward all awards to FY 20/21 with the caveat that all ship days are used by the end of the current fiscal year. The decision to carry over the SUS subsidized days was challenging due to several factors, including the R/V Weatherbird II's long and costly shipyard stay, challenges commissioning the R/V Hogarth's dynamic positioning system, and reduced staffing due to budget cuts and resignations. Despite these respective challenges, 44 subsidized SUS days were scheduled with 11 of them cancelled (5 due to COVID & 2 due to mechanical issues on R/V Hogarth). 33 subsidized ship days were completed in support of 94 undergraduates and 29 graduate students from 7 of our 13 SUS institutions.

FY 21/22 Request for Proposals was released on April 8, 2021; 25 proposals were received from 10 SUS institutions. The Ship User Committee and the FIO Director are working together to review the proposals and determine how many subsidized days will be awarded. This number is expected to be lower than previous years due to FIO's limited budget, but the organization remains hopeful that it will be postured to support more SUS days in the coming fiscal years.

FIO Engineering Day(s)

General Eligibility: All SUS member organizations are encouraged to request to utilize this time at sea within the following guidelines:

1) The desired mission can coincide but shall not detract from FIO training and readiness needs.
2) No special or custom accommodations will be allowed.
3) Use of the ship time is on an "as is" basis based on vessel configuration and in close proximity to the cruise's intended location or track.

4) Ship users must adhere to the FIO COVID-19 pandemic plan, which may include COVID testing and/ or limits to science party capacity.

Terms and Conditions: Each ship time request must meet the below criteria mentioned and be approved by the Marine Superintendent. Term and conditions outside of these parameters require approval by the FIO Director.

1) Cruises are generally of short duration (e.g. 8 hours), and shall not hinder FIO's primary training or maintenance objectives.
2) Engineering ship time does not include food or other provisions or use of vessel berthing areas.
3) No overtime will be incurred by FIO staff.
4) Paid ship time and Engineering Days cannot be combined.

Process: Each quarter, FIO will release a FIO Training Plan and the Marine Superintendent will solicit proposals for the day(s) deemed available. Potential ship users should respond within 2 days of the request. Repeat requests for Engineering Days will be considered but FIO's goal is to facilitate participation across the entire SUS.

Marine Field Studies Course: Multi-institutional Effort

In its 8th year (would be 9th if 2020's course wasn't canceled due to COVID-19), the multi-institutional, 5-week summer course hosted by FIO had fifteen undergraduate students enrolled from the Florida SUS system. The course is focused on field study techniques in a variety of marine habitats. Starting in May in Jacksonville, the class is worth 3 - 4 credits (depending on institution) and taught by professors at University of North Florida (UNF), Florida Atlantic University (FAU), Florida Gulf Coast University (FGCU), University of South Florida (USF) and University of West Florida (UWF) who serve as the courses' instructors, respectively, for a week each. The instructors are subject matter experts in different marine science subjects and lead the students in a variety of independent and team-based research methods focused on fisheries and species, habitat analysis, water quality, and much more.

The FIO Marine Field Studies Course is targeted toward sophomore and junior level undergraduate students at the five host institutions mentioned above. FIO is looking to expand participation in 2022 by marketing the course to all Florida SUS institutions and potentially rotating host institutions.

RESTORE Act/ FLRACEP PROGRAM

The Florida RESTORE Act Centers of Excellence Program (FLRACEP), established by the Gulf Coast States Act of 2012, is administered by FIO. With funds managed by the US Department of Treasury, projects awarded through the FLRACEP to Florida institutions emphasize ecosystem monitoring, coastal fisheries analysis, and mapping in the Gulf of Mexico.

FIO continues to serve as the administrative agent for the next ten years as a result of the Deepwater Horizon civil settlement. In May 2021, FIO successfully closed out the first award with the US Treasury. In total since 2015, FIO established ten Centers of Excellence across the State of Florida and approximately $8M was

distributed and funded eighteen research projects of which six SUS institutions received awards through the competitive process.

An additional $9M remains accessible for FIO to administer to new/existing Centers of Excellence.

Center of Excellence (Awardees) *SUS institutions	**Amount of Award**
FIO- to administer FLRACEP	*$2,612,896.88*
University of Florida*	$1,557,350.11
University of South Florida*	$1,541,545.45
University of Central Florida*	$659,717.17
University of Miami	$624,152.44
Mote Marine Lab	$364,432.00
Nova Southeastern University	$321,672.64
Florida International University*	$319,816.15
University of West Florida*	$319,162.21
Florida State University*	$317,080.57
Sanibel-Captiva Conservation Foundation	$233,334.34

Outreach & Communications

Oceans Day 2021

Due to the COVID-19 pandemic and travel restrictions, exhibits for *Oceans Day 2021 – Restoring and Growing Florida's Blue Economy* were suspended in March and will resume early 2022. FIO instead spent the valuable time focusing on supporting state institutions' research needs and assisting with coastal permissions and seafaring medical clearances. The organization is looking to sponsor and host a morale-boosting, public awareness FIO member event in 2022 aimed at networking with marine industry and higher education professionals while engaging with Florida legislators. A successful event will enhance relationships among the FIO Consortium, private marine and fishery industry partners, and Florida-based marine allies.

St. Petersburg Science Festival *2020*

The St. Pete Science Fest went virtual in 2020 due to in-person restrictions stemming from the Pandemic. FIO hosted a livestream presentation focused on research vessel capabilities (including a virtual 360-degree tour of the R/V Hogarth), recent mission highlights, and "life at sea". The presentation lives on the St. Pete Science Fest website and its Youtube channel.

FIO staff engage with students tuning into the St. Pete Science Fest

Social Media

Closing out FY 20/21, FIO's Facebook account has 1,752 followers (an increase of 116 users over the previous FY) and FIO's posts were seen by an estimated 28,105 people (Facebook Page Insights, n.d.). FIO's Twitter page saw a substantial increase in followers as well over the past year, @FIOTweet picked up 98 new followers.

With over 1.2 billion users worldwide and nearly 55% of users between the ages of 18-34 (Statista Instagram Age Distribution, n.d.), Instagram is a medium previously only utilized by the Keys Marine Laboratory. A vessel-focused page was developed in spring of 2021 and will feature short video clips (highlights, montages, Q&A's) spotlighting FIO's research support efforts. Launched in March 2021, @fio_stpete already has more than 150 followers.

Newsletters

Two newsletters went out to FIO's mailing list with highly successful open rates. In the fall of 2020, a mailer focused on resumed operations was opened by nearly 53% of the mailing list recipients (approximately 1,050 readers). The organization also sent out a newsletter in January 2021 centered on the hiring of Dr. Graham as FIO's director and KML's seawater system expansion. That mailer saw a 36% open rate; the standard open rate for mailers is about 17% (Constant Contact , n.d.).

Targeted Legislator Outreach

In an effort to engage more with Florida's state legislation and educate "freshman legislators" on FIO's strategic use of taxpayer dollars in addition to topical and timely coastal issues, FIO Communications has developed an internal policy regarding legislator releases. The organization has developed contact databases for each of the states' representatives, by county, and is sending periodic spotlights and research cruise/laboratory highlights to legislators representing constituents and institutions that are using FIO's resources and infrastructure.

FIO Attribution & Credit

FIO developed a policy for ship and laboratory users that requires crediting FIO in media interviews and any published content, online or print. The organization has found a disparity in publications crediting FIO's

support over the years so this policy should address that issue. All ship users are now required to sign said policy prior to boarding a vessel or utilizing KML.

FIO In The News

FIO was featured prominently in a number of high-profile articles and media reports:

- Florida Institute of Oceanography Names New Director
- Five things that happened while you planned a socially distanced Thanksgiving
- Innovation District's 'smart city' projects take center stage
- With The Biden Administration At Work, What Does That Mean For The Gulf of Mexico?
- Long-term Plan for Piney Point: County Votes to Inject Treated Phosphate Wastewater into Aquifer
- USF scientists launch first Piney Point research cruise
- Scientists Studying Potential Effects on Tampa Bay from Piney Point Discharge
- A Piney Point disaster will happen again. Will the Tampa Bay area be ready to respond?
- USF scientists announce initial findings from Piney Point research effort
- Reef-wide Outplanting of Corals Susceptible to Stony Coral Tissue Loss Disease Begins

Membership Highlights

Piney Point's Impact: Collaborative Effort Underway to Study Water Quality

FIO deployed its research vessel, the R/V Weatherbird II, to collect samples around the outflowing water released from Piney Point's former fertilizer processing plant. Scientists from the University of South Florida College of Marine Science (USF CMS) are working with FIO support to collect data that will ultimately help scientists understand the long-term impacts of the release.

"While the current circumstances in Tampa Bay are unfortunate, I am grateful that the State of Florida has invested in our research vessels and support personnel. FIO is always prepared to bring the best ocean scientists in the nation to the front lines of environmental issues," said Dr. William "Monty" Graham, Director of FIO.

A team of biologists, chemists, and environmental specialists will depart Wednesday out of Bayboro Harbor onboard the R/V Weatherbird II, a 118-foot research vessel that was instrumental in studying the impact of the Deepwater Horizon oil spill. Drs. Kristen Buck and Steve Murawski will lead USF's research efforts, measuring water quality and examining habitats on-site while collecting samples for laboratory analysis.

"Rapid deployments like this one provide us with an unprecedented opportunity to get out there and provide the science necessary to inform an effective response, as well as any necessary mitigation efforts, so that we can safeguard our vulnerable coastal resources," said Dr. Tom Frazer, dean of the USF CMS.

The data will be available to support the state's effort to address the environmental impacts of the Piney Point reservoir release. Samples will also be shared with researchers from the Fish and Wildlife Research Institute, Eckerd College and Florida State University. The scientists are using this event as a means to understand natural ecological processes and how they respond to a sudden release of nutrients and to changes in water

chemistry. The information will be used as a scientific basis for understanding long-term impacts of nutrient pollution on important issues like Harmful Algal Blooms.

Florida International University: Course Takes Students to Sea on FIO's Research Vessel

Florida International University's (FIU) 2021 Oceanography-at-Sea course (OCB4005C) was launched in 2013 and is aimed at providing undergraduate students an immersive, hands-on experience developing and executing a research project at sea. In early March, following strict COVID safety guidelines, Associate Professor and Assistant Director of Coastlines and Oceans in FIU's Institute of Environment, Dr. Heather Bracken-Grissom, led a team of 8 students on a 4-day trip onboard the Florida Institute of Oceanography's (FIO) Research Vessel, the R/V Hogarth, to collect samples in Tampa Bay and the eastern Gulf of Mexico.

Using dredges, otter trawls, bongo nets, and plankton nets, the students successfully collected specimens to measure and observe for their individual projects. Sampling was very biodiverse with an abundance of plankton, fish, and crustaceans enabling students to observe the vast biodiversity in the area while comparing nearshore species to offshore species. Dr. Bracken-Grissom was also able to collect samples that contribute to a National Science Foundation (NSF) Environmental Biology Grant Study designated to reconstruct the crab "tree of life". Several times while in transit, a pod of dolphins danced in the vessel's wake, highlighting to the students the variety of life that call the Gulf of Mexico home. As the weather took a turn and the seas became rough, the FIU cohort and FIO's crew held strong and continued to sample diligently. "Our collections from this trip include a few new representative species to add to the Florida International Crustacean Collection, and many other specimens will be used for local outreach and downstream molecular work"! The crew was very helpful in setting and retrieving the gear throughout the entirety of the trip. Overall, we had an amazing time and are very grateful to FIU, FIO, and everyone involved who made this trip possible!" exclaimed Dr. Bracken-Grissom.

Click here to read about Dr. Bracken-Grissom's scope of work and see testimonials from students regarding the Oceanography-at-Sea course.

Florida Institute of Technology: Utilizes R/V Hogarth for Ocean Engineering Students in the Keys and Dry Tortugas

In late May, the R/V Hogarth departed from Bayboro Harbor for Key West on a two-week long FIO State University System (SUS) Subsidized educational cruise with Professor Stephen Wood and Ocean Engineering students from the Florida Institute of Technology (FIT). Dr. Wood was focused on teaching data collection at sea, shipboard deployment techniques on a variety of instruments and sensors, and much more. The cohort participated in a number of these enriched learning experiences on their way to Key West where another group of FIT Ocean Engineering students enrolled in the Marine Field Projects Course (OCE 4911, 12, and 13) joined Dr. Wood and the Hogarth Crew on the cruise back to St. Petersburg.

R/V Weatherbird II Supports Coastal Ocean Monitoring and Prediction System's Diving

In June, the R/V Weatherbird II supported researchers and divers (and a graduate student) from the University of South Florida College of Marine Science Coastal Ocean Monitoring and Prediction System (COMPS). The team stopped at various locations along the West Florida Shelf to conduct water sampling (through diving and CTD + nutrient sensory deployment), red tide monitoring, and to train researchers enhanced diving

techniques. They also made a few stops along the way to check on buoys and extract data. To learn more about the COMPS program, visit http://comps.marine.usf.edu/

University of South Florida: Echosounders Recalibrated with Scientists

In December 2020, the R/V Hogarth and scientists from USF's CMS calibrated echosounders, which is a type of sonar used to determine the depth of the seafloor and locate objects and fish in the water, in Tampa Bay. To accomplish this, the R/V Hogarth transited to the St. Petersburg Bay Reef, an area that is slightly deeper than the rest of the shallow Bay. Though shallow in comparison to areas where FIO typically conducts calibrations, the area is deep enough to calibrate the vessel's SIMRAD EK80 echosounders and the "EKMini" echosounder installed in one of USF's autonomous underwater gliders, which can transit hundreds of miles of ocean over several months without human operation. Each of these sounders can provide valuable water column information like estimating the biomass of fish swimming below.

Eddie Hughes, Co-Chief Scientist (background, left), and Andrew Warren, FIO Ship Operations, do a bit of puppeteering of the wires holding the calibration sphere while Captain Brendon Baumeister looks on.

CMS article - A Puppet Show on a Chilly COVID-safe Calibration Cruise? | USF College of Marine Science

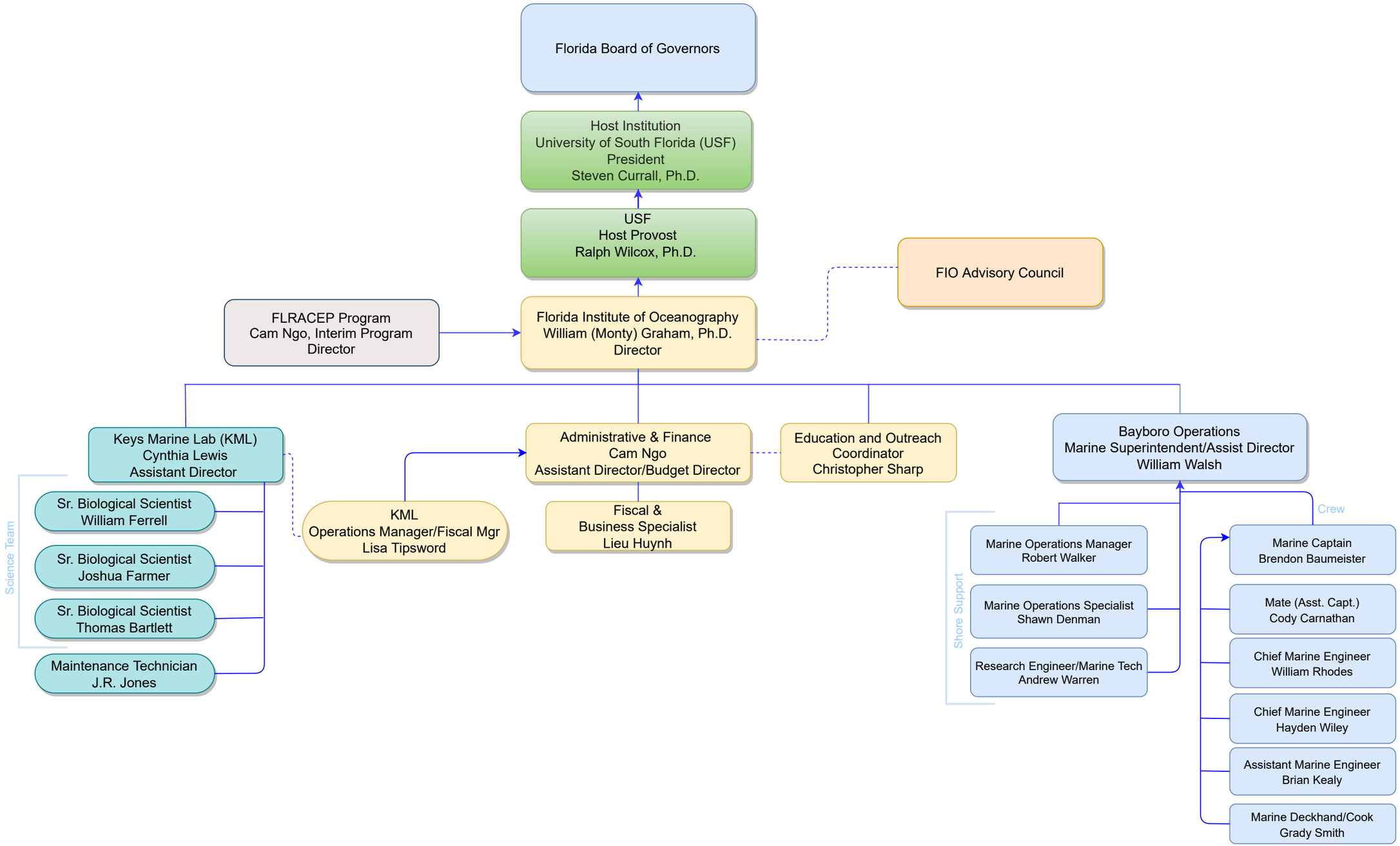
This successful event was the impetus for the development of an "Engineering Day" program that will provide Florida SUS members with equal access to short duration cruises (one day). These days are programmed in FIOs training and maintenance calendar and budget and are awarded at no cost to the SUS user. The Engineering Day Program is positioned to not only allow FIO crew to hone their skills at sea and maintain/test equipment, but also play an important role in building and nurturing partnerships among member institutions.

R/V Weatherbird II 3D Scanning

In January 2021, a team from the University of South Florida's (USF) Access 3D Lab (Laura Harrison, Director and Steven Fernandez, Research Assistant Professor in the School of Public Affairs) carried out a terrestrial lidar survey of the R/V Weatherbird II while it was in dry dock at the Port of Tampa. (SEE APPENDIX B)

Florida Institute of Oceanography

Hosted by the University of South Florida



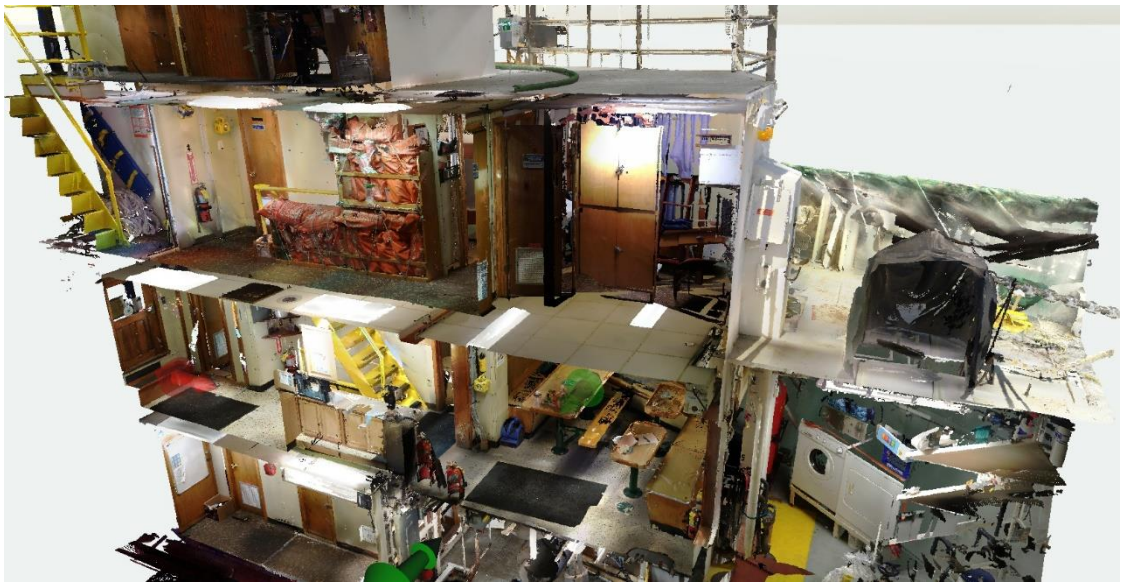
last updated 3/2021

APPENDIX B: R/V Weatherbird II 3D Scanning

By Laura Harrison, Ph.D, RPA, Director of USF Access 3D Lab

They accomplished a complete scan of the R/V Weatherbird II using three terrestrial laser scanners that captured up to 976,000 points per second, with a range of 0.6m to 150m (S150) or 330m (X330). The scanners are equipped with a built-in camera with 70-megapixel resolution, GPS, a compass, an altimeter, and a tilt sensor. The result of the scan is a colorized 3D point cloud dataset with maximum distance accuracy of +/- 2mm. Both scanners were calibrated to industry standards by the manufacturer in October 2019.

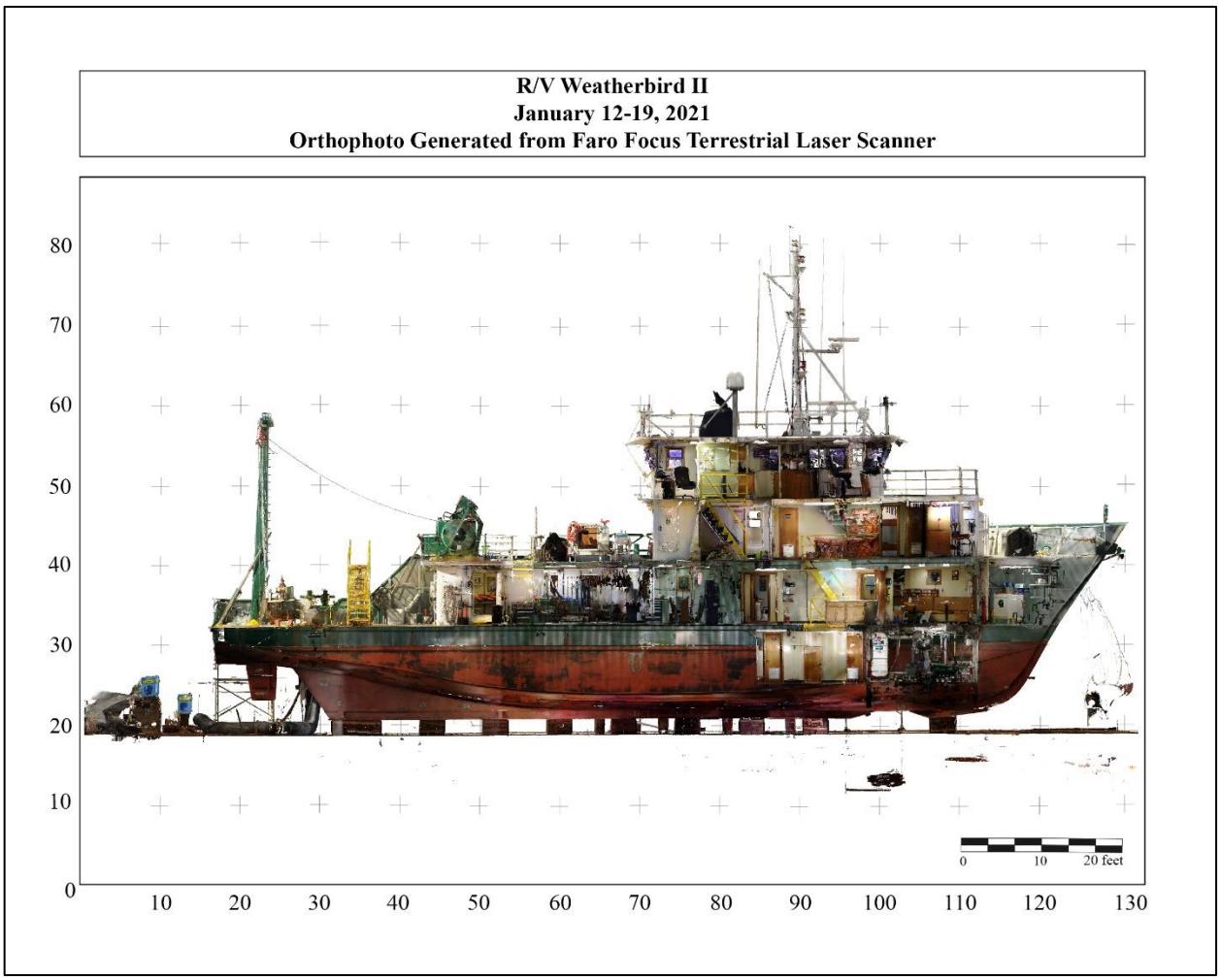
Terrestrial lidar scans of ships are rare, because the scanners must be completely stationary to capture accurate dimensional data of fixed surfaces. Although the Weatherbird was in dry dock in January 2021, the dock itself was a large floating platform rather than stable and secure dry land. The movement of the dry dock, although slight, caused aberrations in a small number of 3D scans. Therefore, it was necessary to implement a processing workflow that combined automated processing with manual registration. These processes allowed for the creation of a final colorized 3D point cloud dataset that offers an accurate representation of the R/V Weatheribird II and meets 3D metrology industry standards for quality and precision.



View of the 3D point cloud showing a cross-section of the R/V Weatherbird II.

The terrestrial laser scanning of the R/V Weatherbird II provides comprehensive documentation of the entire vessel as it appeared in January 2021. The dataset generated meets recommended standards for accuracy. Over time it will offer researchers and vessel personnel an opportunity to make observations, measurements and drawings of the vessel and its components that can be used to assist in maintenance and the fabrication of new parts, and presents myriad opportunities for outreach to the general public and the development of interactive outreach projects such as virtual tours and virtual reality/augmented reality applications. The

digital assets themselves, including registered point clouds, orthophotos, and overview maps, are archived with the at the University of South Florida's Access 3D Lab."



Side-view orthophoto cross section looking from the starboard toward the port side of the ship.

APPENDIX C: FIO Operating Budget Summary

FIO 20/21 EOY Projections
E&G and Carry Forward Operating Summary
As of May 15, 2021

							Total Projected E&G and Carry Forward Balances*		
	E&G			CarryForward					
Operating Category	Authorized Budget	Actual Expenditures	Projected EOY Operating 6/30/2020	Authorized Budget	Actual Expenditures	Projected EOY Operating 6/30/2020	Total Authorized Budget	Total Actual Expenditures	Total Projected EOY Operating 6/30/2020
88021- STAFF	$1,259,604	$968,202	$228,402	$0	$0	$0	$1,259,604	$968,202	$228,402
88022- FACULTY	$217,999	$105,587	$91,412	$0	$0	$0	$217,999	$105,587	$91,412
88027- FRINGE - MATCHING	$541,673	$407,634	$108,039	$0	$0	$0	$541,673	$407,634	$108,039
88029- OTHER BENEFITS	$15,000	$6,255	$8,690	$6,310	$0	$6,310	$21,310	$6,255	$15,000
88032- OPS - OTHER	$0	$32,284	-$32,284	$0	$0	$0	$0	$32,284	-$32,284
88100- TRAVEL	$5,000	$2,290	$1,295	$10,000	$0	$10,000	$15,000	$2,290	$11,295
88200- TELEPHONE & TELECOMMUNICATIONS	$2,501	$2,695	-$194	$11,352	$0	$11,352	$13,853	$2,695	$11,158
88250- CONTRACTUAL SERVICES	$5,000	$117	$4,884	$30,000	$3,756	$12,130	$35,000	$3,872	$17,014
88400- COMPUTER RELATED - MATERIAL, S	$5,000	$7,084	-$2,185	$10,000	-$9,822	$19,822	$15,000	-$2,737	$17,637
88420- MATERIAL, SUPPLIES & EQUIP OTH	$24,000	$3,144	-$7,545	$36,000	$15,564	$20,436	$60,000	$18,708	$12,891
88500- UTILITIES, WASTE & FUEL	$1,000	$0	$1,000	$0	$0	$0	$1,000	$0	$1,000
88510- REPAIRS/MAINTENANCE/RENOVATION	$10,000	$0	$10,000	$186,185	$284,550	-$130,457	$196,185	$284,550	-$120,457
88700- RISK MANAGEMENT INSURANCE	$5,000	$0	$5,000	$25,000	$0	$25,000	$30,000	$0	$30,000
88800- OTHER OPERATING EXPENSES	$10,000	$26,440	-$32,304	$158,382	$6,677	$151,705	$168,382	$33,117	$119,401
88900- OCO PURCHASES	$40,000	$0	-$23,420	$75,000	$0	$17,668	$115,000	$0	-$5,753
88997- BUDGET REDUCTION RESERVES	$0	$0	$0	$400,000	$0	$400,000	$400,000	$0	$400,000
88028- OTHER SALARY	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grand Total	**$2,141,777**	**$1,561,732**	**$360,790**	**$948,229**	**$300,726**	**$543,965**	**$3,090,006**	**$1,862,457**	**$904,755**

reserves required

*estimated thru June 30th

FEMA- Irma reimbursement made to FIO expens.

FIO 20/21 EOY Projections

Auxiliary Operations Summary

As of May 15, 2020*

Auxiliary Type	Beginning Cash Balance 7/1/2020	Actual Revenue*	Actual and Encumbered Expenditures	Est. FYE Balance 6/30/2020
MS Weatherbird II Aux	$ 74,576	$ 209,102	$ 332,187	$ (48,509)
FL Institute of Oceanography	$ 88,600	$ 16,764	$ -	$ 105,364
Keys Marine Lab Aux**	$ (1,294)	$ 253,772	$ 124,102	$ 128,376
Hogarth Aux	$ 40,024	$ 195,500	$ 221,000	$ 14,524
Total				$ 199,755

*Auxiliary Revenue impacted by COVID-19

**KML received a contract from FWRI to expand seawater system during COVID