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Sixty Years of History

In 1949, just 2 yr after the Florida State College for Women was transformed into a coeducational institution—The Florida State University (FSU)—marine science gained a permanent foothold on the Tallahassee campus with the formation of The Oceanographic Institute (OI). This institute—within the College of Arts and Sciences—was meant to train graduate students in marine science, to provide marine research facilities for faculty and students and visiting investigators, to conduct interdisciplinary basic research in the northeastern Gulf of Mexico, and also to conduct applied research directed toward improving Florida's fishing industry and developing other marine resources.

At first, the OI had three remote marine facilities, but two of them—a station at Mayport on the St. Johns River and another on Mullet Key at the mouth of Tampa Bay—were closed sometime after 1955. The remaining facility, sited on 25 acres of the peninsula that constitutes the southern shore of Alligator Harbor, about 45 miles south of Tallahassee, became FSU's operative marine laboratory (Fig. 1). The structures constituting this Alligator Harbor Laboratory were built to accommodate Harold Humm, the first director of the OI. The main laboratory building consisted of a room provided with seawater for research and classes, and a room of research cubicles. Other structures included a residence for faculty and visitors, a boathouse–shop, large concrete seawater tanks for keeping marine animals, a large pool (21.3 × 15.2 m, 2.1-m deep) constructed in 1954 to keep porpoises for W. N. Kellogg, and a 100-m concrete pier for docking small boats. The laboratory's fleet included five power boats (6.7 to 11.6 m) and several skiffs.

Throughout the 1950s and 1960s, research at the Alligator Harbor Laboratory was substantial. But in 1966, under the direction of Carl Oppenheimer, FSU replaced the OI with a Department of Oceanography; the Alligator Point Laboratory was closed, and a new facility was built across the harbor, just west of St. Teresa near Turkey Point (Fig. 1). Because Ed Ball, President of the St. Joe Paper Company, donated some of the land to FSU, the new facility was officially designated as the Edward Ball Marine Laboratory. This name, however, was rarely used, and the toponym Turkey Point Laboratory or, more often, the FSU Marine Laboratory (FSUML) stuck for more than 4 decades.

In 2006, Felicia Coleman became the 13th director of the Laboratory. She is the first director whose primary workplace is at the laboratory, and the first with an on-site faculty to manage. And the laboratory became the FSU Coastal and Marine Laboratory (FSUCML).

The history of these two laboratories, which follows, is narrated primarily by three of the 13 directors. We have divided the narrative into four distinct periods: The Genesis, 15 yr at Alligator Harbor; The Great Move from Alligator Harbor to Turkey Point, 7 yr of change; The Long Struggle at Turkey Point, 34 yr of intermittent, slow increases in activity; and finally, The Awakening, 4 yr of exploding activity. We describe these periods, revealing how this long experiment finally succeeds.

The backbone of our narrative is a series of vignettes describing the backgrounds and activities of each of the 13 directors. References to earlier and later vignettes provides cohesion and continuity. But we have also interspersed, within the backbone, sketches about the activities of students, faculty, and visiting investigators, and about educational and outreach programs. In a way, then, this narrative is a mosaic. The sketches are in the first person, except when an individual is deceased, aged, distant, or prefers the third person omniscient narrator.

The Genesis (1949–1964)

The natural surroundings at Alligator Harbor.—Alligator Harbor proved an enormously productive backyard for researchers. It was then and remains today a narrow, shallow bay (roughly 6.4 × 1.6 km; depth 1.8 m, except for a central basin); the southern flank of the harbor is a thin peninsula (Alligator Point). No freshwater streams flow into the harbor, and rainfall does not exceed evaporation, so the salinity is the same as that in the gulf. A great attraction of the laboratory at this site was its access by skiff to Baymouth Bar (Fig. 1), a sandbar that almost completely closes the mouth of the harbor. At low tides, Baymouth Bar is exposed—revealing an expanse of sand, with seagrass around its edge and on its flanks. It is home to an extraordinarily wide diversity of marine invertebrates that were

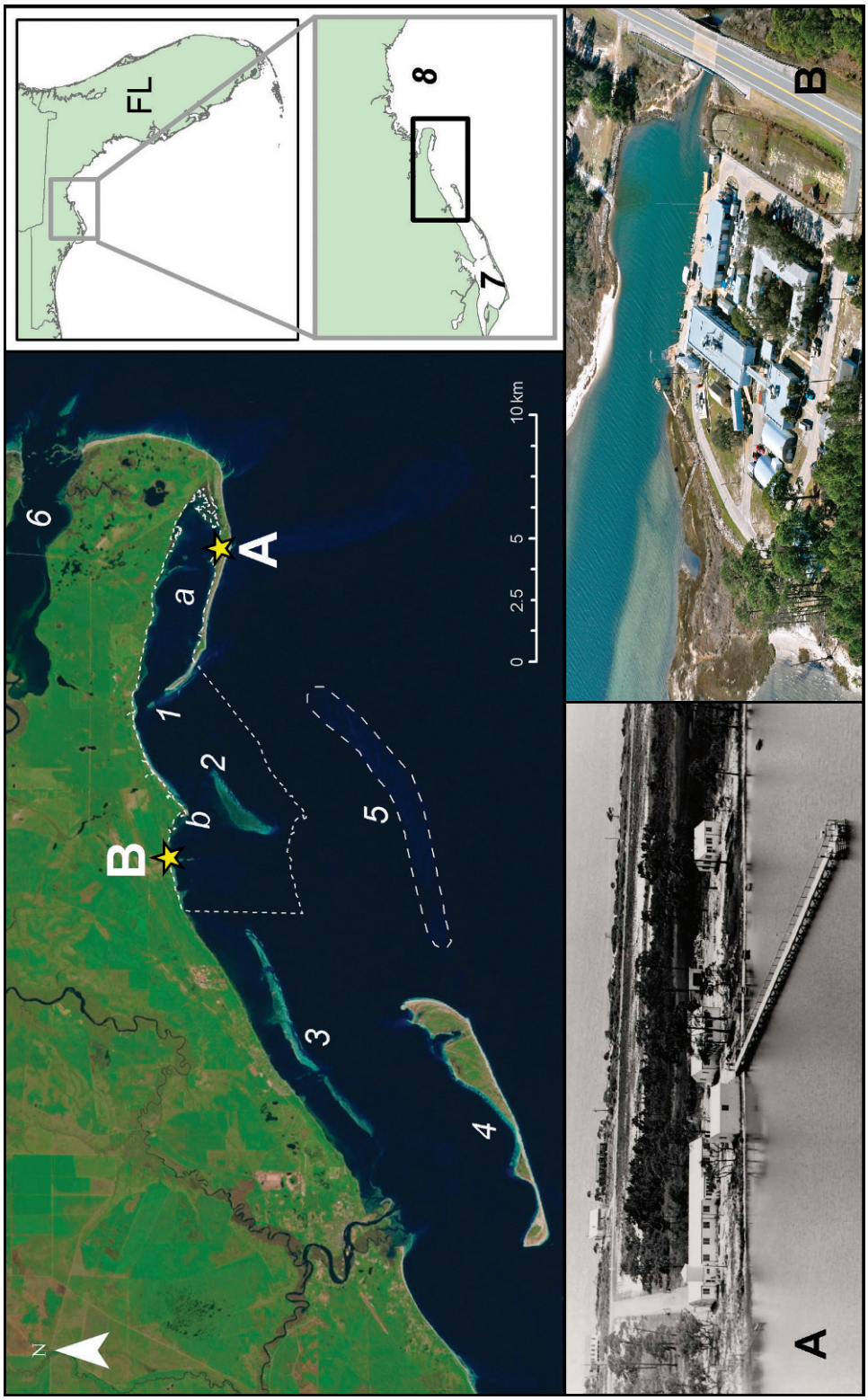

Fig. 1. FSU's successive Marine Labs: locations and offshore worksites: (A) Alligator Harbor Lab (1949–66) viewed southward from the harbor (a). (B) Turkey Point Lab (1966–present), built just west of the Point (b) in greater St. Teresa, is now called FSU Coastal & Marine Lab. Local worksites: (1) Baymouth Bar; (2) Turkey Point Shoal; (3) Lanark Reef; (4) Dog Island; (5) Dog Island Reef; (6) Ochlockonee Bay. Dotted boundary: Alligator Harbor Aquatic Preserve. Distant worksites (lower insert): (7) Apalachicola Bay; (8) Apalachee Bay.

objects of research and teaching at the FSUML or on the campus in Tallahassee. Well into the 1960s, the Point and the Bar were separated by a deep channel, which closed sometime in the 1970s. And at about the same time, the property at the tip of Alligator Point was donated to the Nature Conservancy, which closed it to vehicular and pedestrian traffic. Further below, we will describe some of the more important research initiatives undertaken in this remarkable location.

The Directors: Humm, Meyer, Fox, Metz, and Collier

Harold Judson Humm.—(Director 1949–1954), Ph.D., Duke University (1942): Areas of expertise: general natural history, algae, marine microbiology (bacteria and archaea), development of marketable products from marine algae.

In the course of his career, Harold Judson Humm became—three times, and for three different institutions—the first director of a marine laboratory. The first instance was at Duke, where, after receiving his doctorate in botany, he was appointed Resident Investigator at the marine laboratory in Beaufort, NC. In 1948, he was appointed the first Resident Director of the Duke Marine Laboratory, and a year thereafter (1949) he came to FSU to be the founding director of the newly established OI and its Alligator Harbor Laboratory, which was soon under construction.

In 1950, Humm reported to a National Research Council committee on work conducted at the Alligator Harbor Lab: composition of a checklist of the common species of animals in Apalachee Bay (Fig. 1),[1] and the distribution of marine algae in the region; the ecology of intertidal annelids on several types of beaches; and a study of the physical properties of the agar or agaroids available from several species of seaweed that were abundant in the region. These glutagenous substances are used globally as culture media in medicine and microbiology, and Humm already had a patent on a method for extracting the gels. By the early 1960s, much of this work was completed and published. In 1954, Humm left FSU precipitously, and returned to Duke.

Years later, in 1967, Humm became the founding director of the Institute of Marine Science at the University of South Florida (USF), St. Petersburg, where he died in 2001. Humm was known to his students at USF as an exemplary teacher and as ''the last of the great naturalists''; indeed, at least 11 species of marine algae, diatoms, and invertebrates were named after him.

Samuel L. Meyer.—(Director 1954–1955), Ph.D., University of Virginia, Charlottesville (1940): Areas of expertise: bryology, academic administration.

Samuel Meyer began to study the physiology of mosses while he was a graduate student at the University of Virginia, and continued this line of research for 8 yr at the University of Tennessee, publishing some 10 papers on the subject. His work at Tennessee was interrupted by stints in the U.S. Army and at Emory University, and when he returned to Nashville, it was as Professor and Chairman of the Department of Botany—the same rank and position that he was to hold at FSU when he moved there in 1951.

In 1954, when Humm resigned, Meyer became director of the OI, while the search for a new director went forward. He took seriously the responsibility to ''include all relevant disciplines'' in his administration; his staff of 19 faculty represented 11 departments, seven of them distinctly nonbiological. During his year of service, Meyer completed the construction of the porpoise pools at the Alligator Harbor Laboratory, and he and Robert H. Williams, a Professor of Marine Science, wrote and published a detailed, illustrated, and historically useful description of the Alligator Harbor Laboratory's earliest years.

Meyer left FSU in 1955 to become Dean at Central Methodist College (now Central Methodist University) in Fayette, MO, where he had received his A.B. degree. In 1965, he became president of Ohio Northern University, in Ada, where he oversaw a 12-yr period of striking academic and physical growth. Widely honored, he became President emeritus in 1977, retired to Lexington, KY, and died there in 2000. Faculty and students from Ohio Northern University continue to visit the FSUCML today.

Sydney W. Fox—(Director 1955–1961), Ph.D., California Institute of Technology (1940): Areas of expertise: protein chemistry, spontaneous formation of protein microstructures, origin of life.

Fox studied chemistry at the University of California at Los Angeles, and was guided to doctoral study at the California Institute of Technology (Cal Tech) by Linus Pauling, with whom he worked as a postdoctoral associate. In 1955, after various commercial positions and a period of fundamental research on protein chemistry at Iowa State College (Ames), Fox came to FSU to direct the OI. He remained at the OI until 1961, when, encouraged by the

[1] Updated in 1956 by R. Winston Menzel.

National Aeronautics and Space Adminstration (NASA), he became Director of the Institute of Space Bioscience at FSU.

It was while he directed the OI, however, that Fox started his groundbreaking work on the origin of life. In seminal experiments, he thermally activated amino acids to produce proteinoids (thermal proteins). He then showed that, when these proteins were mixed in water, they spontaneously self-organized into microspheres. The formation of these structures and their resemblance to primitive cells suggested a process by which life might have originated. This exciting work redounded to the reputations of the OI and FSU, but Fox's concerns could not have stretched to include the Alligator Harbor Marine Laboratory. Fortunately, however, there was Charles Metz.

Charles B. Metz.—(Associate Director 1955–1961), Ph.D., California Institute of Technology (1942): Areas of expertise: fertilization, gamete physiology, biochemical interactions of eggs and sperm, cell–cell recognition.

Metz's doctoral research at Cal Tech was on the biochemical interactions of eggs and sperm during fertilization. And it was fertilization—as well as the underlying general mechanism of cell–cell recognition—that remained the focus of his research throughout his career. In 1953, after completing his education and four brief faculty positions, Metz came to the Department of Zoology[2] at FSU and set up his laboratory in an old barracks about 3 miles from campus. Within a year or two, he had attracted a few graduate students, one of whom was Mike Greenberg (your narrator). Consistently, at low tides, Metz and his students would drive down to the Alligator Harbor Laboratory, get into Metz's boat, and run to Baymouth Bar to collect sea urchins—the source of gametes, which were the basis of their research.

When Fox arrived in 1955 to direct the OI, Metz became Associate Director in charge of the Alligator Harbor Laboratory. It was a good choice: Metz was the most consistent user of the facility. Moreover, he was familiar with marine labs in general, having spent summers, since childhood, at the Marine Biological Laboratory (MBL) in Woods Hole, where he became a member of the MBL corporation, and an MBL Trustee. He was also enthusiastic about natural history, fishing, and boating.

In 1961, when Fox started the new Space Institute, Metz joined him, leaving the OI and the Alligator Harbor Lab without direction. Then, in 1964, Metz and Fox both moved to the University of Miami to found an Institute of Molecular and Cellular Evolution. Metz stayed on in Miami as a Professor of Zoology until he retired. But Fox, in 1989, moved as a Distinguished Professor, first to Southern Illinois University, and then to the University of Southern Alabama, where he retired.

Albert Collier.—(Director 1962–1964), M.S., Rice University (1933): Areas of expertise: chemical oceanography, diatom and dinoflagellate nutrition, oyster feeding.

Collier's scientific and administrative abilities were already firmly established when he came to Florida from Texas. After finishing his education, he had worked for various agencies, including the National Marine Fisheries Service and the U.S. Fish & Wildlife Service. His thorough study of dissolved carbohydrates in seawater and their effects on oyster feeding, published in 1950, is still cited.

In 1946, several oil companies were sued by Louisiana oystermen, who complained that polluted water released during the production of petroleum had caused unusually large losses of market-sized oysters. Collier was one of the key researchers who concluded, eventually, that high temperatures and high salinity, caused by drought, had made the oysters vulnerable to a parasitic protozoan that they called *Dermocystidium marinum*, but which is now known as *Perkinsus marinus,* named after F. O. Perkins (incidentally, a graduate student of Winston Menzel, the seventh Director.)

From 1957 to 1962, Collier helped build the Texas A&M University Marine Laboratory at Fort Crocket, an old barracks in Galveston. He then helped the university to locate the Texas State Maritime Academy in that same building. In 1962, just as the academy opened, Collier moved to FSU to become director of the OI, and in 1963, he initiated a doctoral degree program in the institute.

Collier, in a 1963 assessment of the Alligator Harbor Laboratory, notes that research was ongoing in neurophysiology (Dexter M. Easton), mariculture (R. Winston Menzel), diatom and dinoflagellate nutrition (Albert Collier, himself), embryology (Charles Metz), and taxonomy (Henry Kritzler).[3] He also mentioned that ''…the Laboratory has served principally as a summer teaching installation,'' and although we cannot be sure who taught those courses, we assume that Collier might well have participated, on the basis of his interest in education.

[2] In 1956, the Departments of Bacteriology, Botany, Physiology, and Zoology were integrated into a single Department of Biological Science.

[3] The names in parentheses were added by the authors; but only Kritzler is in doubt.

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In the 1970s, at the Turkey Point Laboratory, Collier offered the first residence course ever taught at the coast. The students stayed in the dorms, and Collier rented a house in St. Teresa Beach because the lab superintendent, Don Phillips, was living in the Director's house. Collier taught all of the topics in marine biology, but also recruited other faculty to give lectures and to come on field trips (including WFH and MJG). Toward the end of the 1970s, there was an intense but brief flowering of residence education, which is described later.

In 1964, Collier left the directorship for the Department of Biological Science. He served as associate chair for undergraduate studies, and on thesis committees of graduate students with interests in diatoms, oyster gills, and photosynthesis. And in about 1970, he wrote the opening overview chapter—*Oceans and coastal waters as life-supporting environments*—of Otto Kinne's five-volume treatise ''Marine Ecology.''

Collier was a renaissance man, often hosting informal eclectic gatherings of artists, scientists, faculty, and students to discuss scientific and societal issues. Moreover, he was an accomplished award-winning artist, especially after retiring to Arizona in the 1980s. He painted in oils, but became an early experimenter in computer art well into his 80s. While a Visiting Scholar at the University of Arizona, he illustrated a field guide to the common tide pool invertebrates of the northern Gulf of California.

Research at the Alligator Harbor Laboratory

Winthrop N. Kellogg.—(1949–1961) (Ph.D., Columbia, 1929), an Indiana University psychologist, although well known for his studies of conditioning in animals, was even better known for rearing his child with an infant chimpanzee for 9 mo to determine the relative effects of nurture and genetics on development. The resulting book—''The Ape and the Child''—by Kellogg and his wife, Luella Kellogg, appeared in 1933. In 1950, after 20 yr at Indiana University, Kellogg accepted an offer from FSU to be a Professor of Psychology because, as Howard Baker, an FSU psychologist, reported: ''B. F. Skinner had been made department head [at Indiana] instead of him…He was through with research, which he concluded had got him nowhere, and he was just going to teach and go sailing.''

Indeed, Kellogg did go sailing in the Gulf of Mexico, but there he became fascinated with porpoises and initiated a study of echolocation—''this complex avenue of audioperception''—whereby the animals navigate, avoid obstacles, and find their food in the ocean, even at night or in turbid water, and at 12–15 miles per hour. He contacted the Alligator Harbor Lab—then being developed—about facilities for his project. Both Humm and Meyer were supportive, and constructed a large holding tank for porpoises on the site. Kellogg also found support with the U.S. Navy Mine Defense Center in Panama City, which lent him specialized equipment for measuring and analyzing sound. The research, which began in 1951, resulted in an article in *Science* by 1952 (the first of many), and another book, ''Porpoises and Sonar,'' in 1961. ''Needless to say,'' Kellogg recalled, ''it was all a great deal of fun.'' And he retired shortly thereafter.

Robert B. Short.—(Ph.D., University of Michigan, 1950) came directly to FSU from Michigan after completing his doctorate. He accepted a position as an Assistant Professor of Zoology, stayed for 40 yr, retired in 1990, and passed away in 2007. Short was a distinguished parasitologist with interests in trematode systematics, life cycles, and sensory structures; chromosomes and sex determination in blood flukes; and dicyemid Mesozoa (parasites of invertebrates). Although his primary research was carried out on campus, he trained many of his students at the Alligator Harbor Laboratory.

The training procedure, as described by Short, involved a drive with his students from town to the coast, during which they collected (as available) birds, fish, snails, or even fresh road kill in their quest for parasites. When they had enough material, they would drive it to the marine lab, remove any parasites found in the intestines, heart, and other organs, and identify and study them microscopically. They often found new species that they subsequently described in the literature. It is not surprising that when Bob Paine—then a graduate student at the University of Michigan and a visitor at the Marine Lab—found metacercariae infecting the brachiopods that he was studying, they were identified as gymnophalline trematodes by Bob Short.

Dexter M. Easton.—(Ph.D., Harvard University, 1947) was a neurobiologist in the FSU Department of Biological Science from 1955 until 2005. He was interested in teaching and had designed equipment that would allow students to make simple observations of electrical potentials. From at least the late 1950s to mid-1960s, he would take his class to the Alligator Harbor Laboratory and teach them how to record from excitable tissue. Easton also carried out research on the morphology and physiology of fish brains at the Alligator Harbor Laboratory; he had a house on the beach very near the lab, so his family could come with him while he worked. In the summer

of 1961, Jack Rudloe—just out of Leon High School—was hired by Easton to collect striped burrfish and bat fish. Rudloe grew up to be a marine biologist in Panacea, FL, co-Managing Director (with his wife Anne) of the Gulf Specimen Marine Laboratory there, and a well-known nature writer.

The Illinois Excursions (MJG narrates).—Charles Metz directed my Master's research on the chemical and physiological properties of fertilizin, a component of the jelly coat on the surface of sea urchin eggs. In 1955, I graduated from FSU, and went to Harvard, where my doctoral studies were on the pharmacology of serotonin on quahog hearts. In the course of this work, I became interested in how the effects of transmitters on bivalve cardiac muscle would vary with species, and whether the pattern of variation would be predictable. So I began to study those questions in 1958, when I joined the zoology faculty at the University of Illinois.

Although Illinois has plenty of freshwater clams, they are difficult to identify, and the hearts are difficult to work with. In 1959, therefore, I arranged with Metz to visit the Alligator Harbor Lab for a week in mid-April; I aimed, simply, to determine the diversity of bivalves on Baymouth Bar and to test the experimental effectiveness of the hearts. This brief review was encouraging, and one of my colleagues—Clyde Manwell, an expert in respiratory pigment function—was excited to learn about the red ''blood'' in *Noetia ponderosa* (an ark shell) and *Cardita floridana* (a small clam). So the two of us went to Florida for 2 wk, near year's end; we collected animals, and did experiments at the Alligator Harbor Laboratory—he on the distribution and function of hemoglobins in the two species of bivalves, and I on the effects of acetylcholine on the hearts of several bivalve species.

Sometime in 1963–64, while Collier was Director, Manwell returned to the Marine Lab to study the striking differences in the hemoglobins of ''stout'' and ''thin'' sea cucumbers (*Thyonella gemmata*). He published three or four papers on the basis of his Florida studies, then went to live in Great Britain, and we have never met again.

My data set from Florida required expansion, so I went to marine laboratories in other regions of the country, until I had examined about 50 different species, and the variation in heart responses was clear and predictable. Then I published a couple of papers and continued doing comparative pharmacology until I retired.

Robert T. Paine and the Great Graduate Student Sabbatical.—That *Glottidia pyramidata*—an inarticulate (or lingulid) brachiopod—is relatively common along the west coast of Florida is probably still not well known. But Bob Paine did know, having read the literature of the late 19th and early 20th centuries. And why wouldn't he want to do his doctoral research on the ecology of a species that had remained virtually unchanged since the Ordovician, i.e., for 40–50 million yr? Paine reports: ''So I made exploratory trips from Ann Arbor (University of Michigan) in 1957 and 1958, just to prove to my advisor that brachiopods could be found.''

In June, 1959, with the proof in, Paine embarked on what he calls ''my graduate student sabbatical: moving to Florida, [and] living out of my VW van.'' It was on this third trip that Paine found the Alligator Harbor Marine Laboratory and was given permission to reside there for an extended period, in fact, about 11 mo. In that time, and with plenty of travel, he managed to determine the range and habitat of *Glottidia* and then—focusing on two populations, in Alligator Harbor and Cape Haze—to quantitatively describe their life history, particularly reproduction, and the ecology of the planktonic larvae, leading to the distribution of the adult populations.

In the course of investigating *Glottidia*, Paine became fascinated with a complex community on Baymouth Bar. The food web comprised eight predatory gastropods and a variety of animals (including some of the gastropods) who were their prey. By determining the prey of each gastropod, and identifying the adaptations or conditions that allowed others to avoid predation, it was possible to tease apart a complex food web into simpler subwebs, which could then be studied more effectively. Paine remarks: ''In many ways, the gastropods were more interesting than the brachiopods, and they certainly stimulated my career-long interests in predation.'' Indeed, within 10 yr of leaving Florida, he clarified, in two landmark papers, the role of ''keystone predators'' in biodiversity.

Paine finished at Michigan in 1961—the *Glottidia* story was his dissertation—and went off to a postdoctoral fellowship at the Scripps Institute of Oceanography, where he organized his Alligator Harbor data into about six papers. He joined the Department of Zoology at the University of Washington in 1962, where he became chairman, and where, though retired, he still works. Paine's work has had a marked influence on ecology, converting it into a dynamic experimental science; he has received many honors, and is a member of the National Academy of Sciences. And he will appear again toward the end of this narrative.

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The Great Move

Carl Oppenheimer.—(Director 1964–1971), Ph.D., University of California, San Diego (Scripps Institution of Oceanography) (1961): Areas of expertise: marine microbial ecology, geomicrobiology, petroleum microbiology and pollution, coastal zone management, known globally as a founder of bioremediation.

Soon after his doctoral studies, Oppenheimer joined the faculty of the Institute of Marine Science at the University of Miami. From there, in 1964, he moved to FSU, and during the next 7 yr, fulfilled several goals: he served as the last director of the OI, he oversaw its closing (1964–68), and he replaced the OI with a new Department of Oceanography in the College of Arts and Sciences, where he developed a new graduate program and served as the first chairman (1968–71).

Oppenheimer also oversaw the funding, development, and design of a new marine laboratory at St. Teresa. In 1964, the State Board of Control had approved FSU's request for $27,000 to buy an 80-acre lot that, with Ed Ball's donated land, would provide space to build a new laboratory with enough left over for future expansion. The new FSUML was about 8 miles west of the previous site on Alligator Harbor, and 48 miles from campus, about the same distance as that from campus to the Alligator Harbor Lab (Fig. 1).

The new lab had a larger research building with labs and suites with running seawater, a classroom/library, a large maintenance shop, four efficiency apartments, and a four-bedroom house for a resident superintendant. A large basin and a high concrete dock were designed to serve an oceangoing research vessel.

In the expectation that the new facility would develop a major seagoing research initiative, a deep channel was dredged adjacent to the laboratory, and Oppenheimer obtained the *Stormy Petrel*, a 125-foot hull, intended as the primary seagoing research platform. Although the ship had a newly reconditioned winch on it, it lacked an engine. Moreover, the hoped-for research initiative failed to develop, and funding for large ships was dedicated to the newly formed (in 1967) Florida Institute of Oceanography, a statewide academic infrastructure support organization.

Oppenheimer's directorship transformed FSU's marine laboratory in every conceivable way: its location, size, structure, services, administration, and especially its potential for growth and development. But the direction of that growth and development was not at all clear. So although a metamorphosis had surely begun, it would take almost 4 decades to complete—or not. In 1971, Oppenheimer returned to the University of Texas, where he remained for the rest of his career. After he left FSU, the *Stormy Petrel* was towed away.

The Long Struggle (1971–2006)

Natural surroundings near the FSUML.—The location of FSU's marine laboratory near Turkey Point is unique in a number of respects (Fig. 1). It resides between two extensive watersheds, those of the Ochlocknee River to the east and the Apalachicola River to the west, and is nested within a region of extensive conservation lands. It lies within the Alligator Harbor Aquatic Preserve (5,814 ha) managed by the Florida Department of Environmental Protection; littoral coastal areas to the east are within the St. Marks National Wildlife Refuge (27,519 ha) and, to the west, within the Apalachicola National Estuarine Research Reserve (99,553 ha). Further, the Apalachicola National Forest (228,647 ha) and Tate's Hell State Forest (81,914 ha) stretch to the north and west. These substantial conservation efforts have resulted in virtually pollution-free nearshore waters. Seagrass beds (mainly *Thalassia testudinum*) provide most of the local subtidal primary productivity and habitats for a remarkably diverse fauna (including more than 65 marine algal species, 150 molluscan species, 80 annelid species, 120 decapod species, and numerous marine vertebrates and planktonic species), playing fundamental structural and functional roles in coastal and marine ecosystems. They are also vulnerable to exploitation and to disturbance. Indeed, the area within which the lab is embedded is considered to be among the more productive and diverse coastal habitats in the United States, and a prime candidate for serving as the focus of intense research and conservation efforts.

The Directors: From Harriss to Iverson

Robert Harriss.—(Director 1971–1974), Ph.D., Rice University (1965): Areas of expertise: regional and global environmental change, cities as complex adaptive systems, integration of science with the arts.

As a young oceanography faculty member, the 1970s were an exciting, productive, and often impetuous era in my life and career. In a moment of weakness, I accepted the additional responsibility as Director of the FSUML. Vice President of Research, Robert Johnson, and Carl Oppenheimer, my Oceanography Department head, assured me that a reduction of one course

from my teaching load would provide the time necessary to lead the lab. This was a gross underestimate, but I viewed the Marine Lab as an opportunity to live and work close to the coastal ecosystems that I researched.

During my first week at the lab, I was confronted by staff discord. With great anxiety, I called the maintenance and ship staff for a face-to-face discussion of the issues. The problematic staff member resigned, and I promoted Earnest Gay to the Marine Supervisor position, where he served until the mid-1980s. Earnest saw to the day-to-day operation of the facility and would become an important mentor during my tenure as Lab Director. Joe Barber, the Captain of the R/V *Tursiops* (a 60-foot steel-hulled T-boat), Bobby Millender, First Mate, and other support staff were a great team. Meanwhile, I lived on site, in the house on the lab property, during much of my tenure.

The 1970s were the best of times for researchers in the environmental sciences. Our R/V *Tursiops* was an ideal platform for research programs on the biogeochemistry of rivers, estuaries, and coastal waters, from the Florida Everglades to the Mississippi Delta, and the National Science Foundation (NSF) provided adequate support for the vessel to be at sea 100–150 d each year. Moreover, the Vice President of Research provided a modest increase in the lab budget to support my efforts to attract more scientists and students to the lab, both FSU folk and visitors. Rich Iverson, Jim Jones, Skip Livingston, Bill Herrnkind, and other faculty had very productive projects at the lab. A major South Florida study included a fruitful collaboration with H. T. Odum at the University of Florida: my group learned how to do modeling with an analog computer, and his students were introduced to field measurements. Odum's 1971 book, *Environment, Power, and Society*, profoundly influenced my thinking and subsequent career interests. At the same time, Skip Livingston and Walter Glooschenko collaborated with me to document coastal environmental damage, and to take on paper, pesticide, and other polluting industries.

Many of my graduate students subsequently had distinguished careers in academia and government laboratories. Jack Winchester, Chair of the Department of Oceanography, provided inspiring leadership. I resigned my position at the lab in 1974 to assume a position as a temporary program manager at the NSF, where I hoped to inspire more awareness of the power of interdisciplinary approaches to the environmental sciences.

After my departure from FSU in 1978, I held positions at NASA, the University of New Hampshire, Texas A&M, and the National Center for Atmospheric Research. In 2006, I returned to Houston, birthplace of my professional career, to serve as President of the Houston Advanced Research Center, a nonprofit institution dedicated to sustainability science. I also hold adjunct faculty positions at Texas A&M-Galveston and the University of Houston.

R. Winston Menzel.—(Director 1974–1978), Ph.D., Texas A&M University (1954): Areas of expertise: all aspects of bivalve molluscan biology, especially that of oysters and quahogs.

Menzel came from a family of commercial fishermen who worked on the Chickahominy River in Virginia. But after his Master's study of the James River catfish fishery, Menzel's interests turned to the reproduction, development, and growth of oysters. He was working in Louisiana, and in 1946, was involved—as Collier had been—in the legal argument between the Louisiana oystermen and the oil companies. His doctoral work also involved oysters—a biological comparison of *Crassostrea virginica* and *Ostrea equestris*, and when it was complete, in 1954, he joined the FSU Department of Marine Science.

Menzel's research at FSU, though focused on a few bivalve genera, was quite broad; about half of it addressed biological questions (ecology, population biology, behavior, and parasitology); a smaller proportion dealt with cellular, genetic, and chromosomal questions (including hybridization and protozoan diseases); and only a small fraction of his papers were about cultivation. But such an artificial parsing of his oeuvre is clearly off, for cultivation of marine animals underlies virtually all of Menzel's work. He remarked in 1961 that open land was disappearing as the population increased, and suggested that shallow coastal waters be exploited by scientifically based ''husbandry of marine forms, or *mariculture*,'' thus both coining the word, and revealing his perspective.

Menzel carried out substantial field and laboratory research both at the Alligator Harbor Laboratory and at the FSUML when it moved to Turkey Point. In 1956, he updated the checklist of local animals and plants that Harold Humm had prepared in 1953, adding more species and commentary, and this annotated checklist is now in its third edition (1971).

Menzel's relaxed manner and slow drawl led people to discount him. But he was close to his many students, who respected his grasp of the literature and natural history, his intelligence, and wit. Through the four years of his director-

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ship, Menzel attended to his research and writing, continued to do so after he retired, and then until he passed away in 1989.

Michael J. Greenberg.—(Director 1978–1980), Ph.D., Harvard University (1958): Areas of expertise: comparative pharmacology and physiology of invertebrates.

Research: In 1965, 10 yr after my Master's degree studies with Charles Metz, I returned to FSU's Department of Biological Science. The astonishing biological diversity at Baymouth Bar and along the coast were still compelling, and the diverse interests of the graduate students in my lab led to a varied research program that included osmotic regulation and echinoderm regeneration, as well as the basic theme of bivalve heart pharmacology and physiology.

When it was my turn to be Director of the FSUML, my primary aim was to develop an acceptable level of scientific activity at the laboratory—and that was strange, considering the operation of my own research group. Typically, during low tides, we would use the skiffs at the Alligator Harbor Lab to go down to Baymouth Bar, or drive to other sites along the coast. We would collect the required animals and then drive them back to campus, where we would maintain them in aerated, artificial seawater in a temperature-controlled walk-in cooler, until they were used in experiments. Clearly, the Alligator Harbor Lab was serving our research program primarily as a transportation hub, and that relationship did not change when the new facility at Turkey Point opened in the spring of 1970.

Education: In the 1970s, Bill Herrnkind and I began to participate in the general residential marine biology course that Albert Collier had developed at the FSUML. But also in the 1970s, I was involved in *Experimental Invertebrate Zoology*, a residential summer course offered at the MBL (Woods Hole). Like most MBL courses, it was team-taught, so specialized instruction could be provided by several expert faculty. This seemed a good model for a multidisciplinary course in *Experimental Marine Biology* (*EMB*) at FSUML. There were only three problems: recruiting students and instructors, and obtaining general measuring and optical equipment for the labs.

Fortunately, the State universities in Florida were on the quarter system during the 1970s. So we proposed—and could reasonably expect—that at least some interested students would be willing to devote 10 wk, 5 d per wk—lecture, lab, or fieldwork from morning to evening—to this one course. But in return, students would receive all of their credits for the quarter (15 hr). They would not need to commute, but would live in the FSUML dormitories. Many students signed on. Moreover, common course numbering had just been instituted in the State University System, so we invited students from other universities to join in, and a few did.

Recruiting faculty proved easy. Since *EMB* would be team taught, faculty would stay only a week or two at Turkey Point; they would reside in the lab director's house, give daily lectures in their field of interest, and offer a set of laboratory projects in their field, which the students would carry out. Moreover, although the course had a research assistant, faculty were invited to bring one of their own graduate students along to help out, which they did. The instructors were primarily from Biological Science: Larry Abele (invertebrate zoology), Bill Herrnkind (marine behavior and ecology), William Marzluff from Chemistry, Gerald Schatten (development), and I (comparative physiology). But we also recruited Ranga Rao from the University of West Florida (endocrinology) and Barry Ache from Florida Atlantic (neurophysiology).

The faculty did bring such specialized equipment as was needed for their laboratory experiments, and Bob Johnson (Vice-President for Research) funded dissecting microscopes, spectrometers, and recording oxygen meters and osmometers. With the problems solved, we tested *EMB* in 1975–76, and offered it statewide in 1977.

Fitting *EMB* to the University's academic rhythm, culture, and regulations was always challenging—but interesting. In 1980, for example, we shifted the weekend to Tuesday and Wednesday, so students could leave to conduct business on campus or in town. Still, the course succeeded and improved with each iteration; for me, it was the most rewarding undertaking of my directorship.

Maintenance: I had no sooner been appointed Director then two problems emerged: First, an inspection revealed that the reinforcement bars in the floor and in the pillars holding up the laboratory building had rusted, then expanded, and finally cracked the concrete around them. Moreover, the ventral surface of the building extending over the tank area was covered in asbestos, which we were required to remove at once. And the seawater system, beset with silt, was in need of attention. The repairs took months.

The second problem was tied up at the laboratory's dock: a large scruffy boat that never moved—and then disappeared. Thirty-two years

later, Herrnkind explains: ''In about 1969, Professor James ''Jimmy'' Jones, a geologist, came to FSU, bringing with him R/V Tursiops, a 60-foot T-boat. Small and slow, but seaworthy, it became the laboratory's oceangoing vessel. I took it to Bimini several times (1973–75) where it served as a mobile diving platform and thus enabled my research on the population biology of spiny lobsters. I also used it in the Scientific Diving course; and others used it as well for research and teaching. By the late 1970s, however, its block funding had ended, and yet it needed major refurbishing. So it sat at the dock, and then (in about 1980) it was relinquished to the Federal Government, who took it away to storage in Bay St. Louis.''

William F. Herrnkind.—(Director 1980–1985), Ph.D., University of Miami (1968): Areas of expertise: behavior and ecology of marine crustaceans.

Research: The FSUML opened in late 1967, just as I joined the Biological Science faculty at FSU, and my graduate students and I have operated there ever since. Although the primary focus of our research was on the behavior and ecology of spiny lobsters, and was conducted underwater in the subtropics, our experimental studies were carried out at FSUML. In addition, our lab continuously studied and published on littoral gastropods and crustaceans in the Gulf, and on their ecological linkages, both direct (predator–prey) and indirect (mollusk shell–web dynamics).

Diving: Already in the mid-1970s, I began to instruct my graduate students in scuba diving safety and the techniques of scientific diving. Then I hired a full-time Diving Officer and started to promote the development of an academic diving program (ADP) that would be offered and overseen by the FSUML. This campaign was successful, and ADP has provided science-diver training for many graduate students in marine science and underwater archaeology, while also offering advisory and technical support to research, including safety oversight, and free use of scuba gear and instrumentation.

Education: I continued to coordinate and teach in the multidisciplinary residence course: *EMB.* But in 1981, when the quarter system ended, so did the course—overwhelmed by logistical and scheduling problems. Later, however, from 1995 to 2006, I commuted from the main FSU campus, 2 d per wk, to teach *Biology of Higher Marine Invertebrates.*

Maintenance: For 3 yr after the departure of R/V *Tursiops,* only outboard skiffs and pontoon boats were available to FSUML investigators. In 1981, however, soon after becoming Director, FSU acquired a vessel from U.S. Customs. Renamed R/V *Callinectes,* it was a 46-foot diesel-powered craft with a semitunneled stern, suitable for use in both near-offshore and bay waters. I secured funds to upgrade it and oversaw its renovation into a serviceable research platform.

Well before the age of desktops and the Internet, I also acquired a terminal with a phone-line linkage to the mainframe computer on the FSU campus. For the first time, computer access to the FSUML was available. Moreover, in response to an assault threat on a student assistant staying overnight at the coastal facility, I persuaded the administration to provide enhanced security, including a barrier fence, expanded outdoor lighting, and under my successor, after-hours security personnel.

Outreach: During my directorship, I initiated a series of outreach programs that continue to this day. For example, in 1984, Dr. Patricia Hayward and I created Saturday-at-the-Sea (SATS), a hand-on program for middle school students that has operated at the lab for 26 yr and served ~20,000 middle-school students (see Outreach section below).

W. Ross Ellington.—(1985–1989), Ph.D., University of Rhode Island (1976): Areas of expertise: enzyme structure, function, and evolution.

Administration: I have been a faculty member at FSU in the Department of Biological Science since 1981. While Marine Lab Director, I established the position of Associate Director (AD) at FSUML to provide continuous, on-site direction for all of the diverse day-to-day operations. Thus, the AD position anticipated expanded research, teaching, and outreach at the coast, and provided the Director with time to meet faculty and administrative commitments on the main campus, and thereby to pursue long-term support for the Marine Lab. I also brought the FSUML into the National Association of Marine Laboratories. In my present position as Associate Vice President for Research, I watch over the direction and operation of the Marine Laboratory, including changes to the facility and personnel.

Maintenance: I obtained night and weekend security personnel for the coastal facility and oversaw the repair and improvement of infrastructure following substantial damage by Hurricane Kate. An unusable boat launch ramp was

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replaced with a new, larger one suitable to all FSUML outboard watercraft up to 28 feet in length.

As Director, I obtained NSF funding to build a recirculating seawater system. This opened the Marine Lab to research on marine species with narrow salinity and temperature tolerances, and supported studies that require long-term controlled conditions. Additionally, I upgraded the open seawater system, providing higher water quality, greater reliability of supply, and the expansion necessitated by the increasing demands of research and outreach programs.

Research: My research program focuses on the structure, function, and evolution of phosphoryl transfer enzymes. This is a highly technical program that must be sited on the main campus. But most of the model animals and experimental materials used in the program are, or are derived from, local marine invertebrates, from sponges to octopi.

Nancy H. Marcus.—(1989–2001), Ph.D. Yale University (1976): Areas of expertise: ecology and evolutionary biology, centering on dormancy in the life cycle of marine copepods.

My career began at the Woods Hole Oceanographic Institution, first as a postdoctoral fellow and then as member of the scientific staff. I moved to the FSU Department of Oceanography in 1987 and assumed the FSUML directorship in 1989.

Maintenance: With two NSF facilities improvement grants, the seawater system was greatly upgraded and expanded. The raw water intake was moved farther offshore and deeper, providing a continuous flow, even during storms and extreme low tides. Because of these improvements, marine organisms could be held for longer periods, with less risk of stoppages or declines in the quality of the seawater supply. And therefore, research outcomes for replicated and long-term tests and experiments were improved.

I also supervised a mammoth dredging operation to clear accumulated sediment and to deepen the Marine Lab channel. As a result, larger vessels, including R/V *Callinectes*, could finally enter and leave the basin without risk of grounding or propeller damage. I also ensured that all programs were able to operate through the year-long period of dredging, that the seawater supply was adequate, and that dredged sediment caused no environmental damage or local disturbance of sensitive sea grass and oyster reef habitats.

Research: Among the major projects at the Marine Lab was my long-term, externally funded research on the life cycle needs and cultivation of marine copepods. As important as the basic research goals, was the evaluation of cultivated copepods as a superior food source for rearing commercially valuable fish species. I also built two large and durable greenhouses.

By 2001, I had served longer than any Director, before or since. After completing my term as FSUML director, I went on to become Director of the Women in Math, Science, and Engineering program (2001–2005), and Chair of the Department of Oceanography (2003–2005). By August 2005, these roles had prepared me to take on a new challenge: Dean of Graduate Studies.

Richard Iverson.—(Director 2001–2005), Ph.D., Oregon State University (1972): Areas of expertise: physiology and ecology of marine phytoplankton.

During his tenure as Director, Iverson refurbished the R/V *Callinectes*, replacing the electrical system, installing a new winch, replacing the radar/sounding system with an advanced unit, and replacing the life rafts. These improvements assured that the craft would continue to be effective for both teaching and research cruises. Iverson also replaced the engines in the heavily used small-boat fleet that was serving, not only greatly expanded public outreach programs, but also supporting the research and teaching of FSU and other institutions.

Iverson also significantly upgraded the FSUML infrastructure. With support from Brooks Keel and Kirby Kemper, he replaced the freshwater system and installed a 5,000-square-foot modular building that had been donated by the Seminole Boosters. He also secured and oversaw two major installations affecting information transmission: fiber-optic Internet cable was laid throughout FSUML research, education, and maintenance buildings, and a server and new personal computers for all staff members were provided. These improvements permitted direct communication with the main campus via a DSL Internet connection. He also replaced the antiquated telephone system, including complete rewiring throughout all of the buildings on the Marine Lab campus.

For the first time, the laboratory could provide on-site dedicated offices, meeting space, and communications for researchers and teachers, both from FSU and elsewhere. These improvements would later enhance academic activity at the coast, facilitating an increased appreciation for the pristine habitats and diverse organisms located adjacent to the FSUML.

Research at the FSUML: From Harriss to Iverson

Robert J. "Skip" Livingston.—(Biological Science): From 1970 through the 1990s—and with the intensity for which he is legendary—Skip Livingston and a large contingent of collaborators and students, graduate and undergraduate, researched the ecology of our important panhandle estuaries: the Fenholloway, Econfina, Choctawhatchee, and especially the Apalachicola, Florida's main producer of oysters as well as shrimp and blue crabs. Livingston aimed to accumulate sufficient long-term physical and biological data so that seasonal, annual, and future trends could be assessed. Of special interest to him was the trophodynamics of each system—the key to the nature of the food chain and to productivity measures. The work of Livingston's group was largely in the field and sorting room, but they also had a continuous presence at the FSUML, where they conducted long-term mesocosm experiments. His ability to sustain support for such long-term data collection and subsequent analysis was remarkable.

Livingston's projects yielded seminal discoveries about the relationship of river flow to the bay's ecology, and the contributions of microorganisms to the productivity of the ecosystem. The projects spun off numerous Master's and doctoral studies, and a set of lessons on the nature of the estuary was developed and was taught in the local public schools in Franklin County.

William "Bill" Herrnkind.—(Biological Science): A marine station located amidst pristine habitats that provides the basic services of small boats and running seawater can generate significant research by graduate students and faculty even when their funding is limited. This possibility has been revealed by more than 3 decades of observing the sophisticated behavior and intricate linkages among littoral Gulf mollusks and, mainly, crustaceans that constitute what has been termed the ''shell web.''

In an area without nearshore rocks, mollusk shells provide both the limiting hard substrate and shelter. Although bivalves and gastropods both produce shells, it is mainly predaceous gastropods that make the shells available for other taxa to exploit, e.g., hermit crabs, sea anemones, gobies, blennies, and other benthic fishes. Meanwhile, blue, stone, and box crabs—shell-crushing predators of mollusks—remove those shells for their own use. A dynamic interaction between these processes operates in salt marshes and in sea grass meadows. Horse conchs, the top gastropod predator of local waters, devours pen shell flesh, thus providing nesting sites for several fish species and dwarf octopuses—an important indirect ecological effect. Some shell-using hermit crabs actively seek and acquire, by specialized behavior, anemones that sting potential crustacean predators. Such insights and many others have emerged from a lineage of graduate student projects that have been directed, since the 1960s, by Herrnkind and other faculty from FSU and elsewhere. Two of the earliest and best-known papers on this topic were by Robert T. Paine, present Chair of the FSUCML Science Advisory Board.

Christopher C. Koenig and Felicia C. Coleman (Biological Science).—Over the past 2 decades, Koenig and I have elucidated the life history and recruitment of a number of species of groupers. During the early 1990s, we worked on these aspects off the FSUML, focusing especially on gag and red grouper, two of the most sought-after and heavily fished species in both the recreational and commercial fisheries in this part of the Gulf. In particular, we found that, during their juvenile stage, gag use the seagrass beds, which extend from Apalachee Bay to throughout the Big Bend, as critically important nursery grounds. We estimated that the year-class strength, just in the St. George Sound, was nearly 1 million young fish. This signified both the important function of this region as nursery habitat and its incredible importance in supplying fishery productivity. The National Marine Fisheries Service (NMFS) was highly interested in this work. So more than 15 yr ago, we left the Marine Lab to work with colleagues at NMFS labs throughout Florida. This change allowed us to expand our work offshore to the edge of the continental shelf and to the rest of the state.

In the early 2000s, Herrnkind used our data effectively to forestall plans for a marina to be built off the FSUML.

Outreach at the FSUML: From Harriss to Iverson

In 1984, the Florida Legislature mandated the state universities to offer their facilities and services beyond enrolled students, i.e., directly to state citizens. Bill Herrnkind and Patricia Hayward (Biological Science.) designed and obtained funding for the SATS program to encourage interest in nature and science among middle-school students—an audience that tends to lose interest in science. The hands-on activities included field trips, wading and seining along the shore, and trawling the sea-grass meadows just offshore, as well as a brief wet lab session using

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dissecting microscopes and touch tanks. In 1996, the program won the Governor's Environmental Educational Excellence Award. Now SATS and spin-off programs operate several days weekly in spring through fall. In 1994, Herrnkind initiated a NSF–Science Education program for middle-school science teachers, Marine Ecology for Teachers: A Model for Inquiry-Based Teaching. The success of this experience for the participants formed the basis of two subsequent long-term NSF grants (2000–2012).

Among the legacies of Nancy Marcus's tenure is the very successful, ongoing, Open House Day. This biannual springtime event draws hundreds of coastal citizens to the FSUML to experience research exhibits, lectures on a wide array of timely marine topics, and close-up, hands-on contact with live, local marine invertebrates and fishes.

These collective outreach efforts have enhanced the perception of the marine lab and its regional role.

The Awakening (2006–)

In 2004, Kirby Kemper, Vice President for Research, appointed a select committee of FSU Marine Science faculty (including Herrnkind and Coleman) to evaluate and recommend the direction of future development at the FSUML. The committee's proposals led the FSU administration to appreciate the value in supporting and growing the laboratory's research capacity, an epiphany that set the stage for significant changes in mission, organization, and scope of activity.

The mission expanded from that of a support facility to becoming a programmatically based center for research, education, and outreach, with a focus on the coastal and marine ecosystems of the northeastern Gulf of Mexico. The organization changed with the hiring of a full-time on-site director, three resident research faculty members, and three postdoctoral associates to get it off the ground, and moving both the administrative support positions and the academic diving program from the main campus to the laboratory. The scope of activity expanded to include place-based research, education, and outreach, and the significantly increased involvement of undergraduate students in marine research.

The Director

Felicia C. Coleman.—(Director, 2006–), Ph.D. Florida State University (1991): Areas of expertise: reef fish ecology, marine fisheries management and policy.

Before describing the transformation of the FSUCML, I want to acknowledge the giants I've had for mentors. In particular, Greenberg, Herrnkind, and Bob Paine have been walking with me from the start—and Joe Travis, Dean of Arts and Sciences, even before that. Greenberg pointed me toward developing a Board of Trustees—on which both he and Herrnkind serve, and through which Travis is involved—and a Scientific Advisory Board, chaired by Bob Paine. They are as engaged and energetic a bunch as I've ever seen. I also acknowledge the incredible staff at the laboratory, from long-timers who shared the institutional history to the new staff now on board. They get it. All of these people are dedicated to the laboratory and all that it can become, and perhaps more particularly, they love this part of the world—now in immediate jeopardy because of the Deepwater Horizon oil spill of April 2010.

Maintenance: Marine labs are hungry beasts. During my first 2 yr as director, the 1960s-era electrical and fueling systems were replaced, and the internet connectivity of the lab was brought into the 21st century by upgrading the single DSL phone line to a T-3 line, thus unifying FSUCML electronically with campus. We then went wireless. The building that was moved on site during Iverson's tenure was quickly filled with staff, faculty, and postdoctoral associates, and was also used to host a series of outreach events. An energy audit caused us to replace outdated equipment with energy-efficient gear, and reduced our energy use by nearly half, despite the growing number of residents. We landscaped the grounds and reorganized space to squeeze in a dive locker and graduate student housing. And then took a breath. Next was research.

Research: The mission of the Marine Laboratory—outlined at its inception—is now in full swing: we focus on conducting innovative, interdisciplinary research on the coastal and marine ecosystems of the northeastern Gulf of Mexico, and on providing the scientific underpinnings for informed policy decisions.

The first three faculty and three postdoctoral associates hired to tackle this mission arrived in 2007 and 2008. They brought in research dollars for the first time, research technicians, and more recently, graduate students. *Their* hunger for space and developing projects has been met by moving them into existing laboratory space, constructing storage units for gear, and converting the Marcus greenhouses into labs used to

evaluate predator–prey interactions and genetic diversity in sea grass and salt marsh plant systems.

Resident scientists

David Kimbro (Ph.D., University of California, Davis) studies the community of organisms that live in oyster reef and salt marsh habitats. He combines laboratory and field experiments with broad-scale monitoring to understand the suite of environmental conditions—including nutrients, phytoplankton, tidal inundation, salinity, and temperature—that both promote and inhibit predators from maintaining critical habitat all along the NE gulf coastline.

Randall Hughes (Ph.D., University of California, Davis) examines the ecological effects of species and genetic diversity in salt marshes, sea grasses, and oyster reefs. Diversity often reduces the negative impacts of disturbance and thus could be an important factor in the response of these habitats to the oil spill. In addition, because these systems provide critical habitat for a wide variety of birds, fishes, and invertebrates, any factors that mitigate the negative effects of oil could have far-reaching community and ecosystem effects.

There is a strong fisheries ecology component at the FSUCML now, including scientists who use fishery-independent surveys to develop baseline habitat-specific indices of the relative abundance of larger fishes, including sharks, grouper, and many other species throughout the region. The FSUCML shark studies, conducted by Dean Grubbs (Ph.D., Virginia Institute of Marine Science), indicate that this region is home to at least 12 species of sharks, including small and large coastal sharks that are managed at the federal level. His data show that the extensive sea grass beds in the Big Bend serve critical functions as pupping and nursery grounds for at least six of these species. In addition, Christopher Stallings (Ph.D., Oregon State University), who studies population and community dynamics of marine organisms in sea grass beds and rocky sponge reefs, finds that more than 10 species of economically important bony fishes and many species of forage fishes inhabit these habitats as juveniles or adults (or both). This kind of information is critical for assessing the ecological effects of habitat restoration efforts or improved water quality, as well as the effects of habitat degradation caused by development, dredging, or oil inundation.

Farther to the west, from Apalachicola to the Mississippi River, Kevin Craig (Ph.D., Duke University) assesses the effects of human-induced changes in water quality—such as nutrient pollution, decreases in river flow, and shoreline development—on the nursery function of estuaries and other nearshore habitats. He has a strong interest in understanding both the acute effects of human-induced impacts on economically important species living in these habitats and the longer-term effects that are mediated by interactions within coastal food webs.

Farther offshore, Koenig and I study reef fish species that have complex life cycles involving individual life stages that move from pelagic to inshore and to offshore habitats. At each stage, these fish have the potential to be affected by anthropogenic impacts. The focus of our research is understanding how these impacts affect their productivity and life history.

Campus-based faculty.—The connection between the FSUCML and campus-based faculty remains active. Indeed, more of the research is becoming collaborative and interdisciplinary, involving colleagues in the departments of Biological Science and Earth, Ocean, and Atmospheric Sciences. They include William Burnett, who has evaluated submarine groundwater discharge as a pathway for delivering nutrients and other dissolved constituents from land to the coastal ocean; Jeffrey Chanton, who uses stable isotopes as a means of investigating linkages in marine food webs; Joel Kostka, whose work focuses on marine microbial communities and their function in enhancing nutrient availability in coastal areas; Markus Huettel, who investigates sediment–water exchange of O_2 and nutrients in the coastal zone, key parameters in biogeochemical studies of marine systems; Kevin Speer, who runs the Current Meter Facility, a field operations system housed in part at the FSUCML that supports grant-funded research, including hydrographic observations in the NE Gulf of Mexico; and David Thistle, an expert in benthic ecology, whose research includes studies of copepod communities throughout the Gulf of Mexico—their systematics, morphology, response to natural disturbances, and habitat associations.

Education.—In 2006, we moved the administration of the Certificate Program in Marine Biology to the FSUCML. Herrnkind and I developed this program over 10 yr ago, in the Department of Biological Science, to provide intensive research experiences for undergraduate students who had already demonstrated a keen interest in marine science. Many of the students enrolled in the program are mentored by FSUCML faculty and postdocs, as are other undergraduates from FSU and other academic

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institutions. Knowing a good thing—when we looked back in history and saw it—and with encouragement and early participation by Herrnkind, the lab also started offering summer courses that now include ''saturation time'' for undergraduate students at the Marine Lab.

The faculty members at the FSUCML are also actively engaged in training graduate students, bringing in one student in 2008, four in 2009, and anticipating several more in 2010. This activity has allowed the lab to grow the research capacity beyond that provided by the faculty themselves.

Outreach.—The ''Forgotten Coast'' of the Florida panhandle is rapidly gaining population with its associated coastal development. To provide information of interest to coastal residents, we initiated, in 2006, a monthly Public Lecture Series that usually fills the modest FSUCML auditorium to overflowing. Speakers include local scientists, naturalists, state agency officers, and visiting authorities—a diversity of expertise. In addition, FSUCML has hosted numerous symposia and conferences for small working groups, to exchange information about coastal issues, fisheries, and living marine resource management.

To further increase the lab's visibility, we updated the website, developed a biannual online newsletter, and have continued the Marcus tradition of holding an open house every other year. We strongly support the SATS program, and have developed a series of noncredit courses of our own that are geared primarily for adult audiences interested in learning something about marine ecology. In addition, all of the researchers are involved in providing service to state and federal agencies responsible for the management of the living marine resources of this region. It is considered an important and integral part of all research initiatives.

Conclusions

1. A marine laboratory must aim to become an interactive community of scientists—students, postdocs, and faculty—and staff, whose workplace is at the laboratory, and who all live nearby. Moreover, their number, interests, ability, and relative permanence must be sufficient to maintain the interaction, and this is the basis of ''critical mass.'' The selection, cohesion, and scientific productivity of this community is the function of the Director, who is also a working member of it. The Awakening at the FSUCMLwas possible because the Director—with the help of the FSU administration—could achieve these goals.
2. A close relationship between research and education is common at marine laboratories, but its form is variable—seminars, data clubs, formal and informal technical training, formal classes for residents, for visitors, in seasons, short, long, and classes for schoolchildren. But somehow, when an interactive research community is lacking, education, particularly at the college level, sputters and winks out. The answer is clear: research and teaching are closely related everywhere—they are functions that inform each other regardless of the site. If one can't travel to do research at a marine lab because his research and students are at a university, how can he come to teach, and abandon his research?
3. Reaching out to a community to increase its citizens' understanding and appreciation of an institution's perspectives, functions, and activities is absolutely critical for rural marine laboratories like the FSUCML. Fortunately, outreach has developed amazingly at the FSUCML, as is emphasized in this article. But there are two lessons: show & tell is not the same as research & teach; and we must be careful that the community's perception of our laboratory does not swing strongly to the former. Keeping the efforts spent on research, teaching, and outreach in good proportion is a very important function of the Director.
4. University-operated marine laboratories are always prey to the vagaries of administrative and cultural changes, changes in scientific priorities, financial disasters, hurricanes, and oil spills. But the long history of the FSUCML clearly shows us that there is always a road back—and it could be a superhighway.

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