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**History of Moss Landing Marine Laboratories
The Middle Years (1978-1995)
by
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Preface

The history of MLML from the early 1960's - 1977 was documented by Dr. James Nybakken in "The Early Years." These years were dominated by how the Labs were obtained and organized, how facilities were developed, and the pursuit of institutional recognition and funding, and centered around a few key founders and supporters, and the Governing Board and its precursors. By 1977 the Labs had a new Director, Dr. John Martin, with a keen sense of what was needed to firmly establish MLML within the California State University (CSU) system and for growth into an institution of excellence in marine science. MLML's first Academic Master Plan, completed in 1977 by Director Martin and Assistant to the Director Pat Elliott, provided the institutional foundation for the Labs' future development within the CSU and outlined the resources needed to achieve it.

At the end of the early years the faculty included six members who were full-time at the Labs, Drs. Robert Arnal, William Broenkow, Gregor Cailliet, Michael Foster, Ann Hurley, John Martin, and James Nybakken, and two part-time members, George Knauer and Victor Morejohn. This core group taught most MLML classes, supervised most of the graduate students, and did their research through MLML. They had the experience and dedication to work effectively with the Director and Governing Board. Scholarly support was provided by a well functioning library run by the new librarian, Sheila Baldrige. Average student enrollment was ~ 110/semester and most students were male (e.g., 78% of the 125 students registered in Fall 1974 and Spring 1975; 70% of the 118 students registered in Fall 1977). Three quarters of these were resident graduate students, most with MLML faculty as their major advisors. In addition to their own class and research work, these students served as teaching assistants and mentors to new students, and helped with other Labs projects and the research of others.

Education and research were supported by equipment and facilities for getting in and on the ocean, but space was limited. The Labs' research-oriented SCUBA certification course and diving program were well established. By 1977 the growing MLML fleet included a variety of small boats, the R/V Oconostota, and the newly arrived R/V Ed Ricketts. Everyone, however, was crammed into a slightly remodeled cannery building plus a few associated "temporary" trailers. Some faculty had small research spaces, but many used classrooms to process samples or run experiments when the rooms were not being used for teaching. Seawater facilities were limited to a small beach well that delivered seawater (sometimes anoxic) to a tiny "wet room" behind one of the classrooms, a jumble of aquaria along one wall of the former Beaudette Foundation carport, and one large, outdoor holding tank.

This early evolution suggests subsequent years would be dominated by the expansion of facilities and refining and strengthening research and educational programs. This is essentially what happened until nature intervened, destroying the main building with the 1989 Loma Prieta earthquake. It is interesting to contemplate the fate of MLML

if a similar earthquake had occurred in 1978: without the maturation and reputation building that occurred between 1978 and 1989, would MLML have been rebuilt or dissolved? The 1989 earthquake dramatically affected facilities, with consequent effects on all MLML programs. Given the centrality of the earthquake but also the evolution of various parts of MLML, each with its own history coupled to other parts, The Middle Years (1978-1995) will first consider Facilities and the Earthquake and then look back on the rest of the parts.

Facilities and the Earthquake

Pre-Earthquake

The 1977 Academic Master Plan highlighted facilities and an adequate support budget as critical needs. Governing Board discussions in 1978 pointed out that the Academic Master Plan was a prerequisite to a physical master plan in the CSU system. Director Martin produced a physical plan in 1978 that argued the need to expand MLML with a new building to be funded by the CSU plus existing funds from the ever generous Packard Foundation that were designated for a new shop building. The MLML Physical Master Plan was approved by the CSU Board of Trustees in 1979, and planning began for the new building. The building plans were approved and construction budgeted in 1980. The start of construction was delayed until 1982, however, first because of cost increases and then because of the late submission of plans for handicapped access. The first delay was resolved in part by the Governing Board asking the consortium Presidents to speak up for starting construction. Resolution was also assisted with support from local and national politicians. MLML, usually via the Director, typically tried to facilitate large initiatives that involved government agency approval by asking for help from appropriate legislators. Monterey County Supervisor, State Assemblyman, and eventually Congressman Sam Farr was especially supportive. Director Martin helped resolve the handicapped delay by traveling to Sacramento and pleading for approval at a State Public Works Board meeting.

Construction began in 1982 and the main complex completed in 1983, despite nearly losing the seaward part of the new foundation during El Niño storms. The seminar room was finished in 1984 with additional funds from the Packard Foundation, and the building was dedicated in May, 1984, a very fine day! The new building included labs (some with running seawater) and offices for 8 faculty, a Director's office and associated administrative space, seminar room, remodeled seawater system, new outdoor holding tank, seawall, and a courtyard between the new and old building. The old seminar room became the library and the former library was used in various ways, including temporary offices for Sea Grant Marine Advisor Ed Melvin, and for the recently established Elkhorn Slough Estuarine Sanctuary (now Elkhorn Slough Estuarine Research Reserve).

MLML continued into the computer age with acquisition of personal computers as well as computing systems for on-site storage and processing of large data sets, and communication. Hand calculators, the WANG (punch cards and print outs), and the HP (keyboard programming and storage on large floppies) appeared during the 1970s, with students Jim Oakden and Jim Barry helping run them. The first Apples and IBM PCs appeared in the early 1980s, with some purchased and placed in a small computer room for use by students who paid a \$10 fee. In 1986 Dr. Bill Broenkow brought the Labs into the realm of large processing and networks with a Digital MicroVAX, and obtained, with

faculty support, a 1 Gbyte hard drive (for \$24,000!) using the Labs' equipment budget. With help of students and a part-time technician, he put together the first MLML computer network, including internet connection, in 1991, and ran it from his laboratory in the Salinas "trailer park" (see below).

There was never enough space. Negotiations to acquire the Kaiser Property immediately north of the main building and including the Moss Landing pier began in 1979. Even with the new building, trailers on the Kaiser Property continued to be used for student and visitor offices, various research projects, and the State Mussel Watch Program run by former MML graduate Mark Stephenson. The former Moss Landing Firehouse was acquired in 1983 with support from NSF, donations from Rosie Stelow (MLML administrative staff member and enthusiastic supporter of MLML) and her husband, and much help from SJSU AVP for Business Affairs Glen Guttormsen. The property was acquired to support marine operations and house diving facilities that were formerly part of the old lab building. The Kaiser Property was purchased in 1988. Marine operations for the Monterey Bay Aquarium Research Institute (MBARI) arrived in Moss Landing in 1987. By mutual agreement, MBARI began to provide building and dock space for MLML large ship operations with "The Firehouse" dedicated to small boat and diving operations.

MLML's oceanographic programs and national status took a quantum leap forward in 1979 with the arrival of the R/V Cayuse and Captain Lew Skelton. The justification for this ship, which became a UNOLS fleet vessel in 1980, was partly based on MLML's leadership (Drs. Martin, Knauer and Broenkow) with VERTEX, started in 1979 and one of the first large, multi-institutional, NSF-funded oceanographic research programs. The R/V Cayuse was replaced by the 135' R/V Cape Florida in 1985, with a name change to the R/V Point Sur. The need for a large UNOLS vessel on the central California coast was supported by the formation of CENCAL (Central CALifornia Oceanographic Cooperative made up of MLML, UCSB, USNPS, USC, USGS and UCSC). With this increase in ship operations, Mike Prince became head of MLML Marine Operations, replacing Larry Jones who took charge of buildings and maintenance.

Diving operations improved and grew with the appointment of MLML graduate John Heine as part-time Diving Officer in 1982. Early diving at MLML was done under the auspices of the recreational program at SFSU. The MLML program was organized by faculty member and dive officer Dr. Tom Thompson in 1972. Faculty members Drs. Mike Foster and Ann Hurley became the dive officers in 1976. John became full-time in 1985 after MLML's request to the CSU for this staff position was approved. By this time the diving program supported the educational and research diving activities of ~ 50 students and faculty, many of whom were certified through MLML.

Earthquake: The Trailer Park Blues

Just after 5 pm on October 17, 1989, the sand dune beneath the main Labs building and above the former, now mud-filled mouth of the Salinas River, began to shake. The dune sank and stretched, liquefied mud erupted through the sand on the volley ball court, water sloshed out of the seawater holding tank, the PG&E stacks waved, the west end of the harbor bridge partially collapsed, and the Labs were pulled apart. No one was injured and no major equipment damaged, but the twisted and cracked structure was

clearly beyond repair. Other MLML facilities on the sand spit remained usable but in need of repair.

Fall semester was well underway. What to do? Dr. Jim Harvey, former MLML graduate with a new PhD from Oregon State University and beginning his first semester as a temporary birds and mammal faculty member, did a quick tour of the sand spit. The American Shellfish and International Shellfish properties survived the earthquake and, with considerable renovation and remodeling, were possible temporary relocation sites. Fortunately there was a newly completed but as yet unoccupied SJSU satellite campus building on Blanco Circle in Salinas, and SJSU President Gail Fullerton arranged to have essential MLML administrative and faculty offices, and most teaching functions locate there. A warehouse at the former beet sugar processing plant in nearby Spreckles was used to store equipment and samples. In perhaps the greatest group demonstration of MLML Spirit, nearly everything was moved by students, faculty, staff, and numerous friends from around Monterey Bay who formed human chains transferring equipment and books from the destroyed building to a fleet of rental trucks in the old parking lot, with other chains in Salinas unloading. Because of the damaged bridge, vehicle access to the Labs and the entire ML sand spit was from Salinas River Beach via the dirt road behind the dunes. Classes resumed in one week, most in Salinas but some in the MBARI marine operations building.

The MLML SJSU Salinas campus was short lived. The Labs soon had to share the building with SJSU programs, reducing space and inhibiting full implementation of SJSU plans. New facilities for the main Labs as well as additional space for the shop were needed. Space and facilities in Moss Landing were needed to support coastal-dependent teaching and research, and the well being of the MLML community. Views of lettuce fields and the smell of the Nestlé chocolate factory across the street from SML (Salinas Marine Lab) were no substitute for beaches, surf and ocean sunsets, and sea smell with a hint of decomposing beach wrack. Moreover, MLML's presence in ML reinforced the need to rebuild on or near the previous location.

Fortuitously, the Monterey County Office of Education, also on Blanco Circle, was planning to expand using a number of "pre-constructed" buildings. Arrangements were made, lead by Dr. Greg Cailliet and using FEMA emergency financing, to speed up this expansion such that MLML could occupy the new buildings until a new, permanent shore facility was constructed. The "MLML Salinas Trailer Park" development began in 1990 and the "trailers" occupied in 1991. Space for the MLML shop, museum collection, and storage was obtained on Vertin Avenue in Salinas, a short drive from the trailer park. At the shore, a seawater system and an aquarium and sample processing room were built on the Kaiser property, and a triple wide trailer added for use as a "wet" classroom, staging room for field work, and to house the benthic lab which had relocated to an old school house in Castroville. This shore facility, a collage of simple buildings and trailers, also housed the State Mussel Watch program, offices for the Sea Grant Marine Advisor and the USGS, a portion of the Trace Metals lab, some student offices, Dr. Foster's temporary shore office and research space, and numerous storage sheds. This MLML ML trailer park also included a shop trailer used by the very busy shop crew as a base for maintaining shore facilities. Additional space was sought across from Small Boat Operations in the former International Shellfish Building occupied by Salinas Tallow and Peninsula Diesel. The Tallow portion of the building was leased by MLML in 1995 and

remodeled to provide office spaces and a large room for seminars and other MLML functions. To simplify communications this acquisition became known as MLML Shore Facility Norte and the Kaiser property as MLML Shore Facility Sur. These quickly became known as "Norte" and "Sur." Jeff W. Meyer donated the sport fishing vessel Grunt V to MLML in 1995. It was soon renamed the R/V John Martin to honor Director Martin, and replaced the Ricketts.

While considerable post-earthquake activity was devoted to temporary operations, rebuilding in Moss Landing was the ultimate, shared goal of the MLML community, and efforts immediately began to achieve it. In his January, 1991 "Guide to MLML Facilities," Dr. Greg Cailliet echoed the common belief that a new, permanent main building would be built, likely on the hill just east of the former site, in "about three years."

Rebuilding efforts initially required consultation with and approval by FEMA, CSU, SJSU, the California State Offices of State Architect and Emergency Services, the California Coastal Commission, California Resources Agency, the Monterey County Planning and Building Inspection Department, and Board of Supervisors. Based on surveys soon after the earthquake, FEMA advised that because of seismic and flooding hazards the old site had to be abandoned to obtain state and federal rebuilding funds, and negotiations were begun for a replacement site. The old lab was demolished in 1991 and the site landscaped by former MLML graduates Pete Slattery and Dr. John Oliver, and numerous assistants, sending it on its way back to being a dune. The site, as well as CSU-owned property immediately south, was eventually transferred from the CSU to the California Department of Parks and Recreation.

Various potential rebuilding sites were considered and evaluations done, many by ABA Consultants operated by former MLML graduate Jim Oakden. Overall assistance was provided by Melanie Mayer, also an MLML graduate. William Nighswonger championed rebuilding as Program Manager for Physical Planning and Development in the CSU Chancellor's Office. Seismic, environmental, archeological, cost, and marine lab specific considerations all pointed towards the Peterson property on Water Tower Hill (the Hill) in Moss Landing as the best site. FEMA agreed to fund reconstruction on this site in January, 1992, and additional, more extensive studies were begun to further evaluate the site. These studies concluded that construction on the Hill would not result in significant environmental impact (a Negative Declaration), and reconstruction plans were submitted for relevant agency approval. The Monterey County Board of Supervisors unanimously approved the plans in May, 1993, and the California Coastal Commission agreed soon after. While likely not to be finished by 1994 as hoped for, reconstruction seemed well on its way.

A series of human-caused bureaucratic and legal disasters began to strike in July 1993. The first was a letter from the FEMA regional office in San Francisco announcing that FEMA had "deobligated" their previous commitment to rebuild on the Hill. FEMA was again persuaded that the Hill was the only suitable reconstruction site after a full court press led by Dr. Ken Johnson and supported by Congressman Farr. FEMA, however, required that this 'reobligation' be verified by an assessment using FEMA's site selection process. The second disaster occurred at about the same time in the form of a lawsuit filed against the government agencies involved in the approval of the reconstruction plans. The suit was filed by a small group that called itself SMILE (Save

Moss landing Indian Lands and Environment), led by Moss Landing resident Sally Slichter, the Carmel Mission Band of Indians, and Noel Mapstead. The primary allegation was that construction on the Hill would cause significant environmental damage, including to the paleocultural environment. Therefore approving construction based on a Negative Declaration was illegal; a full Environmental Impact Statement (EIS) should have been required. The third disaster was FEMA's February, 1994 Draft Environmental Assessment of Site Selection. Rather than verifying that it was most preferred, the Assessment concluded the Hill was the least preferable of the five sites considered. FEMA preferred the Western Salt property located in a wetlands on seismically unstable land next to noisy Highway 1 just north of Moss Landing. The Assessment, done for FEMA by LSA Associates, was quickly reviewed by MLML and characterized as "a flawed, irresponsible document" with rankings based on "falsehoods, erroneous data and selective use of data to create a deliberate bias."

The CSU became disillusioned by FEMA's Assessment and could not provide the resources necessary to actively defend the legal challenge. Suggestions were made to give up on a site in Moss Landing and relocate MLML to CSUMB, the newest CSU campus recently established at the former Fort Ord. MLML quickly pointed out that a site at CSUMB could not easily support a sea water system, and would place main laboratory operations miles away from ship and other sea-dependent teaching and research facilities. MLML at CSUMB would be little different than MLML at Salinas.

The MLML community was disillusioned but far from giving up. The decision was made to use Labs' funds to hire local lawyers Mark Blum and Laurence Horan to address legal issues. It was also decided to do a full EIS for the Hill site that included an alternative sites analysis, even though those involved in producing the original plan, and the agencies that approved it, felt the original studies and analyses were more than adequate. More steps were taken to garner public support for rebuilding on the Hill and to publicly counter the misinformation advertised by SMILE. Then Adjunct Professor Dr. Kenneth Coale increased his public relations efforts on behalf of the Labs, assisted by the newly-reformed Friends of MLML driven by the energy and creativity of Marlene Martin. Press releases were produced, letters written to the editors of local newspapers, and "Hog Calls" broadcast on local radio station KPIG. The Friends sponsored public seminars held in Moss Landing. Dive Officer John Heine was encouraged to run for membership on the ML Harbor Commission and won. Dr. Mike Foster and others joined the ML Chamber of Commerce.

These efforts began to yield positive results in 1995 as FEMA revised its assessment and once again agreed to support reconstruction on the Hill. Thanks to the efforts of new MLML Director Dr. Gary Greene, Native American representatives agreed to work with MLML during construction to insure their needs were met. The drafting of the EIS was underway, with more detail on mitigation plans for the putatively rare plants Sand Gilia and Spine Flower, and Legless Lizards, and disturbance to an area once used by Native Americans.

The earthquake took a toll on MLML Spirit. Rather than concentrated in a single faculty where most of the MLML community interacted daily, people and operations were split among multiple locations between Salinas and Moss Landing, with considerable time spent driving in between. The human-caused disasters damaged optimism about MLML's future. Of the various special efforts made to keep MLML

together, perhaps the most memorable was the well attended August 9-11, 1991 25th Reunion Celebration in ML, centered in a large tent erected in front of the old lab site. The event was organized by Dr. Jim Harvey and former MLML graduate Mary Yoklavich, and included wine and cheese at the Elkhorn Yacht Club, a volley ball tournament, music by the Slough Stompers (former students Tom Harvey, Chris Jong, Jim Oakden, Mark Silberstein and Bruce Stewart) and an awards "ceremony" mastered by Dr. Greg Cailliet. The awards were pieces of the wall paneling from the old library and even older former office of Palmer Baudette saved prior to demolition.

Institutional Evolution: Governance, Academics and Finances

In addition to and facilitated by the 1977 Academic Master Plan, a number of other developments in the late 1970s and early 1980s contributed strongly to the emergence of the Labs as a largely self-contained institution. These included additional consolidation of State funding into a single MLML budget, the growth of the permanent resident faculty, the implementation of an MLML Masters Degree in Marine Science, and increasing funding from grants and contracts, the overhead from which could be used directly by MLML to support its needs. The Academic Master Plan suggested the Labs was evolving into the equivalent of a CSU campus department. In fact, it was becoming a hybrid between an institute for marine science research supported by external grants and contracts, and a CSU academic department whose primary mission is education.

Direct involvement by consortium campuses declined as increasingly autonomous MLML emerged. SFSU developed its own marine facility, the Romberg Tiburon Center, with programs focused on the San Francisco Bay-Delta, and CSUH began numerous projects in south San Francisco Bay. Nationwide, university biology programs shifted emphasis from the field/organismal to the lab/molecular. Enrollments of consortium undergraduates at MLML declined and the Labs summer course program run through CSUH ended in 1980. Campuses other than SJSU, the operating institution, became unwilling to hire new faculty who would permanently reside at MLML. Initiation of "base budgets" by CSU made the MLML budget an integral part of the SJSU budget, essentially eliminating fiscal ties to other consortium campuses. Fewer and fewer graduate students came from within the CSU, and those admitted enrolled in the MLML MS Degree rather than masters programs at the consortium campuses through which they applied. Enrollment dropped to 98 total students in Fall, 1981, primarily due to fewer undergraduates.

There were efforts to enhance consortium interactions and undergraduate enrollment. In 1981, MLML and Sea Grant funding was used to employ graduate student Bruce Stewart to improve public relations in general and to visit consortium campuses to encourage participation in MLML programs. A succession of students, as well as MLML faculty, continued these visits in subsequent years. The Governing Board even discussed the possibility of providing a bus to transport students from and to SJSU, the closest consortium campus and the one traditionally sending the most students to MLML. An MLML Visiting Scientist was approved and supported by the Governing Board, and initiated in 1985. The goal was to have a consortium faculty member in residence at MLML each year to enhance interactions with the consortium campuses and increase the academic breadth of the Labs. When there wasn't a consortium faculty candidate the position was filled from outside the consortium. Weekend "mini-courses" for consortium

students were started by MLML geologist Dr. Hank Mullins in 1979 and eventually involved most of the MLML faculty. The mini-courses were the most successful of various efforts to increase undergraduate enrollment (total enrollment increased to 154 in Spring 1984) but did so directly, not by a hoped for spill over into MLML regular course offerings. As Director Martin recognized in his report to the Governing Board in 1980, graduate programs were MLML's chief selling point.

These changes and activities had little effect on the formal governance structure, but dynamics shifted; MLML became the proposer of its budgets, facilities, curriculum, etc., and the Governing Board became the approver, and facilitator if change required further approval by each home campus. The Board did remain the necessary vehicle to implement changes in curriculum, and to involve various campus Presidents in support of major projects and to help resolve contentious issues.

One of the many beauties of MLML was how it decided what to propose to the Governing Board. Director Martin encouraged faculty participation in all MLML affairs, and most issues were discussed and decisions made by the Director and faculty in faculty meetings. If research was needed to make a decision, individuals or small groups formed to do it and report at a faculty meeting. Particular faculty took special interest in some areas and became consistently responsible for them (e.g., Drs. Broenkow, computers; Cailliet, facilities and space; Foster, curriculum; Martin, marine operations; Nybakken, sea water systems). Group discussion often lead to consensus. If not and after reasonable discussion, Director Martin made the decision. If the business required Governing Board approval, whomever had taken the lead on the research usually presented the item at a Governing Board meeting. During this time the only vote ever taken at a faculty meeting was in March 1985 after Dr. George Knauer complained about the noise from volley ball games on the court across from his office in the new building. He proposed the court be moved. After spirited discussion, a vote was called for. The proposal lost.

The Governing Board's influence remained primarily in the areas of faculty hires, curriculum, and consortium membership. While MLML was founded as a marine science facility to include biological and physical sciences, the majority of students were interested in marine biology/ecology, suggesting the need for more faculty in this area. The Governing Board, however, was committed to discipline diversity and generally did not support growth of the biology faculty at the expense of the "oceanographic" faculty. This commitment was also made in the 1977 Academic Master Plan, and made particularly clear again in 1982 when the Governing Board considered a replacement for geologist Dr. Hank Mullins - he was to be replaced by a geologist. The Director was, however, also asked to evaluate the faculty "mix" as might affect the long range direction of the Labs.

By 1988 this commitment to breadth produced the current mix of tenure track faculty: four "biologists," and four "oceanographers," the former with expertise in marine macroalgae, invertebrates, fishes, and birds and mammals, and the latter with expertise in biological, chemical, geological and physical oceanography. Biological oceanographer Dr. George Knauer joined the permanent faculty in 1979, left in 1986, and was replaced by Dr. Nick Welschmeyer in 1989. Dr. Ken Johnson, the first permanent MLML chemical oceanographer, was hired in 1988. When marine geologist and former Interim Director Dr. Bob Arnal retired he was replaced by marine geologist Dr. Hank Mullins (1978-82), followed by Dr. Mike Ledbetter (1983-92) and then Dr. Gary Greene

(1994). The biology faculty was slightly more stable; Dr. Ann Hurley left for law school in 1980 and was not replaced. Marine bird and mammal biologist Dr. Bernd Wursig was hired in 1981 as a full time replacement for MLML veteran Dr. Victor Morejohn who retired in 1979. Dr. Wursig resigned in 1990, and was replaced by Dr. Jim Harvey in 1991. At the end of 1995 the biology faculty were Drs. Cailliet (fishes), Foster (marine macrophytes), Harvey (birds, mammals and turtles), and Nybakken (invertebrates), and the oceanographic faculty were Drs. Broenkow (physical), Greene (geological), Johnson (chemical) and Welschmeyer (biological). Joan Parker joined the faculty in 1995, replacing librarian Sheila Baldrige who had graciously served MLML for 16 years. Director Martin died in 1993, a great loss to the MLML community and the larger marine science community of which he was a highly respected, major contributor. Dr. Jim Nybakken served as acting director until Dr. Gary Green was chosen to lead the Labs in 1994.

MLML continued to emphasize field oriented classes and research. Access to the field and the ability to support field work was a primary reason for forming MLML and for its continued operation. This was reiterated by Director Martin in a 1979 memo to the faculty outlining his thoughts on RTP guidelines, and by Dr. Greg Cailliet during a discussion of shore facilities in one of the first faculty meetings after the earthquake. This policy likely contributed to MLML's success as it became one of the few institutions that continued to serve the student population interested in doing field based marine science.

This faculty distribution was reflected in the curriculum, especially the core requirements for the MLML MS Degree as modified in 1984. It also had the unexpected consequence of achieving a certain balance between enrollment and funding. When a permanent faculty member took leave, went on sabbatical, or was Director (in the case of Dr. Gary Greene), a priority was to continue their classes using Adjunct or temporary faculty, or the Visiting Faculty position. Each permanent faculty member was expected to have a good, general knowledge of their academic area to support teaching and graduate advising, but also might contribute special expertise (e.g., Dr. Harvey in statistics). While the majority of graduate applicants were interested in working on biological questions, the MS degree required these students take oceanography courses, increasing enrollment and interest in oceanography. On the other hand, the oceanographers usually obtained larger grants, and consequent overhead returns benefited the "biologists." As oceanographer Dr. Broenkow would good naturedly point out, "We bring in the money, you bring in the students."

Faculty breadth provided opportunities for interdisciplinary research and the expertise to support the variety of classes. Faculty depth was enhanced by visiting scientists, temporary faculty, and a growing group of resident MLML adjunct faculty. The latter, including Dr. Kenneth Coale and former MLML students Drs. Valerie Loeb and John Oliver, taught classes and helped mentor and support graduate students. Depth was also enhanced by the generosity of faculty at other educational and research institutions in the area who were always willing to give seminars, serve on graduate committees and provide advice to MLML students. These faculty also regularly interacted with the MLML faculty, helping fill within-discipline collegial niches unavailable within the small MLML faculty. The number of external faculty increased with the opening of the Monterey Bay Aquarium in 1984, and the Monterey Bay Aquarium Research Institute in 1987. These, along with the establishment of the Elkhorn

Slough Estuarine Sanctuary in 1979 and the Monterey Bay National Marine Sanctuary in 1992, also increased opportunities for collaborative research and student employment.

Curriculum development was done by the faculty with changes requiring approval by the Governing Board. Changes also had to be approved through the committee and administrative structure of each consortium campus, and a primary responsibility of Governing Board members was to facilitate approval on their home campuses. With a growing MLML faculty able to provide the suite of courses expected of a quality MS program, and the bureaucratic difficulties of managing students and course work through the individual graduate degrees on each home campus, crafting of an MLML MS degree to be adopted by all consortium campuses began in 1978. The degree was approved by all campuses and the CSU in 1979 and the first wave of MS degree applicants arrived in the Spring 1981. Relatively minor modifications were made to the degree in subsequent years, the most significant in 1984 when the core courses General Oceanography and Marine Science Techniques were dropped and Biological, Chemical, Geological and Physical Oceanography added. The requirement for a qualifying examination was removed for students that did well in the core courses.

Graduate students were admitted to the MLML MS program with the expectation that they would obtain a major advisor soon after admission. Some (the "floaters") did not. To correct this problem the faculty agreed in 1993 that in addition to meeting the CSU admission requirements, a student had to be accepted by an MLML faculty member to be admitted to the MS degree program. In spite of temporary facilities, the degree program was very successful, with 117 graduate students enrolled in Fall 1993. In addition to the MLML MS degree, the Governing Board and especially Dr. Pam Roe, long CSU Stanislaus Board member, also strongly supported the mini-course program.

Possible expansion of the MLML consortium was frequently discussed by the MLML faculty as it might increase enrollments, provide additional funding, and facilitate interactions with additional CSU campuses with interests in marine science. Cal Poly faculty were particularly supportive, and in 1983 MLML proposed to the Governing Board that Cal Poly be invited to join the consortium. This led to an offer from the Governing Board to Cal Poly, including a \$50,000 "by-in" fee. In 1984 Cal Poly responded that they desired to join, but the "by-in" was too high. MLML and Cal Poly faculty expressed their disappointment that the joining opportunity was disappearing due to administrative squabbling over money. MLML faculty raised the issue again in 1987 and 1988, arguing that the benefits of Cal Poly and perhaps other CSU campuses joining the consortium were substantial without any "by-in" fee. In 1989 it was revealed that SJSU President Fullerton had upped the joining ante to \$120,000. Not surprisingly, Cal Poly folded. Perhaps seeing the administrative writing on the wall, but also thinking of a better way to improve marine science within the CSU, in 1988 the consortium Deans reported through the Governing Board that rather than enlarging the MLML consortium, a CSU-wide marine consortium should be established to allow student mobility among all CSU campuses. The expectation was that many of these students would end up at MLML. The Deans continued to consider this idea but, by 1995, no substantial progress was made.

Financial support for the Labs also significantly changed during these middle years. Up until the mid 1980's discussions of how to spend State equipment funds were a regular feature of faculty meetings, and there was even State support for professional

travel. This support began to decline in the late 1980's. The State budget was cut by \$160,000 (10%) in 1990-91, and by 1994-95 was less than \$1,000,000/yr. Not only were there no State funds for new equipment and supplies for classes, but cuts in faculty and staff had to be considered. The latter were avoided by not filling the geological oceanographer position -- Dr. Mike Ledbetter had been on leave, and resigned in 1992. In his external review of the 1995 MLML Program Plan, Dr. John Pearse of UC Santa Cruz characterized State funding for MLML (faculty salaries, some staff salaries, part of the library, and utilities) as "appalling."

MLML was able to persist because of financial support from grants and contracts obtained by the regular and adjunct MLML faculty and the Director. The Spring 1989 Governing Board minutes note that 70% of the overhead on MLML grants and contracts was returned from the SJSU Foundation, and Director Martin suggested that if MLML did not have this return it would not survive. Grants totaled ~\$2.5 million in 1989, and ~\$8 million in 1994. The overhead was used to support a variety of Labs operations, staff positions, and facilities development which indirectly supported educational programs, especially graduate research. The grants themselves often involved and supported graduate students. The importance of grant support was repeatedly emphasized in financial reports and by Director Martin, who even suggested in 1979 that the amount of money brought in by a faculty member should be weighed in RTP decisions. The overhead returned also provided critical funding for legal and other costs associated with rebuilding efforts after the 1989 earthquake. The MLML "Institute" was clearly essential to the MLML "Department."

Students and Spirit

The smiling faces of John Oliver, Pete Slattery and Steve Pace in the November-December 1972 issue of the Moss Landing Marine Laboratories News are a reminder from the early years that much of what MLML became was due, in currently fashionable ecological terminology, to "bottom-up" processes; the contributions of students. John et. al. were presumably taking courses, but also doing field work on MLML grants that would become part of their masters theses. In the accompanying article, it was noted that John was also the Labs' caretaker, "keeper of the keys and available 24 hrs a day." All were divers, and Steve had a major part in developing and maintaining the early MLML diving program. Pete wanted to "further classify and describe amphipods." They described their research as "Hard, but fun and worthwhile."

This involvement was maintained by overlapping generations of resident graduate students. The MLML faculty and staff endeavored to provide students with the mentoring and resources needed to reach their academic goals. This included making all MLML research facilities available for class and thesis project at no cost, a policy strongly supported by the Director and faculty. The expectation was that students would respond in kind. As Director Martin said in his welcome to new students in the October 1986 MLML Newsletter, "Much of MLML's success in recent years has come from dedicated young men and women such as yourselves. Former and present MLML students have given as much to the Labs as they have taken from it. You have the pleasant responsibility of continuing this tradition." The same Newsletter discussed how students helped clean the recently vacated old library.

Students organized into an MLML student body with elected officers, and a student representative participated in faculty meetings. They wrote a constitution and other documents in 1989 to become an official CSU student body, the Associated Student Body of MLML, and continued to seek the return of student fees from their home campuses for use at MLML. The sex ratio of the student population had shifted to 50:50 by the early 1990s.

Many MLML events, especially the annual Open House, were organized and done primarily by students. Open Houses were held every year until 1991, usually in the Spring. A modified Open House even occurred after the earthquake in Spring, 1990, held in Toro Park in conjunction with an Earth Day celebration. After a brief hiatus while facilities were sorted out, Open Houses were resumed under tents and around temporary buildings at MLML Sur in Spring 1994. The 1978 Open House attracted an estimated 4,000 visitors. Students guided visitors through research, equipment, general marine science displays, and touch tanks, and put on the marine puppet show designed and guided by MLML staff member and former student Lynn McMasters. Money for the student body was raised by selling food, some of which was cooked on the spot by student chefs such as Jim Brennan, Aaron King and many helpers, and selling student-designed MLML T-shirts and cook books. Sales at the 1988 Open House generated a net \$8,000. Students also organized the MLML weekly seminar series and the welcomes for new students each semester.

Beginning at least by 1985 and until 1995 when taken over by the Friends of MLML, students also edited and produced the MLML newsletter. Records are incomplete, but Andrew DeVogelaere edited at least 9 issues (as the Moss Landing Marine Laboratories News, then The MLML Monthly and then MLML Newsletter), Aaron King at least 10 issues (as the MLML Newsletter and then the MLML Monthly Log), and Carrie Bretz and Cassandra Roberts at least one issue (as The Neptune). These newsletters variously featured news of social events, fish-of-the-month stories, interviews with students and faculty, cartoons, marine crossword puzzles, and comments on student life. Articles in 1985 reported that 130 people attended the Second Annual MLML Christmas Party and an MLML St. Patrick's Day Party at the Elkhorn Yacht Club, an ever popular venue for student organized MLML parties. Granite Canyon won the "Bone & Ball" trophy at the 4th Annual Monterey Bay Marine Volley Ball Tournament, but the trophy was regained by MLML the next year. A newsletter article congratulated the team "for bringing the baculum home!" A 4th of July party and a spontaneous Friday afternoon beer tasting were also discussed. Polychaete Punch (ETOH + cranberry juice) was sometimes provided by benthic students at spontaneous gatherings in the late 1970s. An Annual Halloween Party (with music by J.D. and the Nightshift in 1986) and semi-annual MLML Intra-Mural Bowling Tournaments still occur. The latter began as a challenge to the shop staff from the faculty and quickly included student teams. The winners inherit a barnacle-incrusted bowling trophy found at the bottom of ML harbor. Faculty and staff were commonly well represented at these social and "athletic" events.

The newsletters also printed interviews with departing students who passed along advice and traditions. In the February, 1985 newsletter, Dave Anderson commented on what he considered a decline in student spirit and advised: "Don't just come in, do your thing, and split, but know everyone, communicate, share work, have fun." This included submitting articles to the newsletter. Editor DeVogelaere reported in June 1985: "The

editor has heard grunts like, Why isn't there more in the paper about the _____ lab? We are happy to print anything you want in your paper."

Beginning in 1979 additional student financial support became available through a small grants program funded by the Packard Foundation. Any MLML graduate student with an approved thesis proposal could apply for up to \$500 to use for research expenses and travel to scientific meetings to present their research. Further support arrived in 1987 through the Earl and Ethel Myers Oceanography and Marine Biology Trust. This trust provided modest funds for research through an annual competition among marine science students at institutions around Monterey Bay. A total of \$20,000 was divided among the 17 MLML students receiving "Myers Grants" in 1989. Memorial funds from the families of student Kim Peppard who died during a diving accident in 1984, ship crew member Ray Cannon who was killed in an accident on the Pt. Sur in 1987, and friends and family of Dr. John Martin were also established to support students.

There were occasional student complaints. One of the most persistent was the 4+ years it often took to complete a masters degree. Was this because students and faculty set the unwritten standard of peer reviewed publication for thesis research (often as a co-authored publication with the major advisor as encouraged by Director Martin)? Length of time required for field work? Many students had to work to support themselves during at least part of their graduate student tenure? Students taking advantage of a variety of classes and research opportunities that were not required? The social events? There was a suggestion that post-earthquake fragmentation of MLML was causing a further increase in the time to finish the MS degree. Perhaps, but if so and with similar yearly enrollments, one might expect a decline in the number of students/year finishing degrees after the earthquake. The mean number of students finishing/year in 1984-88 was, however, not significantly different from that in 1991-95 ($t = 0.3$, $p = 0.39$). No doubt there were multiple causes for time to completion that varied in importance for each student. On the positive side, over 250 students completed masters degrees between 1978 and 1995

Success

MLML was a success in the Middle Years, becoming nationally and internationally recognized for the accomplishments of its faculty and students. As noted in the 1995 MLML Program Plan, the average faculty member published 3-5 peer reviewed papers/year, commonly served as a peer reviewer and on numerous professional committees, and supervised 11 graduate students, all while also meeting CSU teaching responsibilities. The regular and adjunct faculty were raising over \$8 million in external research funds. Between 1990 and 1994 MLML graduate students received 12 awards for presentations at scientific meetings, their thesis research was commonly published in peer reviewed journals, and they were readily accepted into PhD programs or hired in marine related fields. In his review of the 1995 MLML Program Plan, Dr. John Pearse concluded, "It is clear that the major asset of MLML is the faculty." History shows that the value of this asset and the creation of opportunities for success were a result of the collegiality and commitment of the entire MLML community, The MLML Spirit.

Sources

The primary sources for this portion of the MLML History were Governing Board Minutes, MLML newsletters, the 1977 Academic Master Plan, the 1995 MLML Program Plan, documents associated with post-earthquake reconstruction, and information compiled for the 40th Reunion. The archived minutes from Faculty Meetings are incomplete and those available are often difficult to decipher handwritten notes. The few typed summaries were useful. Memories of the author as well as other members of the MLML community present during the period were also consulted, with the caveat that accuracy may be compromised by the longevity required to have 'been there.' Thanks to Greg Cailliet, Linda Martin and Joan Parker for comments on an early draft.