



# MOSS LANDING MARINE LABS

COVER PAGE

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*July 1, 2017 to June 30, 2018*

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*Prepared by (indicate lead and other contributors)*

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*JIM HARVEY AND KATHLEEN DONAHUE*

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*Approved by  
SJSU PRESIDENT MARY PAPA ZIAN  
(19 October 2018)*

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## 1 Executive summary

Moss Landing Marine Laboratories (MLML) serves the mission of the CSU by providing a world-class M.S. degree program in marine sciences, which incorporates a diverse and engaging educational program with dynamic and integrated research activities. San Jose State University serves as the administrative campus, provides most of the funding to support MLML, thus SJSU President Papazian has the ultimate oversight of MLML. Because the curriculum is offered through all seven consortium campuses, the Governing Board and the individual campuses have oversight over the courses offered. The Director of MLML is a MPP position and serves at the pleasure of the SJSU President.

Undergraduate and graduate students have access to an array of courses and research facilities that are supported by a dedicated faculty and staff. MLML serves the mission of the CSU by supporting student innovation, self-discovery, critical thinking, and community involvement. In the past year, MLML has secured 53 grants totalling \$10 million in contracts and grants from Federal, State, and Private funding sources. Private funds totalled \$477,922 during the year, of which \$29,250 were distributed as student awards to 23 students.

In 2017/18, 17 students finished their M.S. degrees as advised by MLML faculty, and MLML students and graduates continue to receive prestigious awards and jobs (Alum Cyndi Dawson named Exec. Dir. Of O'Neill Sea Odyssey, student Amanda Heidt is this year's KQED Fuhs Science Communication Fellow, student June Shrestha interns at the NOAA Sanctuary Office in Monterey). MLML personnel published 58 scientific papers this past year. MLML has always provided a number of community services including the annual MLML Open House that in spring 2018 hosted 2,500 of the public to learn about marine science and the labs. MLML engages with the public via the student-generated blog that is considered one of the best marine science blogs in the U.S., community tours, and sponsoring numerous community events.

In the past year we have greatly expanded our activities at the MLML Aquaculture Facility, with the arrival of 36 new research tanks, involvement of three industry partners, securing two new research grants, and hosting a two-day meeting of 135 people from the U.S. and International to discuss the future of aquaculture for California:

(<https://www.mlml.calstate.edu/aquaculture/pathways-toward-responsible-aquaculture/>).

MLML successfully recruited three new faculty members: Dr. Max Grand - Chemical Oceanography, Dr. Amanda Kahn - Invertebrate Ecology, and Dr. Luke Gardner - Aquaculture).

## 2 Achievements against strategic plan milestones

### ● Objective 1: EDUCATION AND STUDENT SUCCESS

- A. Shorten the time to M.S. degree  
B. Increase the diversity and number of students we serve

No.	Activity	Outputs/ milestones	Completion date	Comments
1.1	Increased accountability	Fully implemented thesis proposal symposium each Fall semester for graduate students who have finished course work but do not have an approved thesis proposal	Fall semester 2017.	These changes have accelerated the time to graduation and students have expressed their support of the new structure.
1.2	Streamlined core courses	Continuing discussion how we can streamline core courses	Not Completed	This goal is going to take some time and will require the assistance of SJSU and the CSU regarding revising the MLML M.S. degree requirements.
1.3	Weekend, summer and online courses	MLML welcomed an undergraduate Biology class from CSU East Bay for a weekend field course in Dec 2018	December 2018	Professor James Murray, Biological Sciences, CSU East Bay
1.4	Creation of an aquaculture program	Marine Botany course and Bio of seaweeds in Spring 2018 covered some aspects of seaweed aquaculture	May 2018	Taught by Professor Michael Graham, Phycology  New aquaculture course to be offered in Spring 2019 by Dr. Luke Gardner
1.5	Increased student funding	New donations received from the Anthropocene Institute and Simpkins family	Summer 2018	We have increased donations for student research support, employment, and general student support

### ● Objective 2: RESEARCH

- A. Improve and expand our research activities

No.	Activity	Outputs/ milestones	Completion date	Comments
2.1	Faculty empowerment and research initiatives	Two new research grants related to aquaculture; new Research Affiliates adding research capabilities	Summer 2018	The aquaculture initiative at MLML is gaining steam with new grants and proposals in place, a new researcher hired, and active expansion of the aquaculture facility.
2.2	Integration of research faculty	Appointed Dr. Colleen Durkin,	June 2018	We encourage the Research Faculty to assist with some classes, which

	into academic program	member of Research Faculty to teach Phytoplankton/Bio Oce course AY18-19.		increases their exposure to the students and enhances possible research opportunities.
2.3	Institute for Marine Science	Not completed		This goal cannot be achieved until the MLML administrative campus issue is resolved.
2.4	Faculty Recruitments	Appointed a new Chemical Oceanographer starting AY18-19 and an Invertebrate Zoologist starting AY19-20	March 2018	Dr. Max Grand, Chemical Oceanographer and Dr. Amanda Kahn. Invertebrate Zoologist (and MLML alumnus)

● **Objective 3: SOCIETAL BENEFITS**

No.	Activity	Outputs/ milestones	Completion date	Comments
3.1	New and increased public education	Increased outreach and presence at conferences and events throughout the Monterey and SF Bay area	See 8.4 Community Impact, Outreach AY17-18	Our new social media presence and updated website has gained more attention, resulting in more requests for outreach and education activities. MLML has connected with local senior groups and garden clubs who now schedule tours on a regular basis
3.2	Enhanced online presence	MLML Website redesigned	October 2017	Working on a new online GE course in marine science
3.3	K-12 Educational Modules	Not completed		This goal cannot be achieved until the MLML administrative campus issue is resolved.
3.4	New and strengthened partnerships	New partnerships with aquaculture industry	Summer 2018	We have two new industry partners, and new funding via these partnerships.

● **Objective 4: INFRASTRUCTURE AND FUNDING**

- A. Improve and expand MLML's infrastructure
- B. Improve structural hurdles in MLML's financing

No.	Activity	Outputs/ milestones	Completion date	Comments
4.1	Continued development of MLML's properties	Permit applications submitted to the Monterey County Planning to begin 3-phase plan to develop the Del	February 2018	This development plan will require County approval, followed by CA Coastal Commission approval and then US Army Corps of Engineers, Monterey Air Pollution and Control, Monterey Regional Water District and Moss Landing Harbor District

		Mar wharf property		
4.2	Continued development in County planning	Established connection with permit technicians and educated on all regulations and requirements for development in Moss Landing.	February 2018	Monterey County Resource Management Agency. Jurisdiction over properties determined.
4.3	Staff development	We encourage staff to take additional training.	Not completed	We have one staff member that is planning on taking a training course this coming AY.
4.4	Greater generation of indirect cost revenue	Not completed		This goal cannot be achieved until the MLML administrative campus issue is resolved.
4.5	Philanthropic development	Anthropocene Institute and Simpkins family	Summer 2018	Donation received to conduct Aquaculture research, restore Olympia Oysters in local wetlands and endowment established to support students and to develop Aquaculture Center

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## 3 Impact

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### 3.1 Scientific impact

MLML Tenure Track Faculty, Research faculty members and Research Affiliates published 58 peer reviewed papers and 2 books in AY17-18. Some highlights: Professor Jon Geller, Invertebrate Zoology Lab made the cover of SCIENCE magazine with his project on rafted debris from the 2011 Japanese tsunami. Professor Ivano Aiello participated on an international cruise to collect deep-sea cores off the coast of Chile. Professor Mike Graham continues as the Editor in Chief for the Journal of Phycology, the largest Journal regarding seaweeds in the world. Professor Scott Hamilton participated in a research cruise to Palau to study remote coral reefs.

#### **Director Jim Harvey, Vertebrate Ecology**

- Published seven scientific papers, one of which was one of the most cited papers in marine mammal science this past year.
- Continued his collaboration with NOAA scientist Scott Benson to tag and track endangered leatherback turtles to better understand habitat requirements.

#### **Professor Ivano Aiello, Geological Oceanography:**

- National Science Foundation, Major Research Instrumentation Acquisition of X-Ray Diffraction Instrumentation for Mineralogical Research.
- IODP Expedition cruise studying the Chilean Margin, December 2018.

**Professor Tom Connolly, Physical Oceanography:**

- Dr. Connolly is lead PI on a new NSF-FSML award “High-resolution sensing of nitrate in Monterey Bay and surrounding waters.”
- Dr. Connolly is lead PI on three other ongoing projects: Surface waves and transport over the inner shelf (NSF Physical Oceanography), Remote forcing of seasonal currents in the California Current System (COAST Grant Development Program), and a subaward to MLML investigators in the Central and Northern California Ocean Observing System (NOAA-IOOS).

**Professor Kenneth Coale (Emeritus a/s Spring 2018), Chemical Oceanography**

- Characterizes distribution and cycling of trace metals and major nutrients in coastal and open-ocean environments
- Continued collaborations with Monterey Bay CeNCOOS and deployment of trace metal sensors

**Professor Jon Geller, Invertebrate Zoology:**

- NSF PIRE grant and two ongoing CA Dept of Fish and Wildlife projects

**Professor Michael Graham, Phycology:**

- Continued as Editor in Chief for the Journal of Phycology
- Integrated aquaculture
- Kelp morphology
- Physiology of kelps in a changing climate

**Professor Scott Hamilton, Ichthyology:**

- With a CA Sea Grant, is solving impediments to the co-culture of seaweeds and shellfish; Industry collaborators: Hog Island Oyster Company, Monterey Abalone Company). For this project he is testing with co-culture of seaweeds and shellfish can buffer seawater pH and improve the conditions for shell calcification and growth of abalone and oysters during the early nursery phase, when they are most vulnerable.
- He is constructing a new ocean acidification and hypoxia laboratory at the shore lab to test the effects of climate change on embryo development, fish larvae, and the behavior and physiology of temperate fishes.
- He is completing two large projects investigating life history and demographic variation in commercially important fish species (lingcod and canary rockfish) along the U.S. West Coast to aid fisheries management, in collaboration with sportfishing vessels and volunteer anglers.
- In July 2017, he participated in a research cruise with colleagues from Scripps Institution of Oceanography to survey remote coral reefs of the nation of Palau as part of the 100 Island Challenge initiative.

**Katie Lage, Librarian, Faculty Member:**

- Planned building of an augmented reality sandbox
- 3D scanning of natural history museum collections
- History of MBARI's seafloor mapping

**Professor Gitte McDonald, Vertebrate Ecology:**

- “Collaborative Research: At-sea experimental disturbance to characterize physiological plasticity in diving northern elephant seals”
- National Science Foundation: Division of Integrative Organismal Systems

**Professor Nick Welschmeyer, Biological Oceanography**

- Continued partnership with Cal Maritime on ballast water research
- Research cruises in Summer 2018 between Australia and Pacific Northwest

**Professor Emeritus, Dr. Greg Cailliet, Ichthyologist**

- Rewriting the 1986 book, "Fishes: A Field and Laboratory Manual on their Structure, Identification and Natural History".

**Professor Emeritus, Dr. Mike Foster, Phycology**

- Current research follows temporal variation in the intertidal zone along with occupation by invasive seaweeds
- Future studies will look at efficacy of eradication

**Dr. Colleen Durkin, Biological Oceanographer, Research Faculty**

- NASA EXPORT cruise. Dr. Durkin will serve as one of the co-PIs on a project that aims to link sinking particle chemistry and biology with changes in the magnitude and efficiency of carbon export into the deep ocean. The project aims to improve carbon cycle and climate science with more accurate interpretation of satellite data.
- Continued research involving capturing sinking cells and particles in sediment traps

**Dr. Dave Ebert, Pacific Shark Research Center, Research Faculty**

- Served as subject matter expert and consultant on Monterey Bay's Great White Shark population
- Appeared on National Geographic, Discovery Channel's Shark Week, BBC's Blue Planet II, BBC World Service and ABC's Good Morning America
- Continued research on sharks, rays and chimaeras in South Asian seas

**Dr. Luke Gardner, CA Sea Grant Aquaculture Specialist, Research Faculty**

- Research focuses on leveraging advanced technologies to improve aquaculture and alternative feeds
- Participated in Olympia Oyster restoration in the Elkhorn Slough

**Dr. Val Loeb, Ichthyologist, Research Faculty:**

- Inclusion in an NSF funded project "*Small-scale Biological and Physical Variability at Midwater Depths in the Eastern Tropical North Pacific Oxygen Minimum Zone*".

**Dr. Iliana Ruiz-Cooley, Marine Ecologist, Research Faculty**

- Investigates foraging strategies of species, migrations, habitat use, food web dynamics and climate variation
- Uses stable isotopes of bulk tissues and individual amino acids
- Research is conducted in the Gulf of CA, Gulf of Mexico, CA current, Peru, Chile and tropical Pacific.



**Dr. G. Jason Smith, Environmental Biotechnology, Research Faculty**

- Celebrated 20 years with MLML
- Funded by the Gordon and Betty Moore Foundation, NOAA NCCOS and CenCOOS
- His expertise centers on the study of the molecular physiological ecology of marine algae using a diverse array of technologies

**Dr. Rick Starr, Fisheries Biologies, Research Faculty:**

- Awarded a \$600,000+ grant to expand their successful California Collaborative Fisheries Research Program (CCFRP) to the entire state. There are now 3 CSUs and 2 UCs involved in the project.
- Continued work with the Monterey Bay Aquarium Research Institute (MBARI), The Nature Conservancy, and NMFS to develop new video tools to survey fishes in high-relief rock habitats on the US West Coast.

**Dr. Diana Steller, Algal Ecology and Scientific Program Instructor & Safety Officer, Research Faculty**

- Research focuses on algal/animal interactions in rhodolith, kelp, sea grasses and microalgal systems in Gulf of CA, Catalina Island and Canada
- Taught Scientific Diving course in Fall 2018, held ocean exploration workshops and dives every Friday throughout the AY.

**Dr. Alison Stimpert, Vertebrate Ecologist, Research Faculty**

- Characterization of noise impacts of demersal fish survey vehicles, in collaboration with NOAA
- Served as MLML Visiting Scientist AY17-18. Developed and improved the MLML Seminar series
- Research on noise effects of navy sonar on cetaceans in Southern California
- Untrawable Habitat Strategic Initiative (UHSI) cruise, Channel Islands, CA
- Risso's dolphin social and acoustic behavior in Monterey Bay
- COAST Grant Development award to A. Stimpert for humpback whale acoustic research in Monterey Bay

**Dr. Scott Benson, Marine Biologist, Research Affiliate and NOAA**

- Marine turtle ecology and assessment
- Informs domestic fisheries, international partners about leatherback habitat use in coastal and offshore waters
- Level III member of MLML's Whale Disentanglement Team

**Ross Clark, Director, Central Coast Wetland Group, Research Affiliate**

- PG&E treatment wetland and multi-chamber bioreactor installed and put to use
- Salinas River State Beach dune restoration
- Monterey Bay sea level rise vulnerability study
- Coastal confluence monitoring

**Dr. Karin Forney, Marine Mammal Biologist, NOAA, Research Affiliate**

- Setting up statistical models of marine mammal density relative to habitat use
- CA current ecosystem surveys
- Building Humpback Whale models from data collected between 1991 to 2008.

**Wesley Heim, Project Director, Marine Pollutions Study Lab, Research Affiliate**

- Contracts with agencies to provide sample and collection analysis data verification and validation, visualization, and implementation of water quality assurance
- Improving understanding of how contaminants move through the environment with focus on mitigation

**Dr. Kimberly Null, Chemical Oceanographer, Research Affiliate**

- Groundwater discharge to surface water; water quality impairments
- Monitoring flow, freshwater and nutrients in Moro Cojo Slough (Moss Landing)
- Fate and transport of nutrients in central CA watersheds
- Characterizing meltwater fluxes to coastal ecosystems in Antarctica

**Mark Yarborough, Principal Investigator, MOBY, Research Affiliate**

- The marine Optical BuoY (MOBY) is a NOAA funded project to provide vicarious calibration of ocean color satellites.

**Dr. Jenifer Zeligs, Principal Investigator, SLEWTHS, Research Affiliate**

- Long term care facility for sea lion mixes education and research
- CSUMB undergrad courses in Marine Mammal training, including online courses and distance learning courses with ver 42 colleges and universities around the world
- Public outreach includes beach cleanups.
- Awarded 3-year grant from Office of Naval Research to study sea lion mobility
- Nominated for an animal welfare excellence award

**Drs. Qing Wang and Denny Alappattu, Naval Postgraduate School, Adjunct Faculty**

- Collaborates with Dr. Kenneth Coale, Chemical Oceanography and Office of Naval Research
- Understanding the physical and chemical mechanisms of fog formation and evolution and its associated boundary layers
- Understand the impact of the marine atmospheric boundary layers on radio/radar communications and free-space optical propagation
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## **3.2 Financial impact for CSU**

Indicate whether affinity group projects generated revenue beyond grant funding

**MLML Classroom and Seminar Room Rental Revenue: \$2,800**

**MLML Merchandise Store: \$4,762**

**Sandholdt Housing Rentals: \$32,240**

**Del Mar Wharf Property Rental: \$96,000**

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### 3.3 Student success impact

As an institution within the CSU, MLML aims to impact student success and encourage state, national, and international student enrolment. MLML students demonstrate such success through scholarships earned, grant awards, and professional recognition within the field of marine sciences.

#### **AY17-18**

- 19 new students started the MS program
- 17 students graduated from MLML with a MS
- 86 MS students enrolled from consortium campuses during the Fall semester and 74 during the Spring semester
- 14 undergraduates took courses at MLML
- 23 scholarships were awarded to MLML MS students totalling \$29,250
- 9 students received COAST awards totalling \$18,246
- 6 students received CA Sea Grant awards and fellowships

#### *VERTEBRATE ECOLOGY LAB GRADUATE STUDENTS*

- Sharon Hsu travelled to Paramisa, Costa Rica for a four-month field season studying Leatherback Turtles in Paramisa.
- Katie Harrington completed two field seasons in the Falkland Islands studying the impact of a human settlement on the behaviour of endangered caracaras.
- Heather Barrett was awarded SJSU Alumni Associations Dean's Award.

#### *INVERTEBRATE ZOOLOGY LAB GRADUATE STUDENTS*

- Amanda Heidt, graduate student in the Invertebrate Zoology Lab was selected as the 2018 KQED-CSUMB Fuhs Science Communication Fellow. She will host a show on KQED called "Deep Look" which was also entered into the San Francisco 2018 International Film Festival.

#### *ICHTHYOLOGY LAB GRADUATE STUDENTS*

- June Shrestha was selected as a 2018 CSU COAST summer intern with the NOAA Office of National Marine Sanctuaries in Monterey Bay. She will be working side-by-side with sanctuary regional managers on a new project, "Connections between National Forests and National Marine Sanctuaries". The purpose of this project is to explore and describe the connections between National Forests and National Marine Sanctuaries of California to advance land-sea conservation by better understanding the interconnectedness between terrestrial and marine ecosystems.

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### 3.4 Community impact

A major vision of MLML lies within its ability to strengthen the local Moss Landing community, along with the larger state, national, and international communities. As a member of the CSU, all of MLML's research is done in this spirit of advancing knowledge of the marine sciences and to promote sustainable ocean systems. The MLML community impact relies on the outreach of students, faculty, and staff.

MLML is a member of the Moss Landing Chamber of Commerce and participates in all public meetings conducted by the County of Monterey regarding Planning and Development of Moss Landing, California and its harbor. Additionally, MLML continues its positive relationship with neighbouring oceanographic institute, the Monterey Bay Aquarium Research Institute (MBARI) by collaborating on research projects, sharing

scientific subject matter expertise, maintaining security and sharing use of boats and dock space.

MLML strives to promote community integration, communication, and environmental recognition as both an academic and research facility and through the professional accomplishments of its faculty. MLML gave 31 tours to K-12 classes, Camp SeaLab summer camp, Mission Bay High School's Advanced Marine Science class that spent the weekend at MLML, an undergraduate Biology class from CSU East Bay, local Garden Clubs, senior groups, and Monterey Bay tour groups.

The MLML Annual Open House is a well-known event in the Monterey Bay area and draws visitors of all ages from across the state, consortium campuses and family and friends. It is put on by MLML students and supported by staff, faculty, and researchers, and welcomed 2,500 visitors over two days and generated \$13,400 for the MLML Student Body from fundraising, a raffle, silent auction and bake sale and BBQ. MLML welcomed 40 different groups in the Seminar Room and classrooms. These groups provided MLML with \$3,600 in rental revenue for the use of the rooms, an amount directly used towards lab operations and facility maintenance. MLML endeavours to host community organizations for free and only charges fees when necessary to maintain the facility and to earn funds towards a kitchen remodel.. Users included CSUMB, Monterey National Marine Sanctuary, Central Coast American Red Cross, Congressman Jimmy Panetta, Assemblyman Mark Stone, Elkhorn Slough National Reserve, The Marine Mammal Center, CA Strawberry Commission, CSU Emergency Planners, North Monterey County Unified School District, CA State Department of Toxic Substance Control, USDA Natural Resources Conservation Service, Sea Otter Savvy Program, Oil Spill Response and Wildlife Care Network's "Oilpalooza", NOAA Whale Entanglement Team, Monterey Bay Economic Partnership, Monterey County Planning Agency, Trout Unlimited, CA Dept of Fish and Wildlife, CSU COAST, Save Our Shores, Monarch Senior Services, Watsonville Police Dept., Monterey Bay Aquarium Watch Program, Society for Sedimentary Geology, North Monterey County Chamber of Commerce, and the Pacific Grove Natural History Museum.

MLML understands the importance of raising awareness of oceanic life through public education and takes advantage of community-based platform opportunities to do so. MLML was considered the most popular booth when it participated in Monterey Whale Festival 2018 by displaying specimens from our Biological Collection ranging from shark jaws to jarred fish and marine mammal skeletons and hides. MLML's Pacific Shark Research Center participated in the California Academy of Sciences Sharktoberfest in October 2017, where it displayed specimens and gave presentations about shark research. MLML also invites outside researchers from The Elkhorn Slough Foundation to use the Biological Oceanography lab every week for continued collaboration on wetland restoration and aquaculture.

Faculty also play a distinct role in MLML's community impact strategy. Professor Emeritus, Dr. Mike Foster, Phycology served on the Advisory Committee of the Salinas Valley GroundWater Sustainability Agency. Professor Emeritus Greg Cailliet served as President of the Cannery Row Foundation Board of Directors whose mission is to preserve historical sites along Cannery Row in Monterey. Professor MacDonald of the Vertebrate Ecology lab served as a judge for CSU Monterey Bay's Marine Science Department undergraduate poster session and MLML's Environmental Health and Safety Officer, Jocelyn Douglas served her 6<sup>th</sup> year on SJSU's IACUC Board and joined the SJSU's College of Science Safety Committee.

### **OUTREACH AY17-18:**

- National Ocean Science Sea Lion Bowl 2018, CSUMB, judges
- Monterey Academy of Oceanographic Science at Monterey High School, intern assigned to the Aquaculture Center
- MLML Science, Learning and Education with the Help of Sea Lions (SLEWTHS) held public presentations, workshops and presentations throughout the AY.
- Leatherback Sea Turtle Week 2017, MLML hosted opening night mixer and provided informational booth over the weekend at the Monterey Bay National Marine Sanctuary Exploration Center in Santa Cruz.
- MLML welcomed RADM John White, President and CEO from the Consortium for Ocean Leadership for a tour and presentation, summer 2018.
- MLML hosted an undergraduate Biology class from CSU East Bay for a weekend field course, December 2017.
- MLML hosted Mission Bay High School's Advanced Marine Biology class for a weekend course and field trips.
- York High School Science Fair 2018, judges.
- MLML was sponsored by the Santa Cruz Warriors (NBA D-League) who hosted "MLML Night".
- MLML welcomed the Palo Alto Brownie troop for a tour, SLEWTHS workshop, beach cleanup and activity for troops to earn Environmental Hero badges.
- Sierra Helman, MLML graduate student in the Biological Oceanography lab played Julia Platt in [Monterey Bay Aquarium](#)'s summer production of "*Turning the Tide: The Story of Monterey Bay*". Julia Platt was responsible for setting aside Marine Protected Areas in Monterey Bay.
- Vicky Vasquez, graduate student with the Pacific Shark Research Center was Vice Chair of San Francisco's World Oceans Day June 6, 2018.
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#### **3.4.1 Economic impact**

As an internationally recognized institute of marine sciences, MLML requires a broad economic strategy to maintain its academics, research lab and expeditions, and the maintenance of six properties. During AY17-18, MLML submitted 53 proposals totalling \$13 million. For its 9<sup>th</sup> year, MLML operated on a \$3.5M budget from the State, \$50K of which was allocated to continue funding student assistants to support our IT department and Operations and to fund 25% of the salary for a California Sea Grant Aquaculture Specialist.

To qualify and remain competitive for grant revenue, MLML must remain on the cutting edge of innovation because the scientific discoveries and investigations generated by MLML link powerfully to local, regional, state, national and international economics. For example, understanding the effects of climate change, shoreline erosion, and overfishing informs diverse populations about regulating local fisheries and assessing shoreline communities and assets. MLML was awarded 53 grants totalling \$10 million. This generated \$1.9 million in F&A revenue, of which MLML was returned \$67k; \$190k in administrative support for facilities and administration with a one-time supplement from the SJSU Research Foundation of \$125k to assist MLML with major shortfalls from grant F&A revenue.

#### **3.4.2 Social impact**

MLML advocates on behalf of the marine sciences and oceanic life, and how the health of our oceans, coastlines, and sea life directly impacts society and the quality of individual lives. As such, it is vital MLML continue efforts to highlight our exemplary research efforts through volunteer opportunities, traditional and social media, and through increased brand-marketing.

MLML's research activities throughout AY17-18 served to raise awareness and influence such societal issues as fisheries management, impacts of climate change, pollution from anthropogenic sources like microplastics, agricultural runoff and ballast water release from ships, and developing sustainable aquaculture methods. Also, MLML staff, faculty, researchers, and students volunteered with the Marine Mammal Center, Monterey Bay Aquarium Research Institute's Open House, and as divers for the Monterey Bay Aquarium. Additionally, representatives from MLML visited local K-12 schools, Rotary Clubs, and the SPCA.

Oceanographic Technician, Jason Adelaars received the Wendell Ayers Memorial Leadership Award from the Monterey Bay Aquarium. This award recognizes one volunteer diver each year for their accomplishments in ocean advocacy and conservation efforts.

We continue to expand our reputation within and outside of the scientific community by emphasizing MLML, SJSU, and CSU-branding on posters, papers, and during presentations. The MLML media presence consistently and regularly highlights and reinforces the dedicated work of MLML faculty, students and researchers. The MLML Graduate Student blog, "The Drop In," communicates individual student research and achievement and continues to gain popularity and success with our friends and the public.

### **3.4.3 Environmental impact**

MLML has contributed financially to the development of an EIR in conjunction with the Monterey County Moss Landing Community Plan. More than 10 years ago the Monterey County began the process of developing a community plan for the Moss Landing area. Because MLML has development plans (e.g. Academic Village, Del Mar wharf and marine operations, Aquaculture Facility) MLML has been actively participating in the Community Plan process. There will be environmental impacts associated with any of these proposed development plans, but we are years away from the community plan being completed, permits acquired, construction planning and funding established, and construction beginning.

#### **NOAA Whale Entanglement Team**

MLML was one of the first participants that helped establish a network of people from federal agencies, academia, the fishing industry, and local citizens to respond to whale entanglements off central California. The group, initially called the Whale Entanglement Team (WET), received training and advice from NOAA personnel. With the the help of a number of local NGOs, critical gear was purchased that greatly facilitated the dangerous process of disentangling a whale. Currently MLML supports the disentanglement efforts with meeting spaces, vessels, and trained personnel that participate directly in removing whales from fishing and other gear.

#### **BeachCOMBERS**

MLML's Vertebrate Ecology Lab manages BeachCOMBERS, a regional team of 75 trained public volunteers that monitors beaches from central California to Mexico, counting and surveying dead and stranded marine mammals, birds and turtles. MLML Research Affiliates Dr. Scott Benson and Dr. Karin Forney received the prestigious Monterey Bay National Marine Sanctuary's Volunteer of the Year Award for over 20 years of beach surveys for the BeachCOMBERS program in Monterey.

#### **Aquaculture**

MLML has begun a large effort to promote sustainable aquaculture in California, in collaboration with local, state, national, international and private partners to develop responsible methods for seafood production. With a generous donation from the Anthropocene Institute, Steven Cunningham, a graduate student in the Phycology Lab, was hired to summarize work on the fish-free-feed (F3) project, the primary goal to minimize the amount of fish removed from the sea to feed fishes in aquaculture settings.

MLML also has partnered with the Elkhorn Slough National Estuarine Research Reserve to bring back the native Olympia Oyster population. MLML is providing the hatchery and nursery expertise to spawn young oysters that will be transplanted into Elkhorn Slough in October 2018.

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### 3.5 Communication and dissemination activities

MLML is dedicated to increasing positive impacts on the climate and local, national, and international ecosystems. Communication, via journal articles, lectures, research, and online are all vital pieces to achieving this type of positive global influence. MLML's dissemination strategy includes publishing research, enhancing online presence and accessibility, participating in lectures and seminars, and faculty involvement in committees or other events within the scientific community.

As a result, MLML was involved with numerous positive communication activities. A total of 58 articles and papers and 2 scientific books were authored and co-authored by MLML Faculty and Research Affiliates. The MLML faculty and research community were members of several organizations and committees: Monterey Area Research Information Network for Education (MARINE) and the Monterey Bay National Marine Sanctuary Advisory Committee and Monterey County Advisory Committee (seeking ways to solve groundwater problems and saltwater intrusion in the Salinas Basin). Additionally, MLML distributed packets containing an academic report, budgets and Director's update at Governing Board Meetings in both Fall and Spring semesters.

To enhance accessibility for potential students or outside entities interested in MLML's research, scholarship, and academics, the MLML homepage was redesigned and launched during Fall semester. It is now more user-friendly, informative, and functional.

Faculty, researchers and students led many efforts to both increase and enhance MLML's outward facing communication. Dr. Connolly co-organized the 62<sup>nd</sup> annual Eastern Pacific Ocean Conference in September 2017. Dr. Connolly also co-chaired a scientific session on continental slope processes at this conference, in addition to presenting research on the dynamics of the California Undercurrent and biogeochemical variability in Monterey submarine canyon. Physical Oceanography graduate student, Patrick Daniel presented research on nearshore chlorophyll events at the Eastern Pacific Ocean Conference. Dr. Jenifer Zeligs, SLEWTHS and Research Affiliate presented her research and care methods at the IMATA conference in Mexico and at the 22<sup>nd</sup> biannual SMM conference in Nova Scotia. Vicky Vasquez, graduate student Pacific Shark Research Center gave a presentation about the effects of oil pollution in the SF Bay Delta region at the Soil Not Oil conference in San Francisco. Professor Emeritus, Dr. Greg Cailliet gave a presentation for the Carmel Foundation and Monterey Whalefest 2018, "*Below Pacific Tides*". Dr. Diana Steller, Phycologist and Scientific Diving Safety Officer presented at the 6<sup>th</sup> International Rhodolith Meeting in France, summer 2018. Katie Lage, Faculty Librarian presented at the 43<sup>rd</sup> Annual International Association of Aquatic and marine Science Libraries and Information Centers (IAMSLIC) Conference October 2017. Holly Bower, Research Affiliate was elected co-Chair of the National Harmful Algal Bloom Committee.

Dr. Dave Ebert, Pacific Shark Research Center and Research Faculty member presented at several conferences with his graduate students throughout the academic year:

- *10th Indo-Pacific Fish conference, Tahiti, 2-6 October 2017*
- *Northeast Pacific Shark Symposium, Seattle, WA, 24-25 March 2018*
- *Sharks International, João Pessoa Brazil, 3-8 June 2018*
- *Deep-sea Biology Conference, Monterey, CA 10-14 Sept., 2018*

## **PUBLICITY AND MEDIA AY17-18:**

- Matt James (former MLML student and current Professor at Sonoma State) wrote “*Darwin’s Backyard*” that was featured recently in the New York Times Book Review online.
- Director Jim Harvey interviewed by the Associated Press for article on San Francisco’s AT&T Park, “*Birds and Baseball*”, July 2017
- Dr. Dave Ebert of the Pacific Shark Research Center, along with his graduate students were featured on every episode of Discovery Channel’s *Shark Week*, and on NatGeo *WILD*. In addition, he was interviewed by ABC, KQED, KSBW, the San Francisco Chronicle and did a podcast for the Vancouver Aquarium. July 2017.
- The Redland’s Daily Facts published an article about MLML’s Invertebrate Lab project (funded by the Smithsonian Environmental Research Center (SERC) studying non-indigenous invertebrates in CA waters, using DNA work to complement morphological identification and counts, “*What Is the Best Weapon for Battling Species Invading CA Waters?*”, August 2017.
- BBC featured MLML’s Whale Entanglement team (WET) in a documentary about marine research in the Monterey Bay, August 2017.
- Professor Jon Geller, Invertebrate Zoology Lab received international publicity when his research was featured on the cover of SCIENCE magazine in September 2017. The important paper described his research on the transoceanic transportation of various marine species across the Pacific after the 2011 tsunami in Japan and its implications for dispersal and biogeography.
- Dr. Iliana Ruiz-Cooley, Marine Ecologist and member of MLML’s Research Faculty was featured in the LA Times for her paper published by Science Advances on how climate shifts are shortening food chains off the coast of CA. “*What Dolphin Diets Reveal About Climate Change’s Effects Off the California Coast*”, October 2017.
- The Monterey Herald did a cover story about recipients of CA Sea Grant awards which featured several MLML researchers, November 2017.
- KION did a segment about MLML’s Aquaculture funding. November 2017.
- Assistant to the Director, Kathleen Donahue was interviewed by KCBS and KGO NewsTalk Radio about the sewage spill in Marina, CA, January 2018.
- Dr. Colleen Durkin, Biological Oceanographer and member of MLML’s Research Faculty embarked on the NASA Earth EXPORTS cruise as co-PI on a project that aims to link sinking particle chemistry and biology with changes in the magnitude and efficiency of carbon export into the deep ocean. The group will use sediment traps to collect samples at varied depths of descent up to 500m. NASA has held several press conferences and this project has gained international notoriety. May 2018.
- Amanda Heidt, graduate student in the Invertebrate Zoology lab was selected as the 2018 KQED-CSUMB Fuhs Science Communication Fellow. Amanda will host a show on KQED called “*Deep Look*” along with one other show about scientific advances in marine science. Her productions have been entered into the San Francisco International Ocean Film Festival 2018. June 2018.



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## 4 Training and workforce development activities

### **GRADUATE PROGRAM COORDINATOR**

WASC Workshop, "Meaningful Assessment for Student Learning in Higher Education,"  
October 2017 at Mills College

UndocuAlly Training, CSUMB, March 2018

CSUMB

Office of Inclusive Excellence Core Course, "Diversity at CSUMB: How  
Diverse and Inclusive are We?", January 2018 at CSUMB

CSUMB

Office of Inclusive Excellence Core Course, "Power, Privilege, &  
Oppression", February 2018 at CSUMB

CSUMB

Office of Inclusive Excellence Core Course, "Inclusivity through  
Discrimination Prevention", February 2018 at CSUMB

CSUMB Office of Inclusive Excellence Core Course, "Race in  
America", February 2018 at CSUMB

CSUMB

Office of Inclusive Excellence Elective, "Unconscious Bias &  
Microaggression", March 2018 at CSUMB

CSUMB

Office of Inclusive Excellence Elective, "Challenging Islamophobia",  
March 2018 at CSUMB

CSUMB

Office of Inclusive Excellence Elective, "Queer & Transgender  
Inclusivity in the Workplace", March 2018 at CSUMB

CSUMB Office of Inclusive Excellence Elective, "Class  
Matters", March 2018 at CSUMB

### **SMALL BOATS COORDINATOR**

Radar Observer (Unlimited)

### **ENVIRONMENTAL HEALTH AND SAFETY OFFICER**

Applied Suicide Intervention Skills Training

DOT Hazardous Materials #1205

OSHA Hazwoper Refresher Training

Campus Safety Conference West

CITI Basic Course in Laboratory Animal Welfare for Investigators, Staff and Students

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## 5 Intellectual property (IP) and technology transfer

- a. If relevant, indicate opportunities for intellectual property and technology transfer, including status and next steps.

SJSU and SJSURF are working on a IP process for the university and we expect that this procedure would be useful for the future activities in aquaculture. We currently have three industry partners working at the aquaculture facility, and each of them has signed a Master Agreement that deals with potential IP issues. For one of the companies, MLML and SJSURF have an equity stake in their company such that IP issues are a shared responsibility between the company and MLML/SJSURF.

- b. Indicate IP training events for participants on how to protect

We have not participated in formal IP training other than discussions about IP with regards to the three companies at MLML that have signed Master Agreements.

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## 6 New activities planned for coming year

**Chamber Mixer:** MLML in conjunction with the Monterey Foundation of Monterey has organized a large community social mixer that will include Chambers of Commerce from around the Monterey Bay area, local politicians, donors, and industry leaders. The purpose of the 26 September 2018 mixer is to acquaint community leaders with MLML, with the hope that this will lead to increased monetary and political support of MLML.

**CA-Chile Conservation Summit:** MLML will be sponsoring one day of a 2-day meeting designed to have 25 Chileans and 25 Californians meet regarding shared interests in coastal protection, conservation philanthropy, and collaborations/alliances. The meeting will include high level government officials from Chile, conservation leaders, and local experts in various coastal issues.

**Del Mar Wharf property development:** In 2006, MLML and SJSURF purchased the 1.6-acre parcel that is called the Del Mar property. This property has a 315-foot long wharf that would accommodate most any research vessel length useful to MLML/SJSU and the CSU. The wharf is largely in poor shape and will require some immediate dismantling for safety reason, and eventually a rebuilding once we have established if and what size of vessel(s) might use this space. In the upcoming year we hope to acquire a permit to allow the dismantling of a portion of the damaged wharf.

**Aquaculture Center:** The facilities at the Aquaculture Facility continue to expand as new projects and partners are added. In this next year, we expect to add another 15-20 research tanks, a new power supply to part of the property, internal buildout in the building, and added storage and processing structures. If funding allows, we hope to hire a new aquarist that will be responsible for the health and maintenance of the enclosures and organisms.

**Academic Village Marketing:** In 2005 MLML/SJSURF purchased a 9.2-acre parcel adjacent to the MLML main building for the purpose of constructing housing, additional lab/educational spaces, and a conference facility. To assess whether the build out of an Academic Village on the Sandholdt property was possible and practical MLML obtained a NSF grant that determined that (1) there were no permitting or environmental impediments, (2) that other marine labs had numerous examples of successful enterprises, and (3) that if we built it, there would be users. We then hired Professor Josh Nelson (SJSU) and his students to develop a vision of the development, and they have

recently completed an animation of the design concepts. We next envision a funding campaign that will begin after the MLML Administrative campus decision is finalized.  
Problems and opportunities

- a. Problems: Nature of problems; resources needed to resolve the; status on resolving them

One large problem for MLML is student housing. We operate in one of the most expensive housing markets in the U.S., and with increasing tuition and cost of living students have a difficult time attending MLML unless they have some assistance. MLML and SJSURF purchased the 9.2-acre Sandholdt Property in 2005 with the principle purpose of constructing housing, new research lab/teaching space, and a conference center. Development of this location would provide affordable for our students. In an effort to raise the funding for such a project we have partnered with SJSU Faculty member Josh Nelson (Industrial Design) and his students to create a visualization of the project (site plans and an animation). Once the decision is made by the CO as to our administrative campus, we hope to move forward with the Development team to try and secure funding for this project, including raising money for an endowment fund that would provide financial support for students.

- b. Opportunities: Examples include enterprise-level projects (multi-campus; multi-sector), interdisciplinary projects; high-impact; new technology or tools

### **5-yr agreement for the Californian Cooperative Ecosystem Studies Unit**

MLML had proposed to join the CESU in 2017, and on 12 July 2018 was informed that it had been accepted into the organization for the next 5-year agreement. The CA-CESU is a partnership between a number of federal agencies (e.g. NOAA, DOD, BOEM, USFWS, NMFS, NPS, NASA, USFS, etc.) and non-federal entities, which are mostly academic institutions. MLML joins the CSU campuses of Cal Poly, Channel Islands, Chico, Fresno, Fullerton, Los Angeles, Monterey Bay, Northridge, Sacramento, and Stanislaus as members of CA-CESU. This provides MLML with the ability to respond to RFPs and create potential partnerships with these federal agencies within the context of the CA-CESU structure, which could facilitate certain research projects at MLML.

### **Aquaculture Center Agreements**

Activities regarding aquaculture have increased dramatically in the last year. Dr. Luke Gardner, former post-doc at Stanford Hopkins Marine Station, has joined the MLML Research Faculty and the California Sea Grant as an Extension Specialist. Located at MLML, Luke will teach classes in aquaculture, conduct research, advise students, and help further develop the aquaculture program. He recently organized a forum ("Pathways Toward Responsible Aquaculture in California") that was hosted by MLML with 125 participants from mostly California but also around the world. Information about the forum, with recordings of all the proceedings, can be found on our website (<https://www.mlml.calstate.edu/aquaculture/pathways-toward-responsible-aquaculture/>). The next phase is to organize some working groups to tackle such issues as: permitting, public education, seaweed culture, and fish-free feeds.

We have nearly completed all the requirements involving our proposal for an Organized Research and Training Unit (ORTU) that would establish a Center for Aquaculture at SJSU. Once completed this would formally determine a Center at MLML/SJSU to

invigorate the burgeoning opportunities for research and training regarding aquaculture in California. In anticipation of this designation we have added 36 new research tanks at the Aquaculture Facility that is supporting three large research projects associated with integrated multi-trophic aquaculture, impacts of ocean acidification, and expansion of the seaweed farm. Three industry partners have signed agreements with the SJSURF, allowing them to use the facility for hatchery/nursery, grow out, and holding processes. We have partnered with the nearby Elkhorn Slough National Estuarine Research Reserve to spawn native Olympia oysters for potential restoration of native populations in Elkhorn Slough.

We have proposals in place to investigate various species of marine algae that might reduce methane production in cattle, expanded research on combination of seaweeds and invertebrates in multi-trophic systems, and are developing proposals to fund a new position as an aquaculture technician.

## **RESEARCH**

- Dr. Rick Starr, Fisheries Biologist and member of MLML's Research Faculty has 20 days at sea planned on the National Marine Sanctuary's boats (R/V Fulmar and R/V Shearwater) to use the new video lander to survey fishes from Cape Mendocino to Anacapa Island.
- Dr. Alison Stimpert, Vertebrate Ecologist and member of MLML's Research Faculty will study the life history parameter influence on humpback whale foraging strategies, continue her research on passive acoustic research on humpback whales in Monterey Bay and soundscape characterization in Monterey Bay
- Dr. Gitte McDonald will be embarking on a research cruise to Antarctica in Fall 2018 to study foraging ecology in penguins.
- Dr. Max Grand will participate on a month-long cruise to the Marquesas Islands northeast of French Polynesia to investigate where the High Nutrient Low Carbon waters are the result of lesser concentrations of iron.
- Dr. Ivano Aiello will be a participant on a Deep-Sea Drilling project scheduled to occur AY19-20.

## 8 Budget

Indicate funds received from (a) the Chancellor's Office, (b) Campus contributions, (c) External funds to support operation of affinity group, and (d) External grants of faculty associated with the affinity group.

<b>MLML Operating Budget AY17-18: SJSU General Fund</b>		
<i>Operating Budget For:</i>		
<i>Administration, Instructional Supplies, Dive Program, Facilities, IT</i>		
	<b>AY 17-18 Actuals</b>	<b>AY 18-19 Budgeted</b>
Salary	1,872,051	1,872,051
Benefits	961,923	961,923
OE&E	407,648	407,648
Utilities	305,299	306,845
Salary Recovery / Reimbursement	33,489	15,000
Consortium Funding-Visiting Scientist	21,425	21,425
Other Reimbursement/Support	20,040	11,000
CSUMB Contribution	50,000	50,000
Prior Year Balance Forward	100,083	35,000
Roll-Forward Encumbrances	29,926	TBD
<b>TOTALS:</b>	<b>3,801,884</b>	<b>3,680,892</b>

### MLML: SJSU Research Foundation F&A Return/Support for Operations

REVENUE	AY17-18 Actuals	AY18-19 Budgeted
Other Income	600	600
Rental Income (Del Mar, Sandholdt Center)	128,240	128,240
F&A Return (Less 30% to PI's, Reserve, Deficit Refinance)	65,998	60,000
SJSURF Admin and Facility Support (incl. \$125k SJSURF supplement)	315,000	190,000
Balance Forward From Previous AY	59,185	(16,947)
<b>Balance of Revenue To Fund Operations:</b>	<b>569,023</b>	<b>361,893</b>
<b>OPERATIONS DETAIL</b>		
Salaries, Wages and Benefits	421,024	423,201
<i>SJSURF Facility and Admin Staff - not from Grant Direct Costs</i>		
Administrative Costs	5,513	20,900
Diving Costs	2,100	3,000
Information Technology	15,409	20,000
Construction	10,000	5,000
Maintenance and Repairs to SJSURF Properties:	29,410	35,000
<i>Del Mar, Norte, Aquaculture Center, Firehouse, Sandholdt</i>		
Services & Facility Costs	77,928	72,500
Supplies & Equipment	9,586	25,000
Small Boat Support	15,000	15,000
<b>Total Operating Costs:</b>	<b>585,970</b>	<b>619,601</b>
<b>Deficit:</b>	<b>(16,947)</b>	<b>(257,708)</b>
<b>RESERVE</b>		
Reserve Account Balance EOY	540,256	560,256
<b>REFINANCING ACCOUNT</b>		
Refinancing Account Balance EOY	(2,995,515)	(2,990,515)

<b>MLML MARINE OPERATIONS BUDGET AND REVENUE AY17-18</b>	
R/V JOHN H. MARTIN	136,183
R/V SHEILA B.	13,025
ORANGE RHIB	12,844
WHALERS	2,430
MARINE OPERATIONS	1,474
<b>Total Revenue AY17-18:</b>	<b>165,956</b>
<b>OPERATING COSTS AY17-18:</b>	<b>258,873</b>
<b>MARINE OPERATION BALANCE EOY AY17-18:</b>	<b>(92,949)</b>

## **9 Affinity group's self-certification checklist**

### **Requirements to grandfather in as a System-Wide Center or Institute under EO 1103**

Check list for:

**PURPOSE:**

- Organized around a scholarly, creative, research, education, and/or public service activity that combines interests/expertise of individuals, departments or administrative units, and may draw on expertise of others external to the campus or the academy
- May offer services to constituents beyond the CSU community (e.g., individuals as well as private and public entities)
- As specified otherwise

**FUNCTION**

- Provide opportunities for professional development of faculty and staff through teaching, research, scholarly and creative activities, and public service
- Foster and facilitate interdisciplinary efforts among disciplines, departments, colleges, and universities
- Provide a clearinghouse for information of interest to professionals and conducting workshops and conferences for continuing education
- Improve student success by facilitating/supplementing student academic experience
- Provide opportunities for faculty and staff to collaborate on multi-campus or system-wide proposals for external funding to support the above activities
- Cite other functions as stated in proposal or strategic plan and approved following processes described below

**STRUCTURE**

- Strategic plan, including purpose and mission
- Campus or auxiliary responsible for administration of funds
- Financial support

- Participating CSU campuses and non-CSU entities, and their roles and responsibilities
- Organizational and governance structures
- Suspension or dissolution guidelines
- Hiring procedures, staff, and location
- Protocol for changes in participants—identified under participating CSU campuses...

#### ADMINISTRATION

- Identify lead president or other executive as responsible for the oversight of each system-wide multi-campus center, institute, or affinity group
- CSU personnel shall be subject to a letter of appointment from the campus; the letter sets forth the terms and conditions of his/her employment including, but not limited to, whether he/she serves at will in either capacity and whether his/her employment with the campus will continue after the employee's service to the unit terminates or is otherwise suspended and/or if the unit dissolves