

GRADUATE PROGRAM REVIEW

**SONOMA STATE UNIVERSITY
DEPARTMENT OF BIOLOGY**

FALL 2016

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**Sonoma State University
Graduate Program – MS in Biology
PROGRAM REVIEW**

Department or Program: Biology

School or Academic Division: Science and Technology

Date: 2016

A. Program Introduction and History

The Masters of Science (MS) program in Biology at Sonoma State University (SSU) is designed to provide students strong foundations in scientific methodology, scientific literature and technological principles, and to prepare them to enter a variety of professional fields and doctoral programs. The program is thesis based and requires students to conduct original research under supervision by biology tenure track faculty and graduate research faculty. The program offers a range of research opportunities in diverse areas of biology. Along with thesis research, all students complete a minimum of 30 units of course work approved by the graduate committee and participate in teaching in the undergraduate curriculum.

Sonoma State University is a predominantly undergraduate institution and offers degrees in 41 majors at the undergraduate level and 14 at the master's level. SSU is committed to the mission of ensuring quality educational programs for graduate students whose goals include personal and professional development through mastery of specific fields of study. There are currently 793 graduate students enrolled at SSU, comprising 9% of the student population. Graduate programs at SSU are designed to provide opportunities for advanced study and/or independent research in order to broaden intellectual and creative capacity and further prepare students for career opportunities in their field. Developed with the time constraints of the working professional in mind, many graduate programs are structured to allow for part-time enrollment, offer advantages to work closely with faculty and peers, and promote close supervision in culminating projects.

Basic Statistical Data

Number of students currently enrolled in Biology Graduate Program: 35

Number of Biology theses completed since 1966: 229

Number of full-time permanent Biology faculty: 11

Number of participating faculty from other departments: 2 (Anthropology, Environmental Studies and Planning)

Number of degrees: 1 (Masters of Science)

Program Coordinator: Derek Girman

Structure of the M.S. Program in Biology

The M.S. Program in Biology is structured to facilitate student conducted, original research. All applicants are strongly encouraged to contact one or more faculty members in the Department of Biology (or graduate research faculty, see Appendix I – Admissions inquiry response) whose area of research matches the applicant's interests. This initial contact helps applicants find faculty members who would be willing to accept the applicant into their laboratory (and thus become the

applicant's major thesis advisor). Upon entering the program, the successful applicant, in consultation with the major advisor, chooses two additional members to serve on the Thesis Advisory Committee. The Advisory Committee consists of: 1) the major faculty advisor, 2) a second member of the Biology Graduate Faculty, and 3) a third member from the scientific community who has appropriate expertise in the student's field of research. The functions of the Advisory Committee are to (1) help the student plan their course work, (2) serve on the student's Oral Qualifying Examination Committee, (3) advise on thesis research, and (4) serve as the Thesis Defense committee.

As a means of maximizing opportunities for student research, faculty in other departments at SSU with degrees or research interests/experience in related fields also participate within the graduate program. Upon approval of the Department of Biology and the home department of the participating faculty member (see Appendix II), these faculty members are considered members of our graduate research faculty, serve on graduate committees, and can be major advisors to students in our program.

Graduate Coordinator

The role of the Graduate Coordinator is to oversee the graduate program. This entails all aspects of the application process, tracking student progress in the program, and insuring all degree requirements have been met before graduation. A full description of the duties of the Graduate Coordinator is provided in Appendix III. The Graduate Coordinator serves a 3-year term and, unfortunately, receives no workload compensation (2 WTUs of release time per semester was the standard prior to Fall 2003).

The Graduate Committee (chaired by the Graduate Coordinator) serves as the final decision making body for individual students (acceptance to the program, course-work approval, conflict resolution, etc.) and as the initiator of policy changes for the Graduate Program within the Department of Biology.

B. Student Learning

Program Mission and Goals

To provide a premier, nationally recognized Master's level program in the biological sciences that allows students to: 1) develop a skill set that includes critical reasoning, creativity, self-expression, and the ability to collect, synthesize, and analyze information from a variety of sources, 2) prepare for a career or career shift either by pursuing a PhD. or by obtaining a job that uses their biological knowledge and skills, and 3) generate new knowledge about the biological world.

Learning Objectives

a) Discipline Content: Develop a broad working understanding of a range of biological concepts including:

1. Biological diversity in an evolutionary context
2. Cellular and molecular basis of life
3. Principles of inheritance
4. Principles of evolution
5. Structure-function relationships at the organismal level
6. Principles of ecology
7. Principles of reproduction and development

8. Principles of physical sciences and mathematics that support and underlie the biological sciences

b) Skills: Acquire a range of skills to further career goals in biological sciences:

1. Pose scientific questions, and answer these using appropriate scientific approaches. Form hypotheses and design studies to address them.
2. Identify and interpret processes at all levels of biological organization.
3. Gather relevant scientific data using a range of techniques and instruments.
4. Analyze data about biological processes using a variety of quantitative techniques
5. Effectively and accurately communicate concepts and ideas in verbal and written forms.

c) Values: Acquire the following values of an education in biological sciences.

1. A strong appreciation for scholarship in all its forms as a foundation for life-long learning.
2. Critically assess socially relevant biological issues, and integrate them into their daily lives.
3. An ongoing curiosity about biological phenomena at all levels.
4. A dedication to pursuing scientific knowledge in accordance with the Scientific Ethos.
5. Pursue fulfilling careers in biology in a changing and competitive world.

d) Research: Develop ability to articulate, integrate, and express knowledge in advanced areas of biology through scholarship:

1. Demonstrate and articulate knowledge in advanced concepts in area of chosen emphasis in biology.
2. Demonstrate written and oral ability to integrate basic and advanced concepts into research.
3. Demonstrate ability to conduct independent research.

Rationale for Learning Objectives

The learning objectives for the graduate program integrate with those for the undergraduate majors. All major's and graduate courses are designed to offer topics within a research-based approach and are structured to challenge students to develop skills of critical analysis, reasoning, creativity, and self-expression. Often, graduate students take a number of upper division classes in the major (up to 14 units of upper division coursework applies to degree) and seniors in the major often take graduate classes. This integrates the learning objectives from the major with the Graduate Program. Thus the learning objectives designed for the Bachelor's degree in biology, groups *a*, *b*, and *c*, also apply to courses taken by our graduate students. Learning objectives specific for the Graduate Program (group *d*) are based on the research emphasis of the M.S. degree.

Dissemination of Learning Objectives

The Graduate Coordinator provides all new graduate students a student orientation when they enter the program with an associated outline of the expectations and recommendations associated with graduate policy (Appendix IV). In addition, the student meets with their major advisor and their Advisory Committee by the end of the first semester to complete a M.S. Coursework and Timeline Form (Appendix V) listing the Committee approved courses that the student intends to apply to the degree. The mentor works with the student to tailor the learning objectives to student's sub-field in Biology with input from Advisory Committee members. This form M.S. Coursework and Timeline Form is then submitted to the Graduate Coordinator for an additional review.

Learning objectives associated with each graduate seminar are provided by the faculty teaching the seminar. These objectives are provided in hardcopy or are available through an online learning interface such as Moodle.

Aligning Courses with Learning Objectives

Graduate courses in the Department of Biology have undergone a transition in an effort to better meet the evolving needs of our graduate students. We have moved away from the static list of established graduate courses used previously and have adopted instead a more flexible curricular vehicle, the BIOL 500S seminar. Thus, currently the graduate course offerings (Table 1) fall into two categories:

- i. Seminar-style courses (BIOL 500S). In these two unit classes the faculty use a mix of formal lectures, student led discussions, and student presentations. These courses cover the latest information about selected topics and provide a forum for students to discuss them in depth. BIOL 500S provides the Biology graduate faculty the ability to offer courses on foundational topics in biology, on recently emerging fields or areas of biological research, or on implementation of critical skills associated with research in biology. The department offers two BIOL 500S courses each semester, with topics and instructors approved by the Graduate Committee that best meet the curricular needs of the current graduate cohort. For purposes of curricular planning, the Graduate Committee considers the combination of seminar topics offered over the two-year course cycle typically associated with the Master's degree in Biology.
- ii. Research courses (BIOL 595, and 599). BIOL 595 (Special Studies) is the course graduate students take to obtain credit for their research efforts in preparation for advancement to candidacy. BIOL 599 (Thesis Research) is the course students take after advancement to candidacy to obtain credit for their Thesis research. Up to 6 units of BIOL 595 and 599 each may be applied to the degree.

Coursework Requirements for the M.S.

Students are required to complete 30 units of coursework towards the M.S. degree. This course plan is developed by the student in consultation with the Advisory Committee. A minimum of 15 units of this work must be graduate courses. The remaining units provide flexibility to allow students to create a course plan that may include undergraduate coursework that supports the research efforts and discipline of the student. For example many graduate students take an advanced undergraduate biostatistics course. Students must complete at least 3 graduate seminar (500S) classes and are allowed to count a maximum of 6 units each of BIOL 595 and BIOL 599 toward the degree. Students are allowed to transfer a maximum of 9 units of post-baccalaureate coursework completed at other institutions. This allows students to participate in off-campus summer programs that provide experience relevant to their research discipline. Continuous enrollment is required in the program. After coursework is completed, students that continue to work on their thesis research maintain enrollment through BIOL 578 Project Continuation. Continuing enrollment requires that students develop a timeline for completion in consultation with their Advisory Committee.

Table 1. Graduate course offerings 2010 – 2016 and alignment with learning objectives.

Semester	Course	Topic	Instructor	Learning Objectives																				
				a1	a2	a3	a4	a5	a6	a7	a8	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3
Sp 10	Biol 500S	Ecology of Microorganisms	Cohen	x	x			x	x	x	x	x			x	x	x	x	x	x				
Sp 10	Biol 500S	Current Themes in Biology	Crocker	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x			
F 10	Biol 500S	Macroevolution	Geist	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x			
F 10	Biol 500S	Phenotypic Plasticity & Climate	Cushman	x		x	x	x		x							x	x	x	x	x			
Sp 11	Biol 500S	Applied Data Analysis	Nielsen												x		x		x	x				
Sp 11	Biol 500S	Adv. in Cons. Biology	Cushman				x		x								x	x	x	x	x			
F 11	Biol 500S	Global Envir. Change	Cushman	x			x		x		x						x	x	x	x	x			
F 11	Biol 500S	Bioenergetics	Crocker		x			x			x						x	x	x	x	x			
Sp 12	Biol 500S	Developmental Mechanics	Pillai		x	x		x		x							x	x	x	x	x			
Sp 12	Biol 500S	Current Themes in Biology	Girman	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x			
F12	Biol 500S	Extremophiles	Cohen	x	x		x	x	x		x						x	x	x	x	x			
F12	Biol 500S	Professional Skills	Crocker												x		x	x	x	x	x	x	x	x
Sp 13	Biol 500S	Adv. Applications in Excel	Buckley												x		x		x	x	x			
Sp 13	Biol 500S	Current Themes in Biology	Girman	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x			
F 13	Biol 500S	Climate Change	Rank	x			x	x	x		x						x	x	x	x	x			
F 13	Biol 500S	Professional Skills	Crocker												x		x	x	x	x	x	x	x	x
Sp 14	Biol 500S	Data Analysis JMP & SAS	Rank												x		x	x	x		x	x		
Sp 14	Biol 500S	Current Themes in Biology	Girman	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x			
F14	Biol 500S	Secondary Metabolites	Cohen		x												x	x	x	x	x			
F14	Biol 500S	Professional Skills	Crocker												x		x	x	x	x	x	x	x	x
Sp 15	Biol 500S	Envir. Stress and Gene Response	Place		x	x	x	x	x		x						x	x	x	x	x			
Sp 15	Biol 500S	Current Themes in Biology	Crocker	x	x		x	x	x	x	x				x		x	x	x	x	x			
F15	Biol 500S	Mechanisms of Disease	Lin	x	x	x	x			x							x	x	x	x	x			
F15	Biol 500S	Professional Skills	Zippay												x		x	x	x	x	x	x	x	x
Sp 16	Biol 500S	History of Life	Girman	x	x	x	x	x	x	x	x	x					x	x	x	x	x			
Sp 16	Biol 500S	Molecular Adaptations	Place														x	x	x	x	x			
All	Biol 595	Special Studies in Biology	#	*	*	*	*	*	*	*	*	*	*	*	x	*	x	x	x	x	x	x	x	x
All	Biol 599	Thesis Research	#	*	*	*	*	*	*	*	*	*	*	*	x	*	x	x	x	x	x	x	x	x
		* depends on students specific sub-discipline																						
		# specific Graduate Faculty serve in this course for specific students																						

Sample Course Plan

	Year 1	UNITS	Year 2	UNITS
FALL	<u>COURSE</u> BIOL 595 and 500S and 300 or 400 level	3 2 3-4 Total of 8-9	<u>COURSE</u> BIOL 599 and 500S and 1 additional course	3 2 2-4 Total of 7-9
SPRING	BIOL 595 and 500S and 300 or 400 level	3 2 3-4 Total of 8-9	BIOL 599 and 500S	3 2 Total of 5
	Year 1 total goal	16-18	Year 2 total goal	12-14

Oral Qualifying Examination

Students must pass a two-hour-oral qualifying examination prior to advancing to candidacy. The student's Advisory Committee and a fourth member administers this examination. The Graduate Coordinator selects the fourth member from the biology graduate faculty. This examination should be completed prior to the third semester. During the examination, students must demonstrate their ability to articulate the purpose of their proposed research project and that they are competent to complete the work. Students are also required to demonstrate their ability to integrate general principles of biology with their proposed work and a broader understanding of biological principles and concepts, irrespective of one's specific area of research. Upon passing the oral exam, the student will complete an Advancement to Candidacy form (GSO1) which is signed by all members of the Oral Qualifying Examination Committee and the Graduate Coordinator (Appendix VI). The student must also demonstrate proficiency in written English by either having a CSU Bachelor's degree, scoring at least 4.5 on the analytical writing portion of the GRE general test, or having passed the Written English Proficiency Exam (WEPT).

Thesis Defense

Students undergo a culminating experience by writing a Thesis based on original research. The students present results of their research in a public forum, either as a special seminar or in the Biology Colloquium. The students should be prepared to address questions and comments. All three members of the Advisory Committee must be present at this defense seminar. After the seminar, the student and his/her Advisory committee meet to further discuss, evaluate, and comment on the thesis. At the end of this meeting, the student is excused and the committee decides on the acceptability of the thesis and revisions required for acceptance. The Advisory Committee approves the final version of the thesis after revisions. The bar for department research is scope and quality sufficient for publication in a peer-reviewed journal.

Teaching Associate Class Evaluation

All students are required to participate as a paid Teaching Associate in the Department of Biology for at least 2 sections of laboratory in GE biology (BIOL 110) or lower division major's biology (BIOL 130, BIOL 131), or in select upper division courses (e.g. BIOL 320, BIOL 321). During his or her teaching semester, a member of the Graduate Committee or faculty instructor in lower division biology evaluates each student. This evaluation (see Appendix VII) follows a similar format as that used to evaluate tenure-track faculty in their teaching performance. Upon completion of the evaluation, the student meets with the evaluator to discuss the class, the evaluation, and any means to improve their performance. The evaluation is signed by the student and evaluator before being entered into the student's file. The evaluations become part of the student's dossier and are often used by faculty members to write letters of recommendation.

Progress Report

By the end of the second full year in the program, students are expected to provide a completed draft of the thesis or a progress report to their Advisory Committee. The progress report is expected to outline the work that has been accomplished, identify the specific components of the Thesis still to be completed, and provide a time line for work to be completed in the upcoming year. A copy of the progress report is signed by the Advisory Committee and submitted to the Graduate Coordinator. This progress report is the basis for approval of enrollment in BIOL 578 Project Continuation.

Completion of Requirements Evaluation

The student is required to submit a final Completion of Requirements form (GSO2) (See Appendix VIII). Which is reviewed and signed by the student, the Faculty Chair of the Advisory Committee, and the Graduate Coordinator. The student must identify the list of courses that complies with all CSU, Sonoma State, and Departmental course work requirements. The document also identifies the dates of completion of the Oral exam and the Thesis Defense as well as the title of the Thesis.

C. Diversity

Commitment to Diversity

The graduate program in the Department of Biology has a strong commitment to maintaining diversity among its students, staff, and faculty. The graduate program is dedicated to providing a productive learning environment that supports the safety, dignity, and rights of every student. The program seeks to generate a respectful and inclusive community and does not tolerate acts of discrimination or other forms of intolerance.

The Department of Biology is committed to increasing the diversity of its faculty, staff, and students. Equal employment and educational opportunities are promoted for all faculty, staff, and students associated with the Graduate Program in Biology. When hiring new graduate faculty or seeking new graduate students, we seek to recruit from large candidate pools with an expansive range of candidates, including members of underrepresented groups. Marketing for our tenure track positions includes advertising with a wide variety of outlets including organizations associated with underrepresented groups, including the Association for Women in Science, Insight Into Diversity Magazine and Minoritypostdoc.org. During the current period of review the Department of Biology has conducted three tenure track faculty searches. These efforts generated finalist pools which consisted of nine females and three males. These tenure track searches resulted in the hiring of two women to serve as graduate research faculty, mentors, and role models for all of our students, both graduate and undergraduate.

Faculty and Student Conduct

Our graduate faculty are expected to conduct themselves in a manner that ensures that they do not discriminate against or harass any other individual. Whether in the classroom, laboratory, or in the field, the learning environments are expected to remain free from discrimination, harassment, or intolerance. We also expect that this perspective is to be passed on to our graduate students through the extensive mentoring process associated with the graduate program in Biology.

D. Student body

During the review period there have been 82 graduate students in the biology graduate program, including 42 that have completed their Master's degrees, 5 students who left the program prior to completion of their degree, and 35 current graduate students. Among those students 51 were female and 31 were male; this includes two transgender students. Among the students who left the program, three were female and two were male. In the last program review, the Department of Biology showed an average annual enrollment of 24 students from 2002-2008 with an average graduation rate of 5.25 students per year. The number of students graduating each year with an MS in Biology from 2010-2015 has fluctuated around a mean of 6.8 students with an average cohort size of 35 (Figure 1). The program has grown since the last program review and is producing more graduates. Moreover, with the recent hiring of three tenure track faculty with extensive research backgrounds, the Biology Graduate program is poised to, and expects to, further increase both its size and the number of MS degrees in Biology being produced over the next period of years.

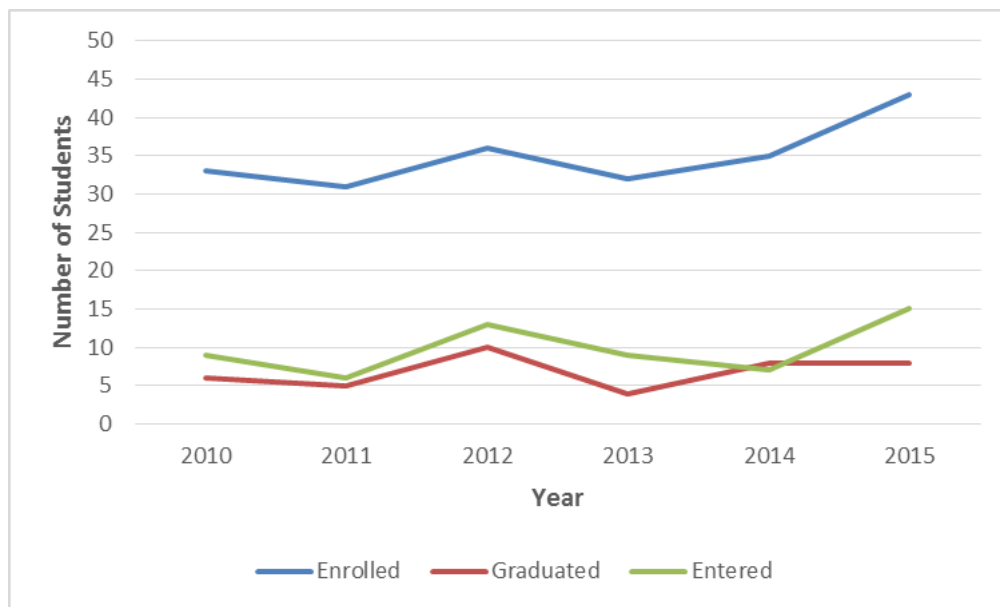


Figure 1. The number of students enrolled, graduating, and entering the Graduate Program in Biology from 2010 to 2015.

Acceptance into the Program

Students are accepted into the program in both Fall and Spring, with the majority of new students entering in the Fall. Acceptance is determined by review of the Biology Graduate Committee and follows the guidelines set forth in the graduate program policy. Students must meet California State University admission requirements. In addition, the applicant must be accepted by a biology graduate faculty member to serve as a faculty advisor. Faculty often conduct phone or in-person interviews with potential applicants, pre-screening the applicants for their labs.

The committee then looks for evidence that the prospective student is capable of initiating and performing original scientific research. As a general guideline, the Department uses the following criteria to determine this potential:

1. An undergraduate degree in biology or equivalent, including:
 - A. One course in calculus or statistics;
 - B. One year of general chemistry and one semester of organic chemistry;
 - C. At least one other course in physical sciences;
 - D. Upper division coursework demonstrating competence in three of four core areas (organismal biology; physiology; molecular or cellular biology; ecology or evolutionary biology).
2. A GPA of 3.0 or higher in the last 60 units.
3. A score at or above the 50th percentile on each section of the General Examination of the GRE.
4. Evidence in the statement of purpose and letters of recommendation of potential for conducting independent and original research in biology.

The program received between 22 and 42 applications per year, accepting between 11 and 16 students per year in the program, acceptance rate of approximately 40% (Figure 2). This high rate of acceptance reflects the pre-screening process described previously.

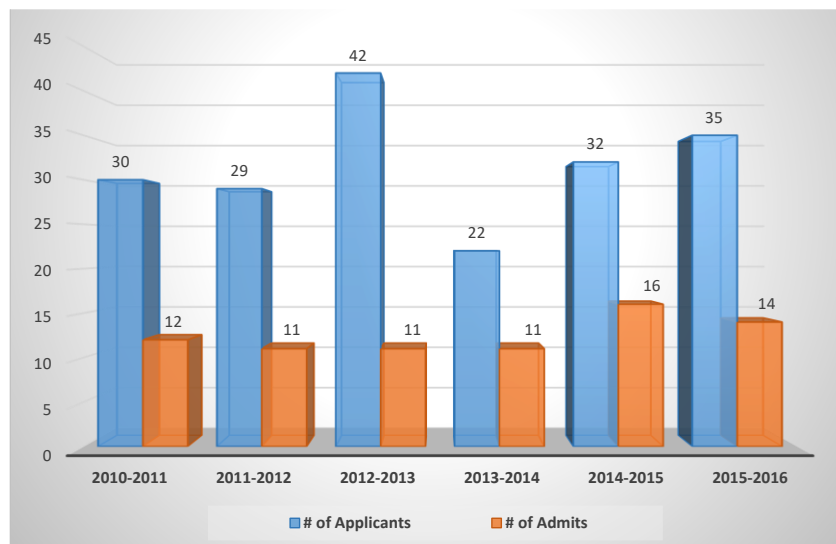


Figure 2. Annual number of applicants and accepted students for the SSU Biology Master's program 2010-2015. Some accepted students elected not to attend.

Student Mentoring

Each accepted graduate student is guided by a tenure track graduate faculty member who serves as a major advisor as well as several additional qualified advisory committee members with specific expertise in their subfield of biology. In addition the graduate coordinator in Biology monitors the progress of each student, serves as an additional mentor and, as needed, as a mediator for the each student. On occasion a student has chosen to leave the program. In these instances the students have chosen a different academic or career track that is not served by the Master's degree in biology and our faculty mentors have been consistently supportive of the students in their efforts to find their own best path forward.

E. Faculty

During the period of review, 17 graduate research faculty members have been affiliated with the Biology Graduate Program (Table 2). Sixteen of these faculty participated in mentoring graduate students in the program from 2009-2015 (Figure 3). A broad range of sub-disciplines are covered by the graduate faculty. Graduate faculty have mentored graduate student theses on topics that include molecular genetics, cell biology, genomics and bioinformatics, biochemistry, population genetics, developmental biology, comparative physiology, community ecology, conservation biology, restoration ecology, behavioral ecology, evolutionary biology, biogeography, systematics, and marine biology. Currently there are 11 tenure-track faculty in Biology, with one new tenure-track faculty member in Biology hired in 2016. Additionally, there are currently two Graduate Research Faculty from outside of Biology, one from Environmental Science and Planning (Christian), and one from Anthropology (Jaffe).

Table 2. List of faculty who participated in the Graduate Program in Biology at Sonoma State University (SSU) during the period of review from 2009 to 2015. Faculty no longer in the program are indicated by#.

Graduate Faculty	Graduate Program Service	Current Academic Affiliation
Tom Buckley#	2009-2013	U. of Sydney
Jim Christmann#	2009-2014	Retired
Michael Cohen	2009-present	Biology, SSU
Dan Crocker	2009-present	Biology, SSU
Caroline Christian	2009-present	Environmental Science & Planning, SSU
Hall Cushman	2009-present	Biology, SSU
Karin Jaffe	2009-present	Anthropology, SSU
Nick Geist	2009-present	Biology, SSU
Derek Girman	2009-present	Biology, SSU
Jennifer Lillig#	2009-2010	Chemistry, SSU
Joseph Lin	2009-present	Biology, SSU
Karina Nielsen#	2009-2014	Biology, San Francisco State University
Sean Place	2014-present	Biology, SSU
Murali Pillai	2009-present	Biology, SSU
Nathan Rank	2009-present	Biology, SSU
Richard Whitkus	2009-2015	Biology, SSU
Mackenzie Zippay	2015-present	Biology, SSU

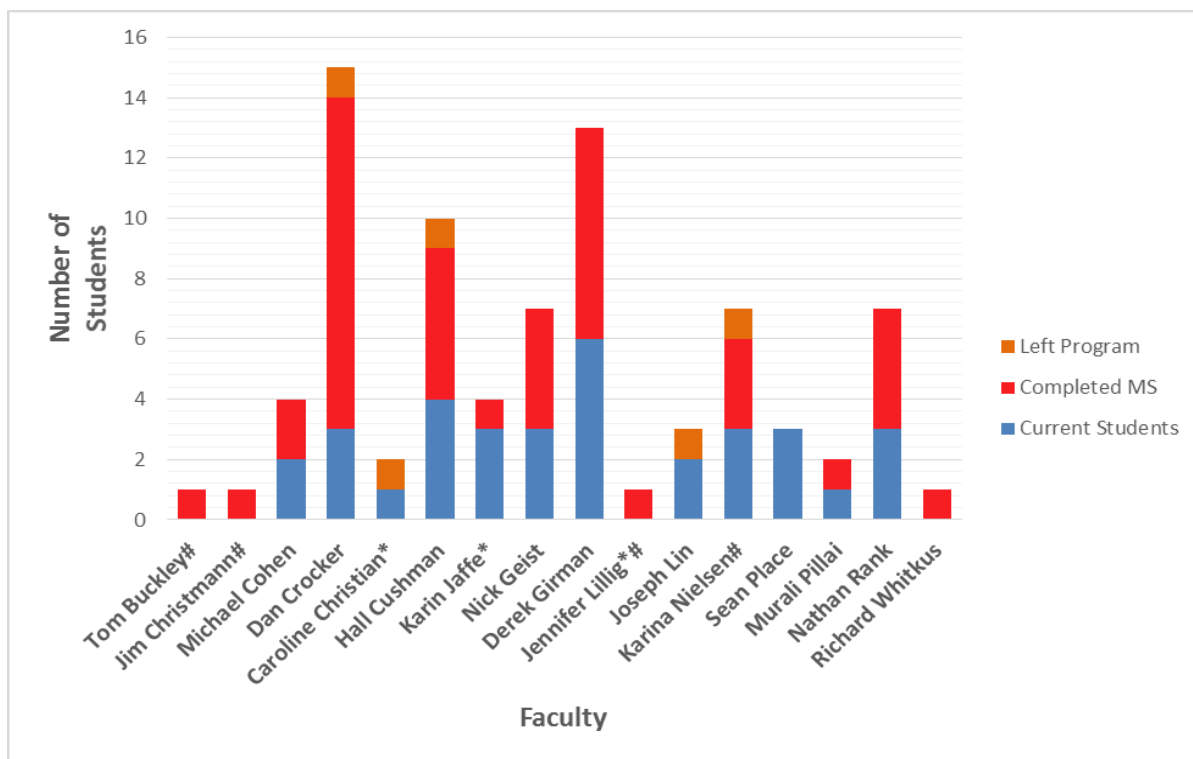


Figure 3. Number of graduate students in biology mentored by each graduate faculty member from 2009-2015. Students are identified as current, completed MS degree, or left the program prior to completing their degree. Graduate research faculty in departments other than biology are indicated by *. Faculty no longer serving in the Biology graduate program are indicated by #.

With the primary emphasis in the graduate program on Thesis development, our graduate faculty work to maintain currency in their field through ongoing funded research, attendance and presentation at scientific conferences and meetings, serving as editors or reviewers for scientific publications and granting agencies, and maintaining collaborations with research scientists outside of SSU. Expectations of ongoing active scholarship through publication, generation of external funds, and mentoring of graduate students within are explicitly identified in the criteria for retention, tenure, and promotion in biology. Moreover, as part of the promotion evaluation, each faculty member is also evaluated by three non-SSU research scientists with regards to their scholarship.

Faculty Participation in Graduate Curriculum

Twelve of the thirteen active tenure track faculty in the Department of Biology have participated in teaching the 26 graduate seminars (Biology 500S) offered during the review period (Figure 4). Only one faculty who was in the faculty early retirement program (FERP) during that time did not participate in teaching the graduate seminars. Note that Graduate Research Faculty (faculty from outside of the Department of Biology) do not teach in the graduate seminars in Biology. The faculty have worked together and with the Graduate Committee to ensure that a wide array of sub-disciplines in biology have been covered. Moreover, the faculty have employed an array of pedagogical techniques in teaching the variety of offerings provided, targeting the most appropriate pedagogical applications to meet each course's specific needs. Participation in teaching in the graduate program is explicitly identified as a criterion for retention, tenure, and promotion.

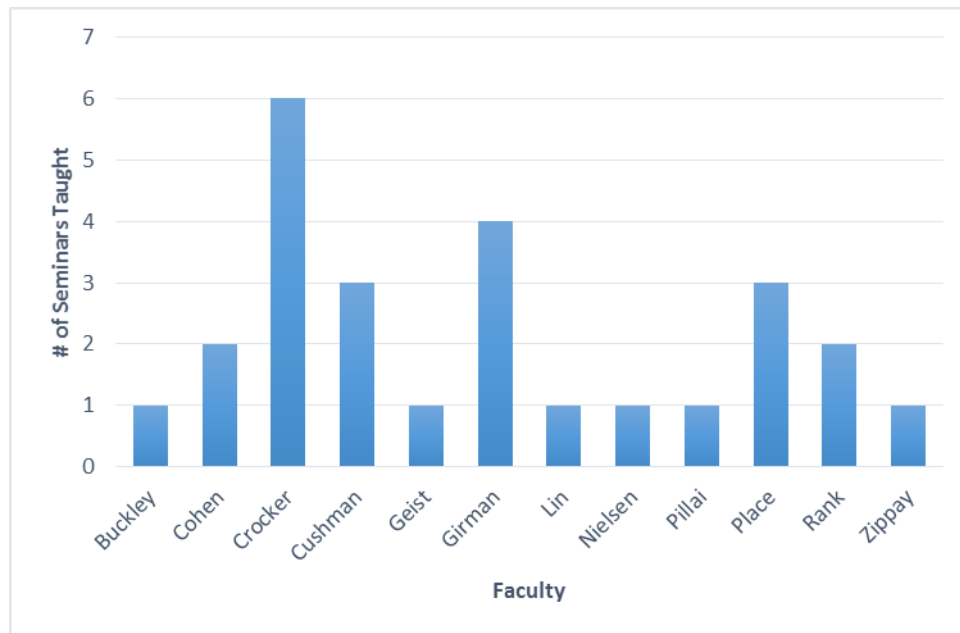


Figure 4. The number of graduate seminars (Biology 500S) taught by each faculty member.

Faculty Research Programs

Faculty members in Biology have been extremely active at conducting externally funded research and publishing results in high quality peer reviewed journals. Our faculty maintains close collaborative relationships with numerous local and national institutions. Some faculty members maintain formal research appointments at other institutions. Collaborative grant proposals with other institutions support purchase of equipment used extensively in supporting the graduate

program. Institutions with strong collaborative relationships with SSU include UC Santa Cruz, UC Davis, UC Merced, UC Berkeley, UC San Francisco, Long Marine Lab, Bodega Marine Lab, North Carolina State University, Oregon State University, Santa Clara University, University of Hawaii, US Department of Agriculture, US National Marine Mammal Program, The Nature Conservancy, The Sonoma County Water Agency, U.S. Fish and Wildlife Service, and Point Blue Conservation. These formal affiliations not only facilitate research experiences for our graduate students but also play a central role in promoting collaborative research and scholarly achievements.

F. Institutional Support and Resources

Physical Facilities

The Department of Biology has 8 teaching laboratories, 10 faculty research laboratories (CSU classification, instructional support space), 2 stock/lab preparation rooms, a combined museum (herbarium, vertebrate, insect), a walk in cold room with recirculating seawater, a small animal room, and a greenhouse complex of three houses and a combined head house/large animal holding room. Office space consists of a main department office and 16 offices allocated to full time and part time faculty, and one dedicated to graduate student office space.

Financial resources

The operating budget for the Department is about \$22,000 per year. This is to support office, laboratory and field supplies. In addition, the Department receives temporary faculty funds of approximately \$200,000 per year to cover lecturer and teaching associate salaries. However, lecturers do not participate in the graduate curriculum. Through the Office of Administration and Finance, faculty and staff are provided opportunities to replace computers every 4-7 years, on average, depending on available budget. The University provides tuition waivers for graduate students who work as a teaching associate and receive a high ranking among all applicants put forward throughout the university. The Provost, with support from the President has generously funded all tuition waiver requests put forth from Biology over the past five years. Small internal funding opportunities have been generated through the Jack Arnold memorial award in the past year. This fund relies entirely on donations from the public which are generated through the efforts of the graduate faculty.

Human resources

The Department has a workload policy for tenure/tenure track faculty of a minimum of 18 weighted teaching units (WTU) of direct class instruction per year and a maximum of 6 WTU of supervisory coursework per year (see Appendix IX). The Department Chair is responsible for enforcement of this workload. Faculty often carry several units of assigned time for School and University service, including Radiation Safety Officer (4 WTU/year) Health Professions Advisory Committee Chair (4 WTU/year), and Faculty Research Associate (12 WTU/year), or have buyout from grants. The Chair of the Department receives 16 WTU of assigned time per year. The assigned time is reimbursed to the School and comes back to the Department as part of the temporary faculty budget. Finally, all faculty members are assigned 6 WTU per year to cover non-teaching associated workload such as advising and university governance.

The workload policy implemented in the Department of Biology is a mechanism to insure a balance between direct instruction, assigned time, and supervision, including supervision of graduate students. However, our faculty members often carry an excess workload to meet the needs of our program. The combined totals for direct and assigned time should be 18 WTU (according to our

Department workload policy). However, our averages are consistently over this amount. Our workload also allows us to count to a total of 6 WTU per year for supervisory courses with graduate and undergraduate students. Faculty members receive 0.5 units of workload per semester for each graduate student working in their lab and taking thesis research supervisory courses. Faculty members receive no workload for graduate students that are completing their research as Project Continuation. There are several faculty members who carry heavy supervisory overloads to meet the needs of their graduate students and undergraduates attracted to their active research programs. Overall, current workload requirements for the Department typically exceed the workload expectations for full time tenure/tenure track faculty (24 WTU per year per FTE)

The Department has 1.5 Administrative Coordinators to cover all administrative aspects of the Department, and to serve the School's Health Professions Advisory Program. The Department also has 2 FTE for Instructional Support Technicians who oversee the preparation and set up of over 40 laboratory sections per semester. They are also responsible for general maintenance of the Department's physical facilities, including safety oversight.

G. Assessment and Findings

Department Assessment Plan

The assessment plan includes both an external and internal review of the program during the past five year period. Through the assessment process the Department will review the following: 1) whether the Department has used prior assessment to make effective changes in the program, 2) the educational effectiveness of the program as it relates to program learning objectives, 3) whether students completing the program are adequately prepared, 4) whether resources are used effectively, and 5) what additional actions or resources are necessary to improve the program.

Response to Prior Assessment and Current Issues.

The last Department review was conducted in 2009. The Department of Biology Graduate Program conducts a self-study of the state of the program approximately every 5 years. In addition, a scientist from a similar/comparable institution is invited to participate in an external review of the Department of Biology. Through that program review process the Department of Biology used both the self-study and the recommendations from the external review to develop a set of action items. Below are the action items that were developed specific to the Graduate Program and the program's response since 2009.

Action items for the short-term:

1. Make every effort to continue to offer 2 graduate seminars per semester as part of normal faculty instructional workload.

The Department of Biology has fully implemented consistent offering of two seminar-style courses (BIOL 500S) every semester. This course workload was maintained through a period of budget crisis when the department declared impaction and was having difficulty delivering appropriate numbers of sections of undergraduate courses. The Graduate Committee approves the topics and instructors of the seminars taught each semester that best meet the curricular needs of the current graduate cohort. Topics and instructors selected are based on instructor availability, the current sub-discipline composition of the graduate cohort, and both informal feedback and structured feedback through the Graduate student representative and the Biology Graduate Student Club. These courses are designed to cover the latest information about selected topics and provide a forum for students to

discuss them in depth. The flexible BIOL 500S seminar format allows the Biology graduate faculty to offer courses on foundational topics in biology, on recently emerging fields or areas of biological research, or on implementation of critical skills associated with research in biology.

2. Continue to develop the current Biology 500S “Scientific Skills” class as a required course offering.

The value of the Biology 500S course titled “Professional Skills” has been well established from both the faculty and student perspectives through both informal discussions and structured feedback from faculty and student representatives. We have implemented this course as a regular offering in the Fall semester. This serves several purposes: 1) it provides established students with a forum to present and receive feedback on Thesis proposals, orals presentations, Defense presentations, Grant proposals, and presentations for scientific meetings; 2) it provides incoming students a chance to immediately learn and become immersed in the variety of professional activities that lie ahead of them in their efforts throughout the graduate program and beyond; and 3) it provides a structured venue where graduate students with more experience and those who are new regularly mix and develop cross cohort relationships within sub-disciplines. This course also provides structured opportunities to help students improve in areas specifically identified in the last program review as needing more attention, such as scientific writing and quantitative analysis. Finally, an unforeseen positive byproduct of this course has been the opportunities for improved social ties among the graduate students in the department as a result of the regular interaction through this course. In fact, the development of the Biology Graduate Student Club emerged as a byproduct of this course.

3. Increase faculty efforts for external grant support for grad students to offset current loss of TA sections and potential loss of fee waivers in response to the budget crisis.

This effort has been addressed on three fronts. First, by working both within the Department of Biology and externally with the Graduate Studies Division of the University both the number of TA sections and the number of available tuition waivers have been increased over the past five years. For the past five years we have managed to provide every biology graduate student who has requested to participate as a Teaching Associate and receive a Tuition Waiver both means of support. In the most recent years, requests from Biology graduate students have exceeded existing support for tuition waivers. These students’ waivers were, nevertheless, supported by supplemental funding added by the Provost and the President of Sonoma State University in response to appeals by the Biology Department.

Second, additional opportunities for graduate student support have been generated through the university’s Instructionally Related Activities (IRA) support program which provides competitive access to funds to support activities that improve student learning and community engagement. Dr. Rank has developed the Biology Outreach Program which supports a graduate student to coordinate outreach activities in the community in collaboration with on campus organizations including the undergraduate Biology student club. Dr. Girman developed and maintains the Biological Collections Program which provides funding to several graduate students to lead curatorial activities for various Biological collections on campus.

Finally, the Department has endeavored to hire additional faculty who have proven records in obtaining external grant support for research with graduate students. This has increased the overall level of effort to generate external support for graduate student research in past several years

4. Advocate for return of indirect costs from external funding sources to help support graduate research expenses and create research infrastructure.

Through collaboration with the Dean of the School of Science and Technology, and the Provost of the University, the University has implemented the return of a portion of indirect costs to Principal Investors in the Department. These funds are expected to be used by those PIs towards the research efforts associated with their graduate student research programs. In several cases, faculty have used returned indirect costs to directly support graduate student stipends.

5. Explore strategies for developing office space for use by the graduate program.

The Department has dedicated one faculty office space to use by the graduate students for use in holding TA office hours and has provided a computer in that space for use in conducting work associated with teaching efforts. This space also contains secure graduate student mailboxes.

Graduate student space for research, meetings, and storage of personal materials remains limited. Currently, most graduate students reside in their faculty advisor's lab. This reduces space available for research activities and ultimately limits the size of the graduate cohort. As the Department has worked to increase the number of graduate students in the program, a concomitant amount of space has yet to be identified that would satisfactorily serve the needs of the graduate student cohort.

6. Progress for implementation of assessment tools for the graduate program.

Several assessment tools were developed for the graduate program in Biology and include: a Thesis Assessment Rubric, a Teaching Associate Observation Rubric, a Progress Report Form, and a Graduate Student Exit Survey. The Teaching Associate Observation Rubric remains an important tool in aiding faculty in generating formal documented observations of graduate students as Teaching Associates. These observations are used to provide feedback to graduate students as part of a requirement to participate in two teaching experiences during their degree progress. In addition, the observations serve as references when graduate students seek evidence of evaluation of the teaching skills (e.g. when applying to graduate schools, or jobs).

The progress Report Form is used by graduate students who seek to enroll in Project Continuation (Biology 578) for more than one semester. This allows the Graduate Coordinator to monitor the progress of students through the degree and provide any necessary facilitation of motivation to help the student complete the program.

The Graduate Student Exit Survey is no longer used. After being implemented for several years, it became obvious that the "anonymous" survey was not truly anonymous with only, at most, a handful of students finishing their degree each semester. As students expressed concern about the lack of true anonymity, the faculty determined the exit survey would not serve as an effective tool for receiving unbiased and candid responses from the participants.

The Thesis Assessment Rubric was never employed as Graduate Faculty determined that professionals selected to serve each on Advisory Committees would be able to adequately assess the Theses manuscripts and presentations of the graduate students without the simplified rubric and felt the Rubric duplicated the detailed input received by students from the Advisory Committee on their thesis drafts.

7. Increase compliance with recent revisions to graduate policy through a mandatory retreat of graduate faculty.

The intent of this recommendation was to increase compliance with the large number of new revisions that occurred to the graduate program policies. In practice, improved compliance with graduate policy was achieved through education and monitoring by the Graduate Coordinator and through extensive interaction of faculty members on Advisory Committees. Graduate faculty members have been briefed and reminded of policy changes at Department faculty meetings as well as individually (particularly for Graduate Research Faculty not in the Department of Biology). However, no retreat dedicated to graduate policy review has occurred.

Applicant files are assembled by the Graduate Coordinator and must meet minimum standards of review. Each application is reviewed by all members of the Biology Graduate Committee prior to acceptance into the program in accordance to guidelines set forth in the graduate program policy.

All new graduate students are provided a student orientation when they enter the program with an associated outline of the expectations and recommendations associated with graduate policy (Appendix IV).

Progress and compliance with graduate policy is monitored via a series of checkpoints established through the degree progress. The MS Coursework form (Appendix V) is due for review by the graduate coordinator at the end of the first semester and establishes the advisory committee for the student as well as lays out expectations for coursework associated with their sub-discipline. The GS-01 form (Appendix VI) is signed by all members of the student's Advisory Committee as well as the Graduate Coordinator and confirms that the student has passed an oral exam and has met written English proficiency requirement prior to advancement to candidacy. The GS02 form (Appendix VIII) is signed by the student's Advisory Committee Chair as well as the Graduate Coordinator and confirms that all required coursework has been completed, that advancement to candidacy was approved, and that the culminating experience, the Thesis, has been approved by the Advisory Committee.

Action items for the long term:

1. Seek return of release time for the Graduate Coordinator position.

Despite efforts to regenerate the release time for the Graduate Coordinator, the School of Science and Technology has not been able to prioritize funding for this position. A recent university-wide survey conducted in 2013 found that Graduate Coordinator positions were largely supported in graduate programs across campus with the exception of those in the School of Science and Technology such as Biology and Kinesiology (note: the nursing receives external funding to support the position).

2. Make a strong departmental case for new hires with research programs in areas of programmatic deficits.

Extensive efforts have been made in to generate new tenure track hires in the Department of Biology. In the last program review, particular concern was expressed regarding both graduate student recruitment and graduate course offerings in the Molecular & Cellular Biology (MCB) sub-disciplines. As a result of this effort to hire new faculty and enhanced efforts by existing MCB faculty, we have established an improved balance both in terms course offerings and the overall graduate student cohort. In 2009 we had four graduate students who could be identified as focused on the MCB disciplines. Since then, we have doubled that level with eight students currently associated with those sub-disciplines. Moreover, graduate course offerings in the past five years have included six MCB focused topics (Developmental Mechanics, Extremophiles, Secondary Metabolites, Environmental Stress and gene response, Mechanisms of Disease, and Molecular Adaptations). Four of our more MCB focused faculty have participated in providing this more robust MCB graduate curriculum. We also note that the incorporation of molecular tools by faculty and graduate students working in other disciplines has increased exposure to MCB content throughout the department.

3. Explore workload mechanisms that acknowledge the extraordinary time commitment necessary for supervising publication quality student research and encourage faculty to accept graduate students.

The Department has consistently followed the model providing 18 WTUs of direct classroom instruction and 6 WTUs of Supervisory instruction per year. The Department has not been successful at developing proposals for additional release time to support supervision of graduate research efforts. Areas where the Department will seek to enhance opportunities to generate release time for increased participation in supporting the research efforts of graduate students include: 1) seeking a basic level of release time for the Graduate Coordinator as articulated above in section 1 under long term action items; and 2) seeking release from direct classroom teaching for work on externally funded projects with students that bring substantial resources to the University.

4. Explore mechanisms for increasing institutional support for graduate students

The Department of Biology has been able to make some in-roads in improving support for graduate students, but still has a long way to go before the levels of support are adequate. First, with the support of the Dean of the School of Science and Technology and the University Provost, start-up funds have increased for the most recent tenure track hires in Biology. Although these funds are still at a level well below those of other universities where graduate research is expected, the increases have been strongly appreciated and are being effectively deployed for the improvement of opportunities for graduate students seeking to work with our newer faculty.

One important institutional deficit is the inability to generate scholarship or financial support commitments from the University for incoming graduate students. These letters of support commitment are standard at many competing institutions, leading to the loss of qualified students from the program. This is due, in part, to the structuring of the scholarship application process at SSU. The deadline for application for scholarship support for Fall semester is in December, several months prior to the admission of students

to the biology graduate program. Thus applicants are required to apply for financial aid prior to applying for the program and without knowing if they are accepted into a research lab. Functionally this has meant that graduate students do not receive any scholarships or financial aid from the University during their first year. This problem could be solved by having a separate financial aid application deadline for graduate programs.

As the number of graduate students seeking access to tuition waivers has increased the university has also increased the number of waivers supported. In 2009 there were 10 graduate tuition waivers available across Sonoma State Campus, whereas that number has increased to 30 waivers budgeted for funding and 34 waivers actually funded for the 2015-2016 academic year. However, the Department of Biology has been informed that access to tuition waivers is unlikely to continue to increase at the rate it has since 2010 and that the graduate program should plan accordingly. In addition, tuition waivers are granted on an annual basis rather than a semester by semester basis which restricts the flexibility necessary to accommodate graduate work at remote locations needed to acquire new training or techniques or to complete seasonal field work needs.

The rate of pay for teaching associates has increased from \$884 per WTU to \$968 per WTU. TAs have received two raises in their pay rate in the last five years which is appreciated by the program. However, the rate of pay for teaching associates is still dramatically below that which can minimally support a graduate student and is substantially below that found in graduate programs at other universities. This will continue to be a focus of our efforts to better support our graduate students.

Finally, a concern that was explicitly expressed in the prior program review was the need to hire additional tenure track faculty in the Department of Biology. Despite the recent hiring of three new tenure track faculty in the Department, the Department has simultaneously suffered losses of four Biology faculty (Christmann, Buckley, Nielsen, and Whitkus) either to retirement or to other positions at SSU or other institutions. Moreover, two of the four Graduate Research Faculty who formerly have had graduates students through the Biology Graduate Program are no longer active in the program. In 2009 there were 11 Biology faculty and 4 Graduate Research Faculty (from Anthropology, Chemistry, & Environmental Science and Planning) to serve 27 graduate students. Currently there are 10 Biology faculty (with one more to join in Spring of 2017) and 2 Graduate Research Faculty (from Anthropology & Environmental Science and Planning) to serve 35 students. Additional graduate research faculty are needed more than ever. Efforts to hire additional faculty in Biology will remain a priority moving forward in an effort to grow the Biology Graduate Program as the university grows as a whole.

Educational Effectiveness

To review the educational effectiveness of the graduate coursework associated with the program, the Graduate Committee meets to assess the recent coursework offerings in light of our ever changing graduate cohort and their associated sub-disciplines. A review of Table 1 shows that the graduate courses provided since the last program review provide substantial coverage of the program learning objectives. Critical to our program goals is that we provide opportunities for every student meet all of the learning objectives within the course of a two year sequence, a standard which has been consistently met in the time since the last program review. It should also be noted that in addition to the required graduate level course requirements, most students take

additional coursework either in undergraduate courses or through independent study efforts outside of their Thesis efforts. Thus, students have ample opportunity to meet all of the learning objectives associated with the Graduate Program in Biology.

Informal Feedback

As an additional means of assessing educational effectiveness, the Graduate Coordinator maintains an open door policy to all graduate students and seeks input on course offerings. This has led to numerous opportunities for students to express their views of program. We have found this to be an effective mechanism to judge the success of all aspects of our program on a real-time basis. In addition, the Department has supported the formation of the Biology Graduate Student Club with a Faculty Advisor who is different from the Graduate Coordinator. This organization has officers who organize opportunities for the graduate student body to express their concerns which are reported by the Graduate Student Representative to the Club Faculty Advisor, the Graduate Coordinator, or the Biology faculty as a whole at faculty meetings. This informal feedback structure has proven to be the most effective mechanism for receiving candid perspectives from the graduate student body and has resulted in adjustments being made to the graduate program.

Student Preparation

The Graduate Faculty in the Department of Biology have determined that the most relevant way to assess whether students are adequately prepared after completing the M.S. in Biology is to evaluate: 1) whether they are able to generate Theses that are of the quality to be published in peer-reviewed scientific journals and 2) whether the students are able to go on to Ph.D. programs and jobs associated with the biological sciences. These measures provide real world evidence of whether the culminating experience as supported by the coursework and mentoring provided by the graduate faculty are valued outside of the Department of Biology.

Thesis Publication

Since our program is research based, we consider the ability of students to publish their thesis in peer-reviewed journals an important metric of whether we are meeting our program mission. Graduate students also earn co-authorships based on research contributions made while at Sonoma State University. Since 2009 SSU graduate students have published or have currently in review 21 first authored and 19 co-authored publications in 24 different peer-reviewed journals. Appendix X lists all 40 manuscripts produced by our graduate students.

In the previous program review we found that students had published 27 manuscripts in peer-reviewed journals, with 18 as first author and 9 co-authored, over the course of seven years (2002-2008). Despite the recent turnover in faculty (loss of four tenure-track faculty) since 2009 and the fact that three of our current 11 tenure track biology faculty have been hired since 2014, our graduate students have nevertheless maintained a strong pattern of publishing their Thesis work. We expect that as our new faculty establish their research programs with graduate students, the overall level of productivity as measured by biology graduate student publication will increase further.

Student Career Tracking

Our program mission places a strong focus on preparing students for a career or career shift either by pursuing a PhD. or by obtaining a job that uses their biological knowledge and skills. To assess this key goal the program maintains tracking data on recent graduates to evaluate how well students advance into positions following completion of their degree. Of the 42 graduates from our program since 2009, 41 went on to use their Master's degree in Biology in the next step in their career path.

The tracking data reveal that 12 students have moved into Ph.D. or DVM programs, 7 hold faculty positions in community colleges, 10 have taken positions with private agencies, 7 with public agencies, and 5 work for non-profit organizations. See Appendix XI for a detailed list of graduate tracking data.

Effective Use of Resources

Graduate faculty in Biology have been as effective as possible in coordinating the use of existing facilities and equipment among the graduate student research projects. Sharing of resources has long been a key component of the culture within the Department of Biology. As the research experience is paramount for the graduate program in biology, faculty and staff work to provide access to any necessary equipment and even consumable resources available to Department members.

Despite the generally effective coordinated use of resources, there remain serious concerns regarding several areas of resource use. First among these that needs attention is space utilization to support graduate students. During the time since the last program review, faculty research and office space has become available as faculty have retired or transitioned to new positions within and outside of the University. These research spaces have not been used to maximum efficiency during this period. Improved efforts to identify little used research space and to find economies of office space could provide additional space to house the increasing number of graduate students entering the program. Of particular concern is identifying space for students of Graduate Research faculty outside of Biology without isolating the students from the rest of the graduate cohort.

Another troubling concern is that resources provided to cover maintenance of or replacement of equipment has not been returned to the School of Science and Technology after removal of these funds during a time of budget reductions. As a result, most of the new equipment that has been brought into the Department has come from individual faculty start-up funds to new faculty and from external grant funds obtained by graduate faculty. We rely more and more on faculty using grants and other outside sources of funding for research to supplement equipment, maintenance, and supplies for teaching. We also are dependent on donations of surplus materials from the community to cover course materials in an effort to free up costs for maintenance efforts. Regular allocations towards maintenance of existing equipment and updating with new equipment or facilities is a standard met at many universities because it assures that students are able to receive the most up to date educational experiences associated with the science disciplines. It should be noted that some relief has developed recently through the implementation of course fees in additional undergraduate courses, which provides additional opportunity for support of maintenance and/or improvement of infrastructure for graduate program efforts.

Improvements Needed

The Department of Biology will focus on improving aspects of curricular development, program assessment, and improving access to important resources during the coming years.

Curricular Innovation

Informal student feedback from students and through Graduate student representatives suggest that alterations to the Professional Skills course offered each Fall semester can target specific needs of in-coming students through an enhanced course structures that provide hands-on or workshop activities to reinforce some front loaded concepts related to data management, literature search and reference management, proposal program identification and proposal development, scientific

networking, and meeting attendance. In addition, students have requested an enhanced selection of more specialized courses. The graduate committee will investigate potential curricular mechanisms to allow faculty to provide an enhanced selection courses within their normal teaching load in way that will avoid negatively impacting the undergraduate curriculum. Finally, TA training provided through a workshop early in the first semester should be developed to support incoming students who will be engaging in serving as Teaching Associates.

Program Assessment

The Department of Biology will take some immediate steps to improve program assessment for the next program review period. The Department will implement assessment tools developed previously, but not implemented adequately during the last review period including the graduate student exit survey and the Thesis Assessment Rubric. In addition, the Graduate Committee will seek to develop and Oral Examination Rubric to be implemented and assist with evaluation of students prior to advancement to candidacy. Finally, the Graduate Committee will seek to document selection of graduate course topics in light of established program learning objectives, advances in the sub-fields of biology, and the dynamic composition of the graduate cohort.

Resource Improvements

Many areas of concern regarding improvements to the Graduate Program in Biology over the next period years largely entail increased support from the university. These areas of concern begin with aspects of graduate student support and include increases in pay for teaching associates and continued support of access to tuition waivers. In addition, the Department of Biology needs to address graduate student space needs in a more comprehensive way so that all Biology graduate students can have adequate space in a manner that maximizes opportunities for critical collaboration and intellectual interaction.

Providing additional support to faculty in the graduate program would also provide a stronger program and graduate student experience. Faculty release time for the Graduate Coordinator position is becoming critical to maintaining the ability to address all of the duties associated with that position as the program continues to grow. In addition, continued enhancement of faculty start-up funds for new faculty will keep the program and the university moving in direction to continue to compete for the highest level faculty hires and graduate applicants. This will also allow the new faculty we do hire to be able to compete effectively right away with other Biology programs in California and across the nation.

Continued efforts to hire new tenure track faculty in Biology would allow the Graduate Program in Biology to grow as the university grows rather just continue to figuratively tread water with the same number of faculty year after year. Despite the recent hires, recent losses among our faculty have left us in the same plight of having the same number of faculty covering the program workload, despite the increasing numbers of graduate students coming through the program. The Department of Biology could also work to further engage additional Graduate Research faculty from outside the Department as appropriate thereby increasing the opportunities for graduate education in Biology at SSU in a widening array of sub-disciplines.

In addition, identification of mechanisms to provide additional workload for faculty bringing in externally funded large-scale research projects would improve the program in many ways. The ability for research intensive faculty to work more closely with their graduate students to deliver the research products associated with those large-scale awards would benefit graduate students and

associated faculty by increasing the productivity of these individuals, thereby ensuring additional opportunities for generation of external funding. In addition, this approach would also enhance the educational experience for our undergraduate population and increase the standing of the university overall.

Finally, support for maintenance and acquisition of departmental resources are necessary for the ongoing research efforts associated with the culminating experience of the Biology graduate students. An effort to return prior equipment support to the School of Science and Technology would not only provide a well past due boost to the Graduate Program in Biology, but would enhance every educational aspect of the science programs at SSU, both graduate and undergraduate.

Dissemination of Findings

Copies of the Self Study, the External Review, and an Executive Summary will be provided to all Graduate Faculty associated with Graduate Program in Biology. In addition, the Program review documents will be provided to the Dean of the School of Science and Technology, the School Curriculum Committee, and Academic Programs. Actions related to the graduate program generated by the program review will be presented to Graduate faculty in Departmental meetings.

Response to External review

We invited a scientist and faculty member from a similar/comparable institution to provide an external assessment of the program following the guidelines for external review set forth by Sonoma State University. Dr. Emily Taylor conducted the review. Dr. Taylor is currently the Graduate Coordinator in Biology at California Polytechnic State University in San Luis Obispo and has participated in several Graduate Program reviews. Below are the recommendations made by Dr. Taylor specific to the Graduate Program and the Department's response.

Recommendation 1: Continue to offer graduate seminars as core offerings in the curriculum, and increase the number of graduate course offerings if possible.

Response: The Department concurs with the need to hire additional graduate faculty who could participate in both the undergraduate and graduate curricula. Currently, the Department works hard to ensure that our undergraduate curriculum is well supported. The Department has made a number of changes to the undergraduate curriculum in the past few years in an effort to streamline the curriculum and reduce to extensive number of faculty overloads that had been occurring. Currently it is not feasible for every faculty to participate in the graduate curriculum every year and still maintain a robust undergraduate curriculum along with mentoring of graduate students. However, as we increase the tenure track faculty cohort, we will seek to enhance the formal coursework component of the graduate curriculum to provide more consistency in courses that are needed by all or most graduate students (e.g. Professional Skills, Statistical Analysis) as well as increase the breadth of offerings at the graduate level for the variety of sub-disciplines that exist in the Department.

Recommendation 2: Consider generating a formal system of checks and balances that requires students to take oral exams before beginning major data collection, not after

Response: The Department Graduate Committee will investigate changing program policy to provide more strenuous enforcement of advancement to candidacy in a timely fashion. Potential mechanisms to be considered include stronger encouragement from the Graduate Coordinator,

requirement for progress report after one year, reduction in access to TAs and/or waivers and ultimately removal from the program.

Recommendation 3: Consider reevaluating the requirement that faculty accept at least three graduate students prior to tenure and promotion.

Response: The Department will refer this recommendation to the Department Retention, Tenure, and Promotion Committee for consideration within the context of overall department philosophies, traditions, and goals.

Recommendation 4: Consider implementing a TA training program for first semester graduate students.

Response: The Department has recognized that incoming graduate students, in particular, benefit from training in new skills that associated with participation as a science professional at the graduate level. As a result we have implemented the “Professional Skills” seminar provided each Fall and targeted to incoming Graduate students as well as more advanced students. However, this course does not focus on the students’ development as teachers. Given the requirement to participate as a teaching Associate in the Biology curriculum, the Department Graduate Committee will review the options and develop a plan to provide teacher training for incoming students either prior to or during their first semester at SSU.

Recommendation 5: Continue to underscore the importance of faculty release time for mentoring graduate students

Response: The Department concurs with the reviewer and maintains the position that WTU credit for mentoring graduate students is critical to the maintenance of this important program. The amount of time and effort used to mentor and provide support for graduate student research and teaching efforts is considerable and we support the statements of support provided in the external review. Moreover, we emphasize the critical importance of faculty taking and supporting graduate students who participate extensively in the effective delivery of the undergraduate curriculum in the Department of Biology. The integration of efforts among the undergraduate, graduate, and faculty levels is essential to the maintenance of a strong department in Biology.

Recommendation 6: Provide release time for the Graduate Coordinator.

Response: The Department has also long recognized the deficit in support for the Graduate Coordinator position. The workload in that position continues to grow as the program continues to increase in size. In addition, the graduate student cohorts are becoming more complex, with more out of state participants who require additional guidance. Finally, the students in the program are seeking to increase their participation in the administration of the program and of the Department as a whole, which will require development, implementation, and monitoring of new structures, policies, and procedures (e.g. Biology graduate club, Graduate Representative election process, improved TA training and observation). We will increase efforts to work with the School of Science and Technology to generate release time for the Graduate Coordinator position.

Recommendation 7: Work on developing assessment procedures to analyze the efficacy of the program.

Response: The Department Graduate Committee will develop and implement assessment tools to allow better evaluation of how students are meeting the learning objectives of the program. In the short-term the Committee will seek to modify and implement assessment tools that have been implemented or explored in the past. The Committee will modify the existing Teaching Observation rubric to be sure that it also aids in assessment of student learning objectives. The Committee will seek to re-implement a Thesis Assessment Rubric developed previously for the assessment of students at their Thesis Defense. The Committee will also develop and implement an Oral Exam Rubric to allow a consistent assessment of student preparation related both to their Thesis research efforts as well as to program learning objectives. In the long term, the Committee will investigate the possibility of additional assessment tools for use in assessing additional program learning objectives. In accordance with these enhanced assessment efforts, the Department will more strongly seek to re-establish support for the Graduate Coordinator position.

Recommendation 8: Re-implement the exit survey as a means of collecting data on the program from recent *graduates*.

Response: The Department had previously developed an exit survey for students completing the program. However, we found that there was a lack of anonymity associated with that survey process (typically only a few students finish at one time, so there was a perceived lack of anonymity in completing the survey). In addition, most students need the support of the faculty mentor for letters of recommendation, additional funding support, networking opportunities, and contacts. As a result of the combination of these circumstances we found that student interest in participating in the survey was very low. However, we will re-implement the exit survey and use these results to glean what we can regarding the graduate student experiences of our students upon completion of their degree.

Recommendation 9: Discuss fundraising opportunities with representatives from SSU's advancement office

Response: The Department has met with representatives of the SSU Development Office in the past. These interactions and relationships have led to generation of funding for Departmental efforts through the combined efforts of faculty and Development Office staff. Nevertheless, enhanced efforts to coordinate with the Development Office with a focus on Graduate Student support could be undertaken. The Department Graduate Committee will seek to meet with Development Office Staff after conferring with all Department faculty regarding the needs, goals, and potential strategies associated with supporting their graduate students.

Action Plan

Action Items for the short-term

1. Make a strong case for re-institution of release time for Graduate Coordinator. The Department will work with the School of Science and Technology to review the demands of

the Graduate Coordinator position as well as standard support practices for this position within SSU and the CSU system.

2. Attempt to expand graduate course offerings. The Department will seek to make improvements to specific courses as well as seek to identify mechanisms to provide additional course offerings at the graduate level.
3. Adjust formal system of checks and balances to increase compliance of timely completion of oral examinations. The Graduate Committee will develop mechanisms that enhance the enforcement of advancement to candidacy in a timely fashion.
4. Implement additional program assessment tools and procedures. The Department will implement existing assessment tools and develop others to enhance program assessment during the next review period.
5. Meet with Development office staff to discuss fund raising for graduate research.

Action items for the long-term:

1. Make a strong case to hire additional graduate faculty in areas of programmatic deficit. The program is still in deficit relative to past years in the program and will work with the School of Science and Technology to identify key faculty hiring needs in the Department that will improve the program.
2. The Department will refer a recommendation to re-evaluate the Tenure and promotion requirement for graduate student mentoring to the Department Retention, Tenure, and Promotion Committee.
3. The Graduate Committee will investigate the development of a TA training program through either a short workshop format or semester course format.
4. Explore mechanisms for generating additional faculty release time for mentoring graduate students. The Department of Biology will investigate additional mechanisms to generate additional support for faculty who generate large externally funded projects that support student research.
5. Explore mechanisms to increase institutional support for graduate students. The Graduate Committee will continue to work towards increased TA compensation by making the case regarding the critical role of graduate students in the delivery of university curriculum.

Program Coordinator, Derek Girman

Prior Program Coordinator, Dan Crocker

Department Chair, Murali Pillai

APPENDIX I

Thank you for your interest in our Master's Degree program. One aspect that is critical for admittance into our program is to make sure that one of our faculty members is familiar and/or interested in taking you into their research program. To gain admission into the Biology Master's program, each graduate student must have a faculty mentor who accepts the responsibility of being a primary Thesis advisor and Chair of a Thesis evaluation committee. So, even a student with great qualifications will not be accepted into the program unless a faculty member has indicated a willingness to accept them into their research group.

Be sure to contact the faculty member whose research interests are most closely aligned with your own and evaluate whether there would be a good "fit" for both parties.

<http://www.sonoma.edu/biology/faculty/>

To Apply, you will need to submit your application materials which include both an online component as well as materials sent to me directly as described in our application process (<http://www.sonoma.edu/biology/graduate/admission.html>).

To summarize: Complete an online University application via CSU Mentor (www.csumentor.edu) NOTE: After you submit online, be sure to print a hardcopy to send to the Department of Biology Graduate Coordinator. Also an official copies of all undergraduate transcripts will need to be sent to Admissions and Records Office, Salazar Hall, Room 2030 Tel: (707) 664-2778) and a copy of your transcripts (can be unofficial) should also be sent to me in the Department of Biology (this can be scanned and emailed if your prefer).

Please send a one-to-two page Statement of Purpose detailing your background in biology, objectives for graduate school and career goals as well as a copy of your Graduate Record Examination (GRE) scores for the General Test (this can be emailed to me if you prefer). Finally, two letters of recommendation from individuals familiar with your background in biology and able to comment on your potential for conducting primary research should be sent to me (either directly by mail or via email).

We hope you find a great collaborative relationship with one of our research scientists.

I wish you all the best in your application process at SSU and your pursuit of a graduate degree.

Sincerely,

Dr. Derek Girman
Graduate Coordinator
Department of Biology
Sonoma State University
1801 E. Cotati Ave.
Rohnert Park, CA 94928

APPENDIX II

Sonoma State University Department of Biology

Graduate Research Faculty Status: Criteria, Application Procedure and Review Process (Approved 2/16)

Tenure-track faculty in departments other than Biology at Sonoma State University are eligible to chair Advisory Committees for the Master's degree program in the Department of Biology, provided they have been granted Graduate Research Faculty status in the Department of Biology. To this end, the Department welcomes outstanding faculty members who wish to join our activities through Graduate Research Faculty status.

1. Application Procedure

To be considered for Graduate Research Faculty status, an application package must be submitted to the Chair of the Department of Biology. This package must include:

- a. A letter of application that includes a summary of the applicant's recent research and other academic activities, and a statement of purpose for applying for Graduate Research Faculty status.
- b. A current curriculum vitae.
- c. A signed memorandum of understanding from the faculty member's home department that agrees to the granting of Graduate Research Faculty status by the Department of Biology.

2. Criteria for Graduate Research Faculty Status

Tenure-track faculty at Sonoma State University may be granted Graduate Research Faculty status in the Department of Biology based on meeting the following criteria:

- a. active engagement in a field of research that is appropriate for potential students in the Biology graduate program.
- b. demonstrable ability to mentor graduate students in Thesis research at a level of quality consistent with the standards of the Department of Biology.
- c. ability to generate appropriate research support for graduate students in biology.
- d. willingness to work within the policies, traditions, and guidelines associated with the Department of Biology graduate program.

3. Review Process

All applications must be reviewed and approved by a majority of the faculty in the Department of Biology, based on the criteria listed above. A review of the standing of current Graduate Research Faculty will be conducted once per year. Graduate Research Faculty members who are not supported for renewal will have Graduate Research Faculty status removed and will be notified by the Department Chair.

APPENDIX II

MEMORANDUM OF UNDERSTANDING

For Graduate Research Faculty in the Department of Biology Sonoma State University

Graduate Research Faculty status in the Department of Biology entails the following:

1. Graduate Research Faculty members are not required to teach in the Department of Biology.
2. Graduate Research Faculty members are expected to arrange office space and financial support for graduate students they advise. The Department of Biology will aid in financial support (Teaching Assistantships) when available and provide access for the students to the Department's facilities.
3. All graduate policy matters and graduate student information currently made available to the Department of Biology will be forwarded to Graduate Research Faculty members. Graduate Research Faculty members will have the right to vote on new graduate policy.
4. For Advisory Committees with Graduate Research Faculty members as chairs, at least one Department administrative faculty representative must be chosen from the remaining committee members. This individual serves as the student's advocate in all administrative matters in the Department.
5. When Biology graduate students sign up for graduate supervisory courses (BIOL 595, BIOL 599), FTE earned in the Department of Biology will be assigned as workload to the Graduate Research Faculty member in accordance with the policy of the Graduate Research Faculty member's home department.
6. Graduate Research Faculty status is subject to annual review and renewal by the faculty of the Department of Biology.

Additional comments or points of understanding provided by the home department should be attached as an additional page.

Applicant: _____ Date _____

Home Department Chair: _____ Date: _____

Biology Department Chair _____ Date _____

APPENDIX III

GRADUATE COORDINATOR DUTIES

I. PROGRAM ADMINISTRATION

A. Advertising

1. Organize/construct/maintain Graduate Program website
2. Disseminate informational materials to School, University, and public

B. Departmental/Programmatic

1. Policy/curriculum
 - a. Initiation/drafting of policy/curriculum changes
 - b. Update policy/curriculum changes in various sources
 - SSU catalog
 - SSU/department website
 - Brochures
 - c. Oversee/coordinate graduate courses with Curriculum

Committee/Department/Program

2. Chair/member/coordinator of Departmental/Program Graduate Committee
3. Faculty matters
 - a. Orient/supervise new faculty in program
4. Information coordination related to graduate program
 - a. Report from Graduate Studies Subcommittee of Educational Policy Committee

(EPC)

- b. Information sharing with individual graduate programs at SSU
- c. Information sharing with related graduate programs at other institutions
5. Decide/coordinate disbursement of Project Continuation funds
6. Gather/coordinate/draft information for program reviews
7. Negotiate with other departments/faculty
 - a. Access to space/equipment
 - b. Attract faculty to serve on student committees

C. University-Wide

1. Representative to Graduate Studies Subcommittee of EPC
2. Interim Program Review for Western Association of Schools and Colleges
 - a. Gather/coordinate/draft interim program review for Graduate Program
 - b. Present/defend draft interim program review to Graduate Studies Subcommittee of EPC

II. STUDENT CENTERED ACTIVITIES

A. Prior to entering program

1. Contact person for all inquiries about Graduate Program
 - a. Phone, email, letter communications
 - b. Present overview of Graduate Program and suitability to potential applicant
 - c. Advise potential applicants on Graduate Programs in general and relevance to career goals
2. Organize application materials into individual application packets
3. Contact applicants regarding status of application
4. Initial review of applicants
5. Coordinate applicants with potential major advisors

APPENDIX III

6. Present applications to Department/Graduate Committee for selection
7. Contact applicants regarding acceptance/non-acceptance of application to Graduate Program

8. Signing/filing recommendation on applicants to Admissions and Records

B. In program

1. Advising/orientating students
 - a. General advisor to students throughout program (individuals or cohorts)
2. Disseminate timely information to students
 - a. Maintain mail and email list
3. Tracking of students through program
 - a. Maintaining adequate progress
 - b. Change in status determination and filing forms
 - c. Review and signing of GS01 and GS02 forms
4. Police policy/curriculum requirements
 - a. Timely signing/filing of forms
 - b. Checking progress of individuals through program
 - c. Advising/informing students on progress through program
5. Nominate students for appropriate awards, provide letters or recommendation
6. Negotiate/determine course validation for credits past seven year limit
7. Coordinate/oversee scheduling/advertising of public thesis defense
8. Maintain student files

C. Post graduation

1. Post graduation assessment of program (WASC)

APPENDIX IV

Overview of the Program

There are about 35 Biology Graduate Students (35 Fall 2015)

12 Research faculty associated with Biology Program

10 in Biology

1 in ENSP

1 in Anthropology

The Biology MS at SSU is a research-based degree

Primary mission is Research project

Must make completing your thesis THE priority

Classroom activity is helpful, provides an immediate concern

Thesis is longer term concern, but must find way to prioritize research

Standard expectation is that student will complete a publication quality research project

Teaching Requirement

Each student is expected to TA minimum of two Biology course lab/discussion sections

Bio 110, 130, 131, 320A, 320B

Provides opportunity to gain teaching experience

Provides Tuition Waiver Opportunity and minor income

Coursework

30 units required to complete degree

Full time for Graduate Student is 8 units

Minimum of 15 units must be 500 level (THIS WILL BE CHANGING)

All remaining units must be 300 or higher (no 100 or 200 level courses)

Up to 6 units can be **Biol 595** (Special Studies)

Taken prior to advancement to candidacy (orals)

More 595 can be taken, only 6 count towards MS

Up to 6 units can be **Biol 599** (M.S. Thesis work)

Taken after advancement to candidacy (after pass orals – Approved **GS01 form**)

Requirement of three (3) graduate seminars (2 units each)

Biol 500S

Example of Coursework plan

6 units 595

6 units 599

6 units 500s

12 units of any upper division coursework

includes standard courses and contract courses

If additional semesters needed to complete Thesis:

Biol 578 – Continuing Enrollment

Through Extended Ed. (~\$250)

First semester, no requirements, automatically approved by coordinator

Additional semester requires progress report

Review of work completed

Plan for completion of thesis with timeline

Approval of committee

APPENDIX IV

Forming Committee

Composition

Major Advisor

One member from Campus faculty associated with Biology Graduate Program

One qualified individual - Must have Ph.D.

Can be from SSU or outside of SSU

One “outside” member – assigned by grad coordinator from Biology Grad faculty

Stands only for participation oral exam

Does not participate in other review/defense activities

Additional member may be added to the committee if expertise is deemed necessary

Mission #1 – Form your committee by the middle of your first semester (earlier is better)

See **Course Plan Form**)

Course Plan

Once Committee is formed, have meeting to approve Course Plan

See **Course Plan form**

Submit approved Course Plan form to grad coordinator by end of 1st semester

Oral Qualifying Exam

Exam used to determine if student prepared to conduct thesis research

Target end of second semester (earlier is better if ready)

Produce Thesis Proposal

Advisor should provide direction on preferred format and have examples

Request assignment of “**outside member**” from Graduate Coordinator

Randomly assigned from graduate faculty pool

Provide to your committee **3-4 weeks prior to desired oral exam date** (earlier = better)

This includes your outside member

Must have **approval** of proposal from all committee members **prior** to scheduling exam

Pre-orals meeting held with committee at least **two weeks prior** exam date

Review oral exam format

Go over issues of concern with committee members

Get idea of subject areas on which to “brush up”

Presentation – **20 minute** power point at beginning of exam

Defend Proposal and Project

~ one (1) hour of specific questions on proposal

~ 40 minutes on broader questions related to your field of science

Expect that committee will seek to aid in making sure project is ready

Expect that committee will seek to define the boundaries of your knowledge

If Pass Oral Exam – Submit completed and signed **GSO-1 form** to Graduate Coordinator

See GSO-1 form

Submission of GSO-1 allows access to Biol 599

Pass Unconditionally

Conditional Pass – Fairly common

May have requirements that must be met prior to defense

APPENDIX IV

Fail – If fail will work with Advisor to determine path from that point
It is important that you do NOT wait to last week or two prior to desired oral exam date to submit proposal to committee members

Thesis Completion

Mature Draft of Thesis:

Submit a complete draft of your thesis to your Major Advisor at **the beginning of the semester you wish to defend**. Complete editing of thesis with Major Advisor.

Sent to committee members (outside member no longer involved)

Submit thesis draft to committee members at least **two months** before your desired defense.

Committee members must **approve thesis** as “**ready to defend**” prior to scheduling defense.

Finding time for defense suitable to all committee members can be very difficult

Typically not accommodated if too close to Thesis Submission deadline

Often can get critique or comments on thesis document from committee prior to presentation

Defense date: Target a date for a public presentation and defense of your thesis project that is at least two weeks prior to Thesis due date for the semester you hope to complete your degree

For 2016 the Thesis due dates are:

- December 4, 2015 for Fall 2015 graduation
- May 6, 2016 for Spring 2016 graduation
- July 8, 2016 for Summer 2016 graduation

Public Presentation: Defense of your Thesis project

Timing should be during a time when members of the public can reasonably attend

Be sure Public defense is at least two weeks before thesis submission deadline

Often additional work required by your committee after defense

Committee Defense

Immediately after public presentation have separate meeting with committee

Defend project, receive input, identify requirements for completion

Hopefully you have been seeking input from committee members all along

Seeking “no surprises” at defense

Submit completed GSO2 form to Graduate Coordinator

Be sure course work is accurate and meets requirements

Get signatures from committee members on title page of thesis

GS0-2 Form: signed by committee members and submitted to graduate coordinator.

All coursework must be valid and in compliance with university policy

Final draft of Thesis and correct preamble is submitted to Graduate Studies for final review.

Graduate studies will review for formatting compliance

Teaching Assistant

APPENDIX IV

Faculty Lab Coordinators - Faculty are here to guide you with instruction plan and approach

Two versions of Teaching Assignments

Lab sections: Bio 110, 130, 131, occasional upper division

3 hours includes wet labs, computer simulations, discussions, field trips

Each lab section is 2 Teaching Units

Discussion Sections: Bio 320A, 320B

1 hour section discussing readings, going over calculations

Each discussion section is 1 Teaching Unit

APPENDIX V

Department of Biology – MS Coursework and Timeline Form

Name		Advisor	
------	--	---------	--

Graduate Course of Study

University-wide criteria: Minimum of 30 units; At least half the units required for the degree must be at 500 level; Two-thirds of the units must be letter-graded; minimum GPA of 3.0 in program coursework with no course below a C (2.0); a minimum of 21 units should be done in residence with a maximum of 30% of coursework allowed in transfer (for large unit programs); no more than 6 units allowed for the thesis; no classes completed as an undergraduate may be used except those granted provisional graduate credit prior to award of baccalaureate degree.

Dept&Course No.	Title	Units	Grade	Semester Taken/Place

Total

Anticipated Timeline for Completion of Requirements:

Date

	Advancement to candidacy Target	
	Defense of thesis Target	

Date

Student Signature

Committee	Printed Name	Signature	Date
Chair			
Second Member			
Third Member			
Graduate Coordinator			

APPENDIX VI



Graduate Studies
Advancement to Candidacy

GSO1

Name		Student ID Number	
Local Address		Telephone Home	
City, State, Zip		Telephone Work	
Permanent Address		Telephone Message	
Master's Program		Authorized Concentration	

Proposed Title and Short Description of Final Project (4 lines)--Use a second page for a long Description

Special Requirements for Advancement, if any (i.e., oral qualifying exam, etc.)

	Date
Requirement	
How Met by Student	

Writing Proficiency Requirement

	Date
WEPT	
Other Option	

In signing this document, I agree to accept the responsibility of preparing a manuscript that meets the standards of the supervising committee and the University [as outlined in the Guidelines for Master's Theses and Projects published by the university].

Student Signature	Date

In signing this document the committee agrees to accept the roles and responsibilities assigned to the task of acting as evaluators of the quality and substance of this student's final project [as outlined in the Guidelines for Master's Theses and Projects published by the university].

Committee	Name (Typed) and Signature	Date
Chair		
Second Member		
Third Member		
Fourth Member		
Graduate Coordinator		

Review and Data Update:	Date
Graduate Studies Clearance	
Admissions & Records	

APPENDIX VII

Biology TA Observation Rubric

Revised March 2015

Observer _____
 TA Evaluated _____
 Date: _____ Class: _____
 #students attending _____

Generic Rubric For Assessing TA Teaching effectiveness			
Unacceptable =1 TA is not effective in this area of instruction	Marginal = 2 TA has limited effectiveness in this area of instruction	Satisfactory = 3 TA is generally effective in this area of instruction	Exemplary = 4 TA has a high level of effectiveness in this area of instruction

	Score	Comments:
Content of introductory information provided TA provides context for the laboratory exercise. TA links exercise to course content.		
Protocols and procedures explained clearly		
TA is well prepared TA is familiar with lab content and has appropriate resources for instruction		
Level of interaction with students Command of classroom. Responsiveness to student input or questions.		
Teaching style and methods Use of blackboard or powerpoint		

Recommendations and additional comments for TA:



APPENDIX VIII

Graduate Studies

Completion of Requirements **GSO 2**

Name		Student ID Number	
Local Address		Telephone Home	
City, State, Zip		Telephone Work	
Permanent Address		Telephone Message	
Program		Authorized Concentration	

Graduate Course of Study

University-wide criteria: Minimum of 30 units; At least half the units required for the degree must be at 500 level; Two-thirds of the units must be letter-graded; minimum GPA of 3.0 in program coursework with no course below a C (2.0); a minimum of 21 units should be done in residence with a maximum of 30% of coursework allowed in transfer (for large unit programs); no more than 6 units allowed for the thesis; no classes completed as an undergraduate may be used except those granted provisional graduate credit prior to award of baccalaureate degree.

Dept&Course No.	Title	Units	Grade	Semester Taken/Place
Total				

Completion of Requirements:

Date

Thesis/Project	Requires Review by Graduate Studies Office	
Title		
Oral Exam		
Written Exam		
Oral Defense		
Other		

Student Signature

Date

--	--

Final Review and Approval:

Culminating Project & Program

Date

Grade

Thesis Clearance Date

--	--	--	--

Signature, Faculty Chair

Date

Date

--	--	--	--

Signature, Graduate Coordinator

Signature, Graduate Studies

APPENDIX IX

Department Workload Policy

Workload (WTU) Policy

Approved by Department of Biology 12/3/2008

This policy focuses on the distribution of weighted teaching units (WTU) among the tenure/tenure-track faculty in the Department of Biology, with respect to the California State University standards as outlined in EP&R 76-36, Faculty Workload: Policies and Procedures. The three major components of workload are: instruction, assigned/release time (from University sources), and buyout from external funding. The Department makes a commitment to ensuring the normal instructional workload includes teaching in the major core curriculum on a yearly basis and sufficient supervisory workload to support approved curricular needs and requirements. This policy allows for flexibility with workload such that faculty can engage in required professional and scholarly activities and administrative commitments. Exceptions to the guidelines described below may be granted by the Chair and Curriculum Committee upon written request by a faculty member before the upcoming schedule of classes is finalized.

- 1) Each faculty member is expected to offer a minimum of 18 WTUs in scheduled classes per academic year. This instructional workload does not need to be equally distributed between the Fall and Spring semesters. Each faculty member is responsible for generating 3 WTU of supervisory course workload per semester to bring the total instructional workload to the CSU standard of 24 WTUs per academic year.
- 2) Upon approval of the Curriculum Committee and the Department Chair, assigned, release or buyout time may be used to reduce the 24 WTU of instructional workload obligation, with limits set below.
- 3) A maximum of 12 WTU from a combination of assigned or release time (acquired for university governance, oversight of programs, etc.) or buyout time (acquired from grants and contracts) will be allowed to reduce the 24 WTU of instructional workload per academic year.
- 4) The Curriculum Committee and the Department Chair will assign additional instructional workload to those faculty members who do not meet 24 WTU of instructional workload as specified above.
- 5) The 6 WTU per year of indirect instructional activity provided by the University for professional responsibility such as student advising, active participation in Department, School, and University-wide governance, and community involvement, must be met by individual faculty.

APPENDIX X

SSU Masters students' peer-reviewed publications 2009 – 2016

- Mazzola, M., **Agostini, A.**, M.F. Cohen. In Review. "Integration of *Brassica* seed meal soil amendment and wheat cultivation for control of *Macrophomina phaseolina* in strawberry". *Eur. J. Plant Pathology*.
- Cushman, J. H. & **L. E. Saunders**. In review. Long-term and interactive effects of different mammalian consumers on growth, survival and recruitment of dominant trees. *Journal of Ecology*.
- Ellis, T.** & J. H. Cushman. In review. Indirect effects of a large mammalian herbivore on small mammal populations: context-dependent variation across habitat types, mammal species and seasons. *Journal of Animal Ecology*.
- Richter, C.**, M. J. Spasojevic, J. H. Cushman. In review. Influence of functional traits, shrub neighbors, and habitat types on plant responses to herbivores. *Plant Ecology*.
- Christie, N.** and N.R. Geist. In review. Temperature Effects on Development and Phenotype in a Free-living Population of Western Pond Turtles (*Emys marmorata*). *Physiological and Biochemical Zoology*.
- Bain, T.K.**, Cook, D.G., D.J. Girman. In Review. The effect of abiotic and biotic factors on movement through wildlife crossing tunnels during migration of the California tiger salamander, *Ambystoma californiense*. *Herpetological Conservation and Biology*
- Dallara, Z.** and N.R. Geist. In Revision. The Role of Maternal Effect, Incubation Temperature, and Gender on Juvenile Growth in Captive-raised Western Pond Turtles, *Emys marmorata*. *Geist Journal of Herpetology*.
- Graham N.R.**, Fisher B.L., D.J. Girman. 2016. Phylogeography in Response to Reproductive Strategies and Ecogeographic Isolation in Ant Species on Madagascar: Genus *Mystrium* (Formicidae: Amblyoponinae). *PLoS ONE* 11(1):
- Somo, D.A., D.C. Ensminger, J.T. Sharick, S.B. Kanatous, and D.E. Crocker.** 2015. Body reserves at weaning impact development of dive capacity in northern elephant seals (*Mirounga angustirostris*). *Physiological and Biochemical Zoology*. 88:471-482.
- Louis, C., **M.S. Tift**, D.E. Crocker, D. Alexander, D.R. Smith, C. Debier. 2015. Isolation of progenitor cells from the blubber of northern elephant seals (*Mirounga angustirostris*) in order to obtain an in vitro adipocyte model – preliminary results. *Marine Mammal Science* 31:764-773.
- Geist, N.R., **Z. Dallara, R. Gordon**, 2015. The Role of Incubation Temperature and Clutch. *Herpetological Biology and Conservation. Herpetological Conservation and Biology* 10 (Symposium):489–503
- Sharick, J.T.**, J.P. Vazquez-Medina, R.M. Ortiz, D.E. Crocker. 2015. Oxidative stress is a potential cost of breeding in male and female northern elephant seals. *Functional Ecology*. 29:367-376.
- Johnston, S. F.**, M. F. Cohen, R. K. Meentemeyer, and N. E. Rank. 2015. Host phenology and leaf effects on susceptibility of California bay laurel to *Phytophthora ramorum*. *Phytopathology*.
- Champagne, C.D., **M.S. Tift**, D.S. Houser, D.E. Crocker. 2015. Adrenal sensitivity to stress is maintained despite variation in baseline glucocorticoids in molting seals. *Conservation Physiology*. 3(4):1-11. doi: 10.1093/conphys/cov004.
- Louis, C., L. Perdaens, S. Suci, **S.K. Tavoni**, D.E. Crocker, C. Debier. 2015. Mobilisation of blubber fatty acids of northern elephant seal pups (*Mirounga angustirostris*) during the post-

APPENDIX X

- weaning fast. *Comparative Biochemistry and Physiology A, Molecular & Integrative Physiology*. 183: 78-86.
- Tift, M.S.**, P.J. Ponganis, D.E. Crocker. 2014. Elevated carboxyhemoglobin in a marine mammal, the northern elephant seal. *Journal of Experimental Biology*. 217: 1752-1757.
- Kleinhesselink, A. R., S. M. Magnoli**, J. H. Cushman. 2014. Shrubs as ecosystem engineers across an environmental gradient: effects on species richness and exotic plant invasion. *Oecologia* 175:1277-129
- Dellicour, S., **SL Fearnley***, A Lombal, **SJ Heidl**, EP Dahlhoff, NE Rank, and P Mardulyn. 2014. Inferring past and present connectivity across the range of a North American leaf beetle from multi-locus sequence data: combining ecological-niche modeling and a geographically explicit model of coalescence. *Evolution* 68: 2371-2385.
- Spraker, T.R., E.T. Lyons, T.A. Kuzmina, **M.S. Tift**, S. Raverty, N. Jaggi, D.E. Crocker. 2014. Causes of death in preweaned northern elephant seal pups. *Journal of Veterinary Diagnostic Investigation*. 26:320-326.
- Ensminger, D.C., D.A. Somo**, D.S. Houser, D.E. Crocker. 2014. Metabolic responses to adrenocorticotrophic hormone (ACTH) vary with life-history stage in adult male northern elephant seals. *General and Comparative Endocrinology*. 204:150-157.
- Tift, M.S.** E.L. Ranalli, D.S. Houser, R.M. Ortiz, and D.E. Crocker. 2013. Development enhances hypometabolism in northern elephant seal pups (*Mirounga angustirostris*). *Functional Ecology*. 27:1155-
- Magnoli, S. M., A. R. Kleinhesselink**, & J. H. Cushman. 2013. Responses to invasion and invader removal differ between native and exotic plant groups in a coastal dune. *Oecologia* 173:1521-1530
- Tavoni, S.K.**, C.D. Champagne, D.S. Houser and D.E. Crocker. 2013. Lactate flux and gluconeogenesis in fasting, weaned northern elephant seals (*Mirounga angustirostris*). *Journal of Comparative Physiology B*. 4:537-546.
- Skaer, M. J.**, D. J. Graydon & J. H. Cushman. 2013. Community-level consequences of cattle grazing for an invaded grassland: variable responses of native and exotic vegetation. *Journal of Vegetation Science* 24:332-343
- Cohen, Michael F., **Caden Hare**, **John Kozlowski**, Rachel S. McCormick, Lily Chen, Linden Schneider, **Meghan Parish**, Zane Knight, Timothy A. Nelson, and Brenda J. Grewell. 2013 "Wastewater polishing by a channelized macrophyte-dominated wetland and anaerobic digestion of the harvested phytomass." *Journal of Environmental Science and Health, Part A* 48, no. 3: 319-330.
- Champagne, C.D., **S.M Boaz**, M.A Fowler, D.S. Houser, D.P. Costa. and D.E Crocker. 2013. A profile of carbohydrate metabolites in the fasting northern elephant seal. *Journal of Comparative Physiology D*. 8:141-151.
- Currylow, A.F., **M.S. Tift**, J.L. Meyer, D.E. Crocker, and R.N. Williams. 2013. Seasonal variations in plasma vitellogenin and sex steroids in male and female eastern box turtles, *Terrapene c. carolina*. *General and Comparative Endocrinology*. 180: 48-55.
- Viscarra, J.A., R. Rodriguez, J.P. Vazquez-Medina, A. Lee, **M.S. Tift**, **S.K. Tavoni**, D.E. Crocker, and R.M. Ortiz. 2013. Insulin and GLP-1 infusions demonstrate the onset of adipose-specific insulin resistance in a large fasting mammal: potential glucogenic role for GLP-1. *Physiological Reports*. 1(2): 1-14.
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- Houser, D.S., D.E. Crocker, **M.S. Tift** and C.D. Champagne. 2012. Glucose oxidation and non-oxidative glucose disposal during prolonged fasts of the northern elephant seal pup (*Mirounga angustirostris*). *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology*. 303: 562-570.
- E.J. Kelso**, C.D. Champagne, **M.S. Tift**, D.S. Houser and D.E. Crocker. 2012. Sex differences in fuel use and metabolism during development in fasting juvenile northern elephant seals. *Journal of Experimental Biology*. 215: 2637-2645.
- Boaz, S.M.**, C.D. Champagne, M.A Fowler, D.S. Houser, and D.E. Crocker. 2012. Water-soluble vitamin homeostasis in fasting northern elephant seals (*Mirounga angustirostris*) measured by metabolomics analysis and standard methods. *Journal of Comparative Biochemistry and Physiology A*. 161:114-121.
- Lyons, E.T., T. Kuzmina, T.R. Spraker, N. Jaggi, D.P. Costa, D.E. Crocker, and **M.S. Tift**. 2012. Parasitological examination for presence of hookworms (*Uncinaria* spp.) in northern elephant seals (*Mirounga angustirostris*) at Año Nuevo State Reserve, California. *Parasitology Research*. 111:1847-1850
- Humple, D. L.**, Nevins, H. M., Phillips, E. M., Gible, C., Henkel, L. A., Boylan, K., & D. J. Girman. 2011. Demographics of aechmophorus grebes killed in three mortality events in California. *Marine Ornithology*, 39(2), 235-242
- Vázquez-Medina, J.P., T. Zenteno-Savín, **M.S. Tift**, H.J. Forman, D.E. Crocker, and R.M. Ortiz. 2011. Apnea stimulates the adaptive response to oxidative stress in elephant seal pups. *Journal of Experimental Biology*. 214: 4193-4200.
- Tift, M.S.**, D.S. Houser, D.E. Crocker. 2011. High-density lipoprotein remains elevated despite reductions in total cholesterol in fasting adult male elephant seals (*Mirounga angustirostris*). *Journal of Comparative Biochemistry and Physiology B*. 159:214-219.
- Gordon, S. P.**, C. M. Sloop, H. G. Davis & J. H. Cushman. 2012. Population genetic diversity and structure of two rare vernal pool grasses in central California. *Conservation Genetics* 13:117-130.
- Cushman, J. H., & **K. A. Gaffney**. 2010. Community-level consequences of invasion: impacts of exotic clonal plants on riparian vegetation. *Biological Invasions* 12:2765-2776
- Sanford, E., **M. E. Wood**, K. J. Nielsen. 2010. A non-lethal method for estimation of gonad and pyloric caecum indices in sea stars. *Invertebrate Biology* 128:372-380
- Thompson, S. A., **H. Knoll**, C. A. Blanchette & K. J. Nielsen. 2010. Population consequences of biomass loss due to commercial collection of the wild seaweed *Postelsia palmaeformis*. *Marine Ecology Progress Series* 413:17-31.
- Bettelheim, M. P., N. R. Geist, **A. Dallara**, and **R. Gordon**. 2009. *Actinemys* (= *Clemmys*) *marmorata* (Pacific pond turtle) nesting depredation. *Herpetological Review*. 40 (4): 433.

APPENDIX XI

Year	Last	First	Advisor	Position after MS
2015	St.John	Wendy	Geist	Instructor, Biology, Sonoma State University
2015	Codde	Sarah	Crocker	Biologist, Pt. Reyes National Seashore
2015	Ellis	Taylor	Cushman	Biologist, Pt. Reyes National Seashore
2015	Gul	Mustafa	Nielsen	Ph.D. program University of Georgia
2015	Lopez	Adriana	Jaffe	Lab Coordinator, Santa Rosa Junior College
2015	Peck	Hannah	Crocker	Technical Developer, Ray Biotech
2015	Richter	Clark	Cushman	Ph.D. program UC Davis
2015	Roberts	Kevin	Rank	Ph.D. program UC Berkeley
2014	Bain	Tracy	Girman	Non-Profit Wild Aid International
2014	Christie	Nicole	Geist	Biological Consulting, Garcia & Associates
2014	Ensminger	David	Crocker	Ph.D. program, University of Pennsylvania
2014	Foster	Blake	Christmann	Raley's
2014	Graham	Natalie	Girman	Ph.D. program UC Berkeley
2014	Minarik	Kelliann	Girman	Midwestern U. Veterinary Medicine Program
2014	Somo	Derek	Crocker	Ph.D. program, Univ. of British Columbia
2014	Spaeth	Rachel	Whitkus	Consultant, Luther Burbank Gardens
2013	Dallara	Zannie	Geist	Asst Professor, Bakersfield Community College
2013	Halahan	Jane	Buckley	Enologist, Guenoc Winery Inc
2013	Heidl	Sarah	Rank	Research Tech, Bloodworks NW Research Inst.
2013	Sharick	Jeffrey	Crocker	Research Associate, Boehringer Ingelheim
2012	Arnold	Peter	Lillig	Instructor, Biology, Santa Rosa Junior College
2012	Cutler	Joshua	Crocker	National Marine Mammal Laboratory, NOAA
2012	Harvey	Emily	Girman	Ph.D program Univeristy of Nevada
2012	Hovis	James	Geist	Program Mngr, Pacific NW Clean Energy Center
2012	Klip	Mario	Crocker	Ph.D. program UC Berkeley
2012	Knoll	Heather	Nielsen	Docent Coordinator, Land Paths
2012	Paquin	Adele	Nielsen	Science Teacher, Nepal
2012	Shaskey	Laura	Girman	Biologist, Kern National Wildlife refuge
2012	Tavoni	Stephen	Crocker	Asst Professor, Bakersfield Community College
2012	Windsor	Christine	Rank	UCSF Research Technician
2011	Agostini	Aaron	Cohen	Instructor, Biology, Santa Rosa Junior College
2011	Kleinhessilink	Andrew	Cushman	Ph.D. program Utah State University
2011	Magnoli	Susan	Cushman	Ph.D. program Michigan State University
2011	Saunders	Laura	Cushman	Environmental Planner, Prunuske-Cheatham
2011	Tift	Michael	Crocker	Ph.D. program Scripps Institute of Oceanography
2010	Boaz	Segal	Crocker	Faculty, Diablo Valley College
2010	Callahan	Briana	Girman	Biological Consulting, Garcia & Associates
2010	Hare	Caden	Cohen	Environmental Inspector, City of Santa Rosa
2010	Humple	Diana	Girman	Non-Profit Point Blue Conservation
2010	Kalmoni	Rana	Pillai	Kaiser Permanente
2010	Kelso	Betsy	Crocker	Faculty, Metropolitan State University of Denver
2010	Lavoipierre	Frederique	Rank	Santa Barbara Botanical Garden

APPENDIX XII – Michael Cohen

Michael F. Cohen - Curriculum Vitae

Associate Professor
Sonoma State University
Department of Biology, Darwin 222
1801 East Cotati Ave.
Rohnert Park, CA 94928

Tel. 707-664-3413
Email: cohenm@sonoma.edu

Professor of Biology, Sonoma State University

HIGHER EDUCATION

September 1990 to June 1996

Ph.D. Microbiology

University of California at Davis

August 1986 to May 1990

B.A. Biology, Microbiology option, Magna cum laude

California State University at Northridge

Graduate Course Instruction since 2009:

Term	Course #	Course Title	Students enrolled	Format	GTAs¹
F14	Biol 500S	Secondary Metabolites	10	Seminar	
F12	Biol 500S	Extreme environments	5	Seminar	
S10	Biol 500S	Ecology of Microorganisms	12	Seminar	

Graduate Thesis Committees:

Sonoma State M.S. thesis project supervisor:

2009 – 2011 Aaron Agostini, Department of Biology, Graduated 2011

2009 – 2011 Mia Maltz, Hutchins School Liberal Studies, Graduated 2012

2008 – present John Kozlowski, Department of Biology

2007 – 2010 Caden Hare, Department of Biology, Graduated 2010

2006 – 2008 Emi Yamamoto, Department of Biology, Graduated 2008

Thesis committee member:

2012 – 2014 Emmanuel Vidaña, M.S. Thesis, Environmental Microbiology Group, Centro de Investigaciones Biológicas del Noroeste, Baja del Sur

2012 – 2014 Jeff Sharick, Thesis Supervisor: Dan Crocker

2010 – 2012 Christine Windsor, Thesis Supervisor: Nathan Rank

2009 – 2014 Luis Alonso Leyva Soto, Ph.D. Thesis, Environmental Microbiology Group, Centro de Investigaciones Biológicas del Noroeste, Baja del Sur

APPENDIX XII – Caroline Christian

2007 – 2010 Rachel McCormick, Thesis Supervisor: Lily Chen, Department of Biology, CSU San Francisco

2007 – 2010 Rana Kalmoni, Thesis Supervisor: Murali Pillai

2007 – 2009 Steve Johnston, Thesis Supervisor: Nathan Rank

Outside member on qualifying examination:

2013 David Ensminger, Thesis Supervisor: Dan Crocker

2011 Tracy Bain, Thesis Supervisor: Derek Girman

April 7, 2011 Meghan Parish, Thesis Supervisor: Caroline Christian

March 3, 2010 Susan Magnoli, Thesis Supervisor: Hall Cushman

Department of Biology Graduate committee service:

Fall 2008 – Spring 2011 Member

Funded grants and awards since 2009

Cohen MF, Farahmand F, “Development of modular biotreatment system for winery wastewater”, CSU Water Resources Policy Initiatives Faculty Research Incentive Program (*Spring semester 2015*) \$6,756.

Covers 4 WTU (2 WTU per PI) workload release for preparing a grant proposal to the Water Environment Research Foundation.

Arango G, **Cohen MF** (‘Administrative Lead’), “Green wastewater treatment,” National Science Foundation (NSF) Innovation Corps (I-Corps) Site micro-grant program, CSUPERB (*Sept. 2014 – March 2015*) \$2,500.

Barker B, **Cohen MF** (‘Administrative Lead’), “Bioproduction and market for geranylgeraniol”, National Science Foundation (NSF) Innovation Corps (I-Corps) Site micro-grant program, CSUPERB (*Sept. 2014 – March 2015*) \$2,500.

Cohen MF, “Monitoring of water nutrients by ion chromatography”, Sonoma State University WATERS Collaborative Project Award, Sonoma County Water Agency, (*Aug. 2014 – Dec. 2014*) \$533.

Cohen MF, SSU School of Science and Technology Travel grant for research trip to the laboratory of Hideo Yamasaki, University of the Ryukyus, Japan, (*May – Jun. 2014*) \$1,740.

Ou J, Farahmand F, **Cohen MF**, “Understanding campus watershed ecosystem through creating an interdisciplinary capstone project,” Campus as a Living Lab Grant Program, (*Sept. 2013 – Aug. 2014*) \$11,900.

Cohen MF, “Microbial source tracking for watershed fecal contamination”, Sonoma State University WATERS Collaborative Project Award, Sonoma County Water Agency, (*Aug. 2013 – May 2014*) \$1,900.

Cohen MF, “Nutrient mining by plant-degrading bacteria” Sonoma State University Provost’s Undergraduate Research Fund, (*November 2013 – May 2014*) \$1,000.

Cohen MF, SSU School of Science and Technology Travel grant for research trip to the laboratory of Hideo Yamasaki, University of the Ryukyus, Japan, (*Dec. 2012*) \$1,300.

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Cohen MF, Fukuto J, “Generation and activity of nitro-isoprenes in plants under heat stress,” CSUPERB Faculty-Student Collaborative Research: Development Grant Program, (June 2012 – May 2014) \$ 15,000.

Cohen MF “Coliform density in digestate-derived compost,” SSU School of Science and Technology Faculty Development Grant, (Spring 2011) \$565

Weisman M, **Cohen MF**, Farahmand F, Lavoipierre F, Rank N “SWEEP: Sustainable watershed environmental education project”, SSU’s contribution to a CSU STEM grant proposal to the Learn and Serve America Higher Education Consortium. (Sept. 2010 – Aug. 2013) \$75,000 awarded. Note: Congress cut off funding after the first fiscal year following grant initiation; \$25,000 received.

Cohen MF “Anaerobic digestion of mixed aquatic and agricultural substrates” Instructional Related Activities Student Assistant Program. \$1,000 (Mar. 2010 – June 2010)

Mazzola M, **Cohen MF**, “Active management of soil microbial communities to limit soilborne disease development in strawberry production systems” California Strawberry Commission. \$46,090 (Mar. 2010 – May 2011)

Cohen MF, Care C, Kozlowski J, “Wastewater to fuel project” internship fund, City of Santa Rosa, \$25,000 (July 2009 – June 2010).

Mazzola M, **Cohen MF**, “Active management of soil microbial communities to limit soilborne disease development in strawberry production systems” California Strawberry Commission research grant. \$44,475 (Feb. 2009 – Jan. 2010)

Cohen MF, “Aquatic Biomass to Fuel,” California Energy Commission, Energy Innovations Small Grants (EISG) Program. \$70,938 (Jun. 2009 – May 2010).

Cohen MF, Fukuto J, Chen L, “Integrated Wastewater Scrubbing and Biogas Production,” CSUPERB Joint Ventures Matching Grants Program. \$25,000 (Jul. 2008 – Dec. 2009).

Cohen MF, “Aquatic Biomass to Fuel,” Bay Area Air Quality Management District, \$75,000 (July 2008 – Jun. 2010).

Peer-Reviewed Publications since 2009 (* indicates publication with graduate student)

1. *Johnston SF, **Cohen MF**, Torok T, Meentemeyer RK, Rank NE (2016) Host phenology and leaf effects on susceptibility of California bay laurel to *Phytophthora ramorum*. *Phytopathology* 106(1):47-55.
2. Yamasaki H, Watanabe NS, Sakihama Y, **Cohen MF** (2016) An overview of methods in plant NO research: Why do we always need to use multiple methods? In: *Methods in molecular biology: Plant nitric oxide research: methods & protocols*, Springer, *in press*.
3. Kiseleva L, Garushyants SK, Ma H, Simpson DJW, Fedorovich V, **Cohen MF**, Goryanin I (2015) Taxonomic and functional metagenomic analysis of anodic communities in two pilot-scale microbial fuel cells treating different industrial wastewaters. *J Integr Bioinform* 12(1):273, 2015.
4. Kiseleva L, Khilyas IV, Simpson D, Briliute J, **Cohen M**, Goryanin I. (2015) Magnet-facilitated selection of electrogenic bacteria from marine sediment. *BioMed Res Int*, Article ID 582471.

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5. **Cohen MF**, Gurung S, Birarda G, Holman H-Y, Yamasaki H (2015) Bimodal effect of hydrogen peroxide and oxidative events in nitrite-induced rapid root abscission by the water fern *Azolla pinnata*. *Frontiers Plant Sci* 6:00158.
6. Kiseleva L, Garushyants SK, Briiliute J, Simpson DJW, **Cohen MF**, Goryanin I (2015) Genome sequence of the electrogenic petroleum-degrading *Thalassospira* sp. strain HJ. *Genome Announc* 3(3):e00483-15.
7. **Cohen MF**, Hu P, Nguyen MV, Kamennaya N, Brown N, Woyke T, Kyrpides N, Holman HY, Torok T (2015) Genome sequence of the alkaline-tolerant *Cellulomonas* sp. strain FA1. *Genome Announc* 3(3):e00646-15.
8. **Cohen MF**, Gurung S, Fukuto JM, Yamasaki H (2014) Controlled free radical attack in the apoplast: A hypothesis for roles of O, N and S species in regulatory and polysaccharide cleavage events during rapid abscission by *Azolla*. *Plant Sci* 217–218:120–126.
9. Gurung S, **Cohen MF**, Yamasaki H (2014) Azide-dependent nitric oxide emission from the water fern *Azolla pinnata*. *Russ J Plant Physiol* 61(4):543-547.
10. Yamasaki H, Watanabe NS, Fukuto J, **Cohen MF** (2014) Nitrite-dependent nitric oxide production pathway: diversity of NO production systems. In: *Oxidative Stress in Applied Basic Research and Clinical Practice - Pediatric Disorders*, H. Tsukahara, K.Kaneko, R.H. Steinhorn, Eds., Springer-Verlag, New York, p. 35-54.
11. ***Cohen MF**, Hare C[†], Kozlowski J[†], McCormick RS, Chen L, Schneider L*, Parish M*, Knight Z*, Nelson TA, Grewell B (2013) Wastewater polishing by a channelized macrophyte-dominated wetland and anaerobic digestion of the harvested phytomass. *J Environ Sci Health* 48(3):319-330.
12. Gurung S, **Cohen MF**, Fukuto J, Yamasaki H (2012) Polyamine-induced rapid root abscission in *Azolla pinnata*. *J Amino Acid* 2012:Article ID 493209, 9 p.
13. Figueiredo J, Baird A, **Cohen MF**, Flot J-F, Kamiki T, Meziane T, Tsuchiya M, Yamasaki H (2012) Ontogenetic change in the lipid and fatty acid composition of coral larvae. *Coral Reefs* 31(2):613-619.
14. Yamasaki H, Itoh RD, Bouchard JN, Dghim AA, **Cohen MF** (2011) Nitric oxide synthase-like activities in plants. *Annu Plant Rev* 42:103-125.
15. Hossain KK, Itoh RD, Yoshimura G, Tokuda G, Oku H, **Cohen MF**, Yamasaki H (2010) Effects of nitric oxide scavengers on thermoinhibition of seed germination in *Arabidopsis thaliana*. *Russ J Plant Physiol* 57(2):222-232.
16. **Cohen MF**, Lamattina L, Yamasaki H (2010) Nitric oxide signaling by plant-associated bacteria. In: *Nitric oxide in plant physiology*. S Hayat, M Mori, J Pichtel, A Ahmad, Eds. Wiley-Vch, Germany. p. 161-172.
17. Mazzola M, de Bruijn I, **Cohen MF**, Raaijmakers JM (2009) Protozoa-induced regulation of cyclic lipopeptide biosynthesis is an effective predation defense mechanism in *Pseudomonas fluorescens*. *Appl Environ Microbiol.* 75(21):6804-6811.

Peer-Reviewed Technical Report

Cohen MF (2011) Final Report: Aquatic Biomass to Fuel. Energy Innovations Small Grant Program, Project #55427A/07-14.

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Conference Proceedings since 2009:

Johnston S, Rank N, **Cohen MF**, Meentemeyer R (2010) California bay laurel susceptibility to *Phytophthora ramorum* depends upon season, leaf Age, and fungal load. pp. 89-91 *In*, Proceedings of the Sudden Oak Death Fourth Science Symposium. General Technical Report PSW-GTR-229. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Albany, CA. 378 p.

Invited Speaker and Conference Presentations since 2009:

“Application of Microbial Fuel Cells for Recycling Distillery and Winery Wastewaters,” CSU Water Resources Policy Initiatives Annual Meeting, Fresno, CA. April 9, 2015.

“Autolytic and bacterial-mediated mechanisms for degradation of plant cell wall matrix revealed by Synchrotron Radiation-based Fourier Transform Infrared Spectromicroscopy,” Advances in Infrared Science at the Advance Light Source, Annual User Meeting, Berkeley, CA. October 8, 2014.

“Mechanisms for weed and phytopathogen suppression in soils amended with brassicaceous seed meals: from biofumigation to remodeling of the microbiome,” 60th Conference on Soilborne Plant Pathogens, San Rafael, CA. March 12, 2014.

“Management of microbial communities in sustainable practices: From biocontrol to bioenergy,” Cal Poly San Luis Obispo, College of Agriculture Seminar, January 8, 2014.

“Biological transformations in wastewater channels and alkaline springs: prospects for bioenergy research,” UC Davis Department of Microbiology and Molecular Genetics, Selected Topics in Microbiology Seminar Series, Davis, CA. March 6, 2013.

“Integrating wastewater treatment with bioenergy production,” National Food Research Institute, Tsukuba, Japan. March 16, 2012.

“Fuel from Aquatic Biomass: A multidisciplinary project,” Japan Society for the Promotion of Science USA Multidisciplinary Science Forum. Seattle, WA. March 11, 2011.

“Integrating biofuel production with wastewater polishing and crop management,” CSU Biofuels Taskforce, 23th Annual Meeting of the CSU Program for Biotechnology. Anaheim, CA. January 6, 2011.

“Integrating vineyard pathogen control with sustainable nutrient and energy management,” 44th Annual Meeting of the Association of Applied IPM Ecologists. Napa, CA. February 2, 2010.

“The chemistry of biofumigation & brassicaceae seed meals,” AAIE Nematode Seminar. Napa, CA. December 18, 2009

“Integrating invasive weed and nutrient management with bioenergy production,” State of the Laguna Conference and Science Symposium. Rohnert Park, CA. October 14, 2009.

“Biodigesters and scrubbers,” Sonoma State University Biology Department Colloquium, Darwin 103, February 10, 2009.

APPENDIX XII – Caroline Christian

CAROLINE E. CHRISTIAN

CONTACT INFORMATION

Department of Environmental Studies & Planning 4752 Hidden Oaks Road
Sonoma State University Santa Rosa, CA 95404
Rohnert Park, CA 94928 Tel: 707.544.6577
Email: caroline.christian@sonoma.edu
Tel: 707.322.3144
Fax: 707.664.4202

EDUCATION

University of California, Davis, CA
Ph.D., Population Biology, 2002

University of California, Santa Cruz, CA
B.A., Environmental Studies and Biology (Honors), 1994

RESEARCH INTERESTS

Population & Community Ecology; Conservation Biology and Planning; Restoration Ecology,
and Invasion Biology.

PROFESSIONAL EXPERIENCE

2012-present. Associate Professor, Department of Environmental Studies and Planning, Sonoma State University, CA
2010-2013. Commissioner, Sonoma County Fish and Wildlife Commission, Santa Rosa, CA
2008. Faculty Associate for Research and Creative Activities, Center for Teaching and Professional Development, Sonoma State University, CA
2007-2013. Member of Board of Directors, Laguna de Santa Rosa Foundation, Santa Rosa, CA (Vice-President: 2009-2010; Secretary: 2011-present)
2006-2011. Assistant Professor, Department of Environmental Studies and Planning, Sonoma State University, Rohnert Park, CA
2006-present. Adjunct Faculty Member, Department of Biology, Sonoma State University, Rohnert Park, CA
2004-06. Senior Ecologist, Central Coast Ecoregion, Nature Conservancy, San Francisco, CA
2002-04. David H. Smith Postdoctoral Fellow, The Nature Conservancy and University of California, Santa Cruz, CA

SELECTED PUBLICATIONS

Christian, C.E. *in review*. Density dependence in the seed bank: emergence, dormancy and seed mortality as influenced by ant mutualists. *Journal of Ecology*.
Cushman, J.H., Lortie, C. J. and **C.E. Christian**. 2011. Native herbivores and plant facilitation mediate the performance and distribution of an invasive exotic grass. *Journal of Ecology*. 99: 524-531.

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- Underwood, E.L., and **C.E. Christian**. 2009. Consequences of ecological disturbance on ant communities: effects of fire and grazing in a blue oak savanna. *Environmental Entomology* 38: 325-322.
- Christian, C.E.**, L. Saslaw, and H.S. Butterfield. 2008. One size does not fit all: cattle grazing for grassland management at Carrizo Plain National Monument. *Desert Report* September Issue: 17-23.
- Fox, H.E., **C.E. Christian**, J.C. Nordby, O.R.W. Pergams, G.D. Peterson, C.R. Pyke. 2006. Perceptions of integrating social science and conservation. *Conservation Biology* 20: 1817-1820.
- McKay, J., **C.E. Christian**, S.H. Harrison, K.J. Rice, J. Thompson. 2005. How local is local? Practical and conceptual issues in the genetics of restoration. *Restoration Ecology* 13:432-440.
- Christian, C.E.** and M.L. Stanton. 2004. Cryptic consequences of a seed dispersal mutualism: seed burial, elaiosome removal, and seed bank dynamics. *Ecology* 85:1101-1110.
- Young, T.P., M.L. Stanton, and **C.E. Christian**. 2002. Effects of natural and simulated herbivory on spine lengths of *Acacia drepanolobium* in Kenya. *Oikos* 101:171-179.
- Christian, C.E.** 2001. Consequences of biological invasion reveal importance of mutualism for plant communities. *Nature* 413:635-639.
- Roy, B.A, J.W. Kirchner, **C.E. Christian**, and L.E. Rose. 2001. High disease incidence and apparent disease tolerance in a Great Basin plant community. *Evolutionary Ecology* 14:421-438.

SELECTED EXTERNAL GRANTS

2015. Campus as a Living Lab, California State University (\$11,800). Campus creeks as labs for sustainability learning. C.E. Christian and P. Draper.
2012. Anonymous Donation (\$75,000). Assessment of best practices for sustainable management of State Parks in Sonoma County, CA. C.E. Christian and C. Luke.
2012. Sonoma County Water Agency (\$57,225). Propagating locally-adapted plants and training the next generation of restoration practitioners. C.E. Christian.
2009. Gold Ridge Resource Conservation District (\$4,100). Estero Americano Grassland Monitoring Plan. C.E. Christian.
2007. Bureau of Land Management (\$3,900). Conditional impacts of livestock grazing in an arid California Grassland. C.E. Christian.
2006. Bureau of Land Management (\$9,930). The role of livestock grazing in managing an endangered grassland system, Carrizo Plain National Monument, California. C.E. Christian.
2005. The Grove Foundation (\$100,000). A restoration vision for the Upper Pajaro floodplain. C.E. Christian and G. Turcotte.
- 2003-05. CALFED (\$100,000). Using field data and remote-sensing information to monitor conservation easements. R. Reiner, C.E. Christian, R. Burnett, E. Underwood, and M. Horney.
2002. David H. Smith Postdoctoral Fellowship, The Nature Conservancy (\$130,000). Fire disturbance and plant invasion: consequences of fire variability, life history diversity and grazing for invaded plant communities. C.E. Christian.
1998. National Science Foundation, Dissertation Enhancement Grant (\$18,900). A demographic analysis of life history variation and seed dispersal in the ant-dispersed Proteaceae. C.E. Christian and M. L. Stanton.
- 1996-98. National Science Foundation Graduate Research Training Grant in Environmental Biology (\$15,000).

APPENDIX XII – Caroline Christian

GRADUATE STUDENTS

Chair or co-chair:

Cody Ender (Biology). Herbivores as mediators of an exotic grass invasion (2014).

Michelle Early (Biology). The role of seasonal livestock grazing on valley oak (*Quercus lobata*) recruitment and restoration in the Santa Rosa Plain (started Spring 2007).

Meghan Parish (Biology). Restoration of native California grasslands invaded by Harding grass (*Phalaris aquatica*) (started Fall 2010).

Committee Member:

Eric Cecil (current), Dennis Devitt (2010), Dawn Graydon (2009), Kandice Gilmore (in progress), Andy Kleinhessenlink (2011); Heather Knoll, Frederique (2011), Susan Magnoli (2011), Jade Nuygen (2010), Tanya Roberts (in progress), Laura Saunders (2011), Meghan Skaer (2009), Richard Stabler (2009).

APPENDIX XII –Dan Crocker

Daniel Edward Crocker

Curriculum Vitae

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Sonoma State University
1801 E. Cotati Avenue
Rohnert Park, CA 94928-3809

Phone: (707) 664-2995
Fax: (707) 664-4046
crocker@sonoma.edu

EDUCATION

1995 Ph.D. in Biology
University of California, Santa Cruz, CA
1992 M.S. in Marine Sciences
University of California, Santa Cruz, CA
1987 B.S. in Applied Biology, with highest honors
Georgia Institute of Technology

PROFESSIONAL EXPERIENCE (postdoctoral only)

Professor, Sonoma State University, 2008 – present.
Associate Professor, Sonoma State University, 2003 – 2008.
Assistant Professor, Sonoma State University, 2000 – 2003.
Assistant Research Ocean Scientist, University of California, Santa Cruz, 2001 – 2004.
Assistant Research Biologist, University of California, Santa Cruz, 1997 – 2001.
Postdoctoral Researcher, University of California, Santa Cruz, 1995 – 1997.

Honors

Fellow, California Academy of Sciences, 2015

Editorial Service

Associate Editor, *Physiological and Biochemical Zoology*, 2015 – present.
Associate Editor, *Frontiers in Aquatic Physiology*, 2012 – present.
Editorial Board, *Physiological and Biochemical Zoology*, 2014.
Editorial Board, *PloS One*, 2014 – present.

Publications: 143 Peer-reviewed Publications.

Recent publications: (Publications with graduate students indicated by *)

Crocker, D.E., C.D. Champagne, J.I. Khudyakov. Oxidative stress in northern elephant seals: integration of omics approaches with ecological and experimental studies. *Comparative and Biochemical Physiology A* (in press).

Martinez, B., J.G. Soñanez-Organis, J.A. Viscarra, J.T. Jaques, D.S. MacKenzie, **D.E. Crocker** and R.M. Ortiz. Glucose delays the insulin-induced increase in thyroid hormone-mediated signaling in adipose of prolong-fasted elephant seal pups. *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology* (in press).

*Peck, H.E., D.P. Costa, **D.E. Crocker.** Body reserves influence allocation to immune responses in capital breeding female northern elephant seals. *Functional Ecology* (in press).

APPENDIX XII – Dan Crocker

- Fowler, M.A., C. Debier, C.D. Champagne, **D.E. Crocker**, D.P. Costa. 2016. The demands of lactation promote differential regulation of lipid stores in fasting elephant seals. *General and Comparative Endocrinology*. 225:125-132.
- Costa, D.P., L. Schwarz, P. Robinson, R.S. Schick, P.A. Morris, R. Condit, **D.E. Crocker**, A. M. Kilpatrick. 2016. A bioenergetics approach to understanding the population consequences of disturbance: elephant seals as a model system. *Advances in Experimental Medicine and Biology*. 875:161-169.
- Louis, C., A. Covaci, **D.E. Crocker**, C. Debier. 2016. Lipophilicity of PCBs and fatty acids determines their mobilisation from blubber of weaned northern elephant seal pups. *Science of the Total Environment*. 541: 599-602.
- ***Crocker, D.E.** and B.I. McDonald. 2015. Post-partum. In: *Marine Mammal Physiology: Requisites for Ocean Living*. eds. M.A. Castellini and J.A.E. Mellish. CRC Press. pp. 219-244.
- Maresh, J.L., T. Adachi, A. Takahashi, Y. Naito, **D.E. Crocker**, M. Horning, T.M. Williams and D.P. Costa. 2015. Summing the strokes: energy economy in northern elephant seals during large-scale foraging migrations. *Movement Ecology* 3:22. doi: 10.1186/s40462-015-0049-2.
- Khudyakov J.I., C.D. Champagne, L. Preeyanon, R.M. Ortiz, **D.E. Crocker**. 2015. Muscle transcriptome response to ACTH administration in a free-ranging marine mammal. *Physiological Genomics*. 47:318-330.
- *Somo, D.A., D.C. Ensminger, J.T. Sharick, S.B. Kanatous, and **D.E. Crocker**. 2015. Body reserves at weaning impact development of dive capacity in northern elephant seals (*Mirounga angustirostris*). *Physiological and Biochemical Zoology*. 88:471-482.
- Peterson, S.H., M.G. Peterson, C. Debier, A. Covaci, A.C. Dirtu, G. Malarvannan, **D.E. Crocker**, L. Schwarz, and D.P. Costa. 2015. Deep-ocean foraging northern elephant seals bioaccumulate persistent organic pollutants. *Science of the Total Environment*. 533:144-155.
- Atkinson, S., **D.E. Crocker**, D.S. Houser, K.L. Mashburn. 2015. Stress physiology in marine mammals: How well do they fit the terrestrial model? *Journal of Comparative Physiology B*. 5:463-486.
- Suzuki, M., A. Lee, J.P. Vázquez-Medina, J.A. Viscarra, **D.E. Crocker**, R.M. Ortiz. 2015. Plasma FGF21 concentrations and adipose fibroblast growth factor receptor-1 and β -klotho expression decrease with fasting in northern elephant seals. *General and Comparative Endocrinology*. 216:86-89.
- Fowler, M.A., D.P. Costa, **D.E. Crocker**, W. Shen, F.B. Kraemer. 2015. Adipose triglyceride lipase, not hormone sensitive lipase, is the primary lipolytic enzyme in fasting elephant seals (*Mirounga angustirostris*). *Physiological and Biochemical Zoology* 88:284-294
- *Sharick, J.T., J.P. Vazquez-Medina, R.M. Ortiz, **D.E. Crocker**. 2015. Oxidative stress is a potential cost of breeding in male and female northern elephant seals. *Functional Ecology*. 29:367-376. A-3
- *Champagne, C.D., M.S. Tift, D.S. Houser, **D.E. Crocker**. 2015. Adrenal sensitivity to stress is maintained despite variation in baseline glucocorticoids in molting seals. *Conservation Physiology*. 3:1. doi:10.1093/conphys/cov004.
- Khudyakov J.I., L. Preeyanon, C.D. Champagne, R.M. Ortiz, **D.E. Crocker**. 2015. Transcriptome analysis of northern elephant seal (*Mirounga angustirostris*) muscle tissue provides a novel molecular resource and physiological insights. *BMC Genomics*. 16:64.
- *Louis, C., L. Perdaens, S. Suci, S.K. Tavoni, **D.E. Crocker**, C. Debier. 2015. Mobilisation of blubber fatty acids of northern elephant seal pups (*Mirounga angustirostris*) during the post-weaning fast. *Comparative Biochemistry and Physiology A*. 183: 78-86.

APPENDIX XII – Dan Crocker

- Louis, C., A. Covaci, M. Stas, **D.E. Crocker**, G. Malarvannan, A.C. Dirtu, C. Debier. Bioaccumulation of hydroxylated polychlorinated biphenyls and pentachlorophenol in the serum of northern elephant seal pups (*Mirounga angustirostris*). 2015. Environmental Research. 136:441-448.
- *Tift, M.S., P.J. Ponganis, and **D.E. Crocker**. 2014. Elevated carboxyhemoglobin in a marine mammal, the northern elephant seal. Journal of Experimental Biology. 217: 1752-1757.
- *Spraker, T.R., E.T. Lyons, T.A. Kuzmina, M.S. Tift, S. Raverty, N. Jaggi, **D.E. Crocker**. 2014. Causes of death in preweaned northern elephant seal pups. Journal of Veterinary Diagnostic Investigation. 26:320-326.
- *Ensminger, D.C., D.A. Somo, D.S. Houser, **D.E. Crocker**. 2014. Metabolic responses to adrenocorticotrophic hormone (ACTH) vary with life-history stage in adult male northern elephant seals. General and Comparative Endocrinology. 204:150-157.
- *Tift, M.S. E.L. Ranalli, D.S. Houser, R.M. Ortiz, and **D.E. Crocker**. 2013. Development enhances hypometabolism in northern elephant seal pups (*Mirounga angustirostris*). Functional Ecology. 27:1155-
- *Tavoni, S.K., C.D. Champagne, D.S. Houser and **D.E. Crocker**. 2013. Lactate flux and gluconeogenesis in fasting, weaned northern elephant seals (*Mirounga angustirostris*). Journal of Comparative Physiology B. 4:537-546.
- *Champagne, C.D., S.M Boaz, M.A Fowler, D.S. Houser, D.P. Costa. and **D.E Crocker**. 2013. A profile of carbohydrate metabolites in the fasting northern elephant seal. Journal of Comparative Physiology D. 8:141-151.
- *Currylow, A.F., M.S. Tift, J.L. Meyer, **D.E. Crocker**, and R.N. Williams. 2013. Seasonal variations in plasma vitellogenin and sex steroids in male and female eastern box turtles, *Terrapene c. carolina*. General and Comparative Endocrinology. 180: 48-55.
- *Viscarra, J.A., R. Rodriguez, J.P. Vazquez-Medina, A. Lee, M.S. Tift, S.K. Tavoni, **D.E. Crocker**, and R.M. Ortiz. 2013. Insulin and GLP-1 infusions demonstrate the onset of adipose-specific insulin resistance in a large fasting mammal: potential glucogenic role for GLP-1. Physiological Reports. 1(2): 1-14.
- *Houser, D.S., **D.E. Crocker**, M.S. Tift and C.D. Champagne. 2012. Glucose oxidation and non-oxidative glucose disposal during prolonged fasts of the northern elephant seal pup (*Mirounga angustirostris*). American Journal of Physiology: Regulatory, Integrative and Comparative Physiology. 303: 562-570.
- *E.J. Kelso, C.D. Champagne, M.S. Tift, D.S. Houser and **D.E. Crocker**. 2012. Sex differences in fuel use and metabolism during development in fasting juvenile northern elephant seals. Journal of Experimental Biology. 215: 2637-2645.
- *Boaz, S.M., C.D. Champagne, M.A Fowler, D.S. Houser, and **D.E. Crocker**. 2012. Water-soluble vitamin homeostasis in fasting northern elephant seals (*Mirounga angustirostris*) measured by metabolomics analysis and standard methods. Journal of Comparative Biochemistry and Physiology A. 161:114-121.
- *Lyons, E.T., T. Kuzmina, T.R. Spraker, N. Jaggi, D.P. Costa, **D.E. Crocker**, and M.S. Tift. 2012. Parasitological examination for presence of hookworms (*Uncinaria* spp.) in northern elephant seals (*Mirounga angustirostris*) at Año Nuevo State Reserve, California. Parasitology Research. 111:1847-1850
- *Vázquez-Medina, J.P., T. Zenteno-Savín, M.S. Tift, H.J. Forman, **D.E. Crocker**, and R.M. Ortiz. 2011. Apnea stimulates the adaptive response to oxidative stress in elephant seal pups. Journal of Experimental Biology. 214: 4193-4200.

APPENDIX XII – Dan Crocker

- *Tift, M.S., D.S. Houser, **D.E. Crocker**. 2011. High-density lipoprotein remains elevated despite reductions in total cholesterol in fasting adult male elephant seals (*Mirounga angustirostris*). *Journal of Comparative Biochemistry and Physiology B*. 159:214-219.
- *Norris, A.L., D.S. Houser, **D.E. Crocker**. 2010. Environment and activity affect skin temperature in breeding adult male elephant seals (*Mirounga angustirostris*). *Journal of Experimental Biology*. 213: 4205-4212.

Grants – \$4,829,786 in research funding. Recent Grants:

2015. Office of Naval Research - Molecular indicators of chronic stress in a model pinniped - the northern elephant seal. \$586,453 (Co-PI, 6/2015-7/2018).
2014. Office of Naval Research - Physiological impacts of variation in hormonal stress markers and stress responses in a large cross-sectional sample of elephant seals. \$119,500. (PI, 9/14-8/16).
2011. Office of Naval Research - Variability of hormonal stress markers and stress responses in a large cross-sectional sample of elephant seals. \$513,967. (PI, 4/11-9/14)

Student Mentoring

Advisor to 26 master's students, SSU: Gitte McDonald, Ramona Zeno, Jason Hassrick, Cory Champagne, Melinda Fowler, Nathan Kofahl, Brian Wenzel, Lovis Sonnerstedt, James Castle, Michael Lennox, Amy Norris, Segal Boaz, Betsy Kelso, Michael Tift, Stephen Tavoni, Mario Klip, Joshua Cutler, Ariel Berwaldt, Jeffrey Sharick, Derek Somo, David Ensminger, Sarah Codde, Hannah Peck, Michelle Ferraro, Sarah Chinn, Geno Durango. Advisor to 4 Ph.D students, UCSC: Gitte McDonald, Jason Hassrick, Cory Champagne, Melinda Fowler. Post-doctoral advisor: Dr. Jane Khudyakov, Dr. Cory Champagne. Served on 67 master's and 18 doctoral thesis committees. Sponsor to 87 undergraduate research theses.

Manuscript Review: 54 journals

Proposal Review: National Science Foundation, Australian Antarctic Research Division, British National Environmental Research Council, NOAA Office of Ocean Exploration, North Pacific Research Board

APPENDIX XII –Hall Cushman

J. HALL CUSHMAN

Department of Biology 707.664.2142

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EDUCATION

Northern Arizona University – Flagstaff, Arizona 1986-89

Ph.D. (1989), Biology

Advisor: Thomas G. Whitham – *Recipient of ESA's Eminent Ecologist Award*

University of Arizona – Tucson, Arizona 1983-86

M.S. (1986), Ecology and Evolutionary Biology

Advisor: James H. Brown – *Member, National Academy of Sciences*

Marlboro College – Marlboro, Vermont 1978-82

B.S. (1982), Honors in Biology

RESEARCH INTERESTS

Population, Community & Ecosystem Ecology; Effects of Exotic Plants, Animals & Pathogens on Native Ecosystems; Mammalian Consumers as Drivers of Community & Ecosystem Processes; Forest Decline & Tree Recruitment

POSTDOCTORAL FELLOWSHIPS

1992-93. **Bing Postdoctoral Fellow**. Center for Conservation Biology, Department of Biological Sciences, Stanford University, Stanford, California.

1989-92. **University Research Fellow**. School of Biological Sciences, Macquarie University, Sydney, New South Wales, Australia.

1989. **NATO Postdoctoral Fellow**. Centre for Population Biology, Imperial College at Silwood Park, Ascot, Berkshire, England.

PROFESSIONAL EXPERIENCE

1994-Present. **Professor** (2004-Present), **Associate Professor** (1999-04) and **Assistant Professor** (1994-99). Department of Biology, Sonoma State University.

2012-Present. **Chief Editor**. *AoB PLANTS*, a peer-reviewed journal published by Oxford University Press since 2010.

2011-Present. **Associate Editor**. *Biological Invasions*, a peer-reviewed journal published by Springer since 1999.

2011-12. **Faculty Liaison**. McNair Scholars Program, Sonoma State University.

2009-10. **Faculty Research Associate**. Office of Faculty Affairs, Sonoma State University.

1998-10. **Member of the Board of Directors**. Sonoma Land Trust, Santa Rosa, California.

2004-09. **Founding Preserve Director**. Galbreath Wildlands Preserve, Sonoma State University.

1997-00. **Graduate Program Coordinator**. Department of Biology, Sonoma State University.

1993-94. **Program Coordinator**. Scientific Committee on Problems of the Environment (SCOPE), Stanford University, Stanford, California.

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SELECTED PUBLICATIONS (publications with graduate students indicated by *)

- ***Cushman, J. H.** & L. E. Saunders. *In review*. Long-term and interactive effects of different mammalian consumers on growth, survival and recruitment of dominant trees. *Journal of Ecology*.
- *Ellis, T. & **J. H. Cushman**. *In review*. Indirect effects of a large mammalian herbivore on small mammal populations: context-dependent variation across habitat types, mammal species and seasons. *Journal of Animal Ecology*.
- *Richter, C., M. J. Spasojevic, **J. H. Cushman**. *In review*. Influence of functional traits, shrub neighbors, and habitat types on plant responses to herbivores. *Plant Ecology*.
- Haas, S. E., **J. H. Cushman**, W. W. Dillon, N. E. Rank, D. M. Rizzo and R. K. Meentemeyer. 2015. Effects of individual, community and landscape drivers on the dynamics of a wildland forest epidemic. *Ecology* (<http://dx.doi.org/10.1890/15-0767.1>).
- *Kleinhesselink, A. R., Magnoli, S. M., & **J. H. Cushman**. 2014. Shrubs as ecosystem engineers across an environmental gradient: effects on species richness and exotic plant invasion. *Oecologia* 175:1277-1290.
- *Magnoli, S. M., A. R. Kleinhesselink, & **J. H. Cushman**. 2013. Responses to invasion and invader removal differ between native and exotic plant groups in a coastal dune. *Oecologia* 173:1521-1530.
- *Skaer, M. J., D. J. Graydon & **J. H. Cushman**. 2013. Community-level consequences of cattle grazing for an invaded grassland: variable responses of native and exotic vegetation. *Journal of Vegetation Science* 24:332-343.
- *Gordon, S. P., C. M. Sloop, H. G. Davis & **J. H. Cushman**. 2012. Population genetic diversity and structure of two rare vernal pool grasses in central California. *Conservation Genetics* 13:117-130.
- Lamsal, S., R. C. Cobb, **J. H. Cushman**, Q. Meng, D. M. Rizzo & R. K. Meentemeyer. 2011. Spatial estimation of the density and carbon content of host populations for *Phytophthora ramorum* in California and Oregon. *Forest Ecology & Management* 262:989-998.
- Cushman, J. H.**, C. J. Lortie & C. E. Christian. 2011. Native herbivores and plant facilitation mediate the performance and distribution of an invasive exotic grass. *Journal of Ecology* 99:524-531.
- Cushman, J. H.**, J. C. Waller & D. R. Hoak. 2010. Shrubs as ecosystem engineers in a coastal dune: influences on plant populations, communities and ecosystems. *Journal of Vegetation Science* 21:821-831.
- ***Cushman, J. H.** & K. A. Gaffney. 2010. Community-level consequences of invasion: impacts of exotic clonal plants on riparian vegetation. *Biological Invasions* 12:2765-2776.

SELECTED EXTERNAL GRANTS [total awarded: \$2,562,753]

- 2014-2017. National Parks Service. \$77,020. Understanding ecological interactions between free-ranging tule elk and cattle in the pastoral regions of Point Reyes National Seashore. PI: **J. H. Cushman**.
- 2012-13. Point Reyes National Seashore Association. \$7,020. Interactions between freeranging tule elk and cattle at Point Reyes National Seashore. PI: **J. H. Cushman**.
- 2012-13. UC-CSU Collaborative Grant. \$10,000. Ecosystem-level consequences of plant invaders and reintroduced mammals. PIs: **J. H. Cushman**, C. E. Christian & V. T. Eviner.
- 2010-11. USDA Forest Service. \$76,540. Re-measurement and analysis of long-term impacts of *Phytophthora ramorum* in mixed oak woodlands. PI: R. K. Meentemeyer; co-PIs: PIs: N. E. Rank, **J. H. Cushman** and D. M. Rizzo.

APPENDIX XII – Hall Cushman

- 2007-11. The Nature Conservancy & Big Sur Land Trust. \$181,386. Evaluating the impact of cattle grazing on an endangered butterfly, its host plant and the surrounding plant community. PI: **J. H. Cushman**.
- 2006-09. USDA Forest Service. \$115,018. Long-term study of disease dynamics and forest impacts caused by *Phytophthora ramorum* in northern California. PIs: **J. H. Cushman**, N. E. Rank, and R. K. Meentemeyer.
- 2006-08. U.S. Fish and Wildlife Service, Habitat Restoration Program (HRP). \$212,789. Developing tools to promote the recovery of five federally listed vernal pool grasses. PIs: H. G. Davis, C. M. Sloop and **J. H. Cushman**.
- 2004-06. USDA Forest Service. \$147,156. Vertebrates as dispersal agents of *Phytophthora ramorum*, the pathogen that causes Sudden Oak Death. PI: **J. H. Cushman**; co-PI: R. Meentemeyer.
- 2003-05. USDA Forest Service & California Department of Forestry & Fire Protection. \$156,448. Influence of land-use history and vertebrates on the occurrence and spread of *Phytophthora ramorum*. PI: **J. H. Cushman**; co-PI: R. Meentemeyer.
- 2002-06. National Science Foundation. \$810,656 (DBI-0217064). Spatial modeling of a biological invasion: the spread of Sudden Oak Death and the importance of host genetics, environmental forcings, and community structure. PI: R. Meentemeyer; co-PIs: **J. H. Cushman**, N. E. Rank, D. Rizzo and R. Whitkus.
- 2000-06. National Science Foundation. \$312,000 (DEB-9981663; includes 2 REU supplements). Mammalian herbivores as consumers and fertilizers: consequences for community structure and ecosystem dynamics. PI: **J. H. Cushman**.
- 2000-03. California Department of Fish and Game. \$175,156. Science-based management of non-native species: quantifying the effects of feral pigs on California grasslands. PI: **J. H. Cushman**.

GRADUATE STUDENTS (Advisor & Committee Chair)

Current Graduate Students:

- Eric Cecil (started August 2015). Indirect effects of a large mammalian herbivore on grounddwelling arthropods.
- Vanessa Dodge (started August 2015). Elk as mediators of soil characteristics and nutrient availability in a coastal grassland.
- Caprice Lee (started August 2015). Herbivores are drivers of rapid evolution of their host plants.
- Cody Ender (started August 2014). Herbivores as mediators of an exotic grass invasion.

Past Graduate Students (with degree-completion dates):

Taylor Ellis (2015), Clark Richter (2015), Andrew Kleinhesselink (2011), Susan Magnoli (2011), Laura Saunders (2011), Dawn Graydon (2009), Meghan Skaer (2009), Richard Stabler (2009), Michelle Cooper (2006), Joan Schwan (2006), James Coleman (2004), Brent Johnson (2004), Denise Cadman (2002), Karen Gaffney (2002), Trisha Tierney (2002), Katherine Etienne (2001), Sean McNeil (2001), Darca Morgan (2001), Peter Warner (2000), Maria Alvarez (1999), Jeffrey Waller (1998), Mark Smith (1997)

APPENDIX XII –Nick Geist

Name: Nicholas R. Geist
Address: Department of Biology, Sonoma State
University Rohnert Park, CA 94928-3609
Phone: (707) 664-30, FAX: (707) 664-3012
Email: nick.geist@sonoma.edu

Education:

Ph.D. 1999: Oregon State University (Zoology)
B.A. 1992: University of California, Santa Barbara (Zoology)

Research Interests: Reproductive and conservation biology of the western pond turtle, *Emys marmorata*, reproductive and metabolic biology of reptiles, evolution of amniote respiratory mechanisms.

Employment History

2011-Present: Professor of Biology, Department of Biology, Sonoma State University
2004-2011: Associate Professor, Department of Biology, Sonoma State University
1999-2004: Assistant Professor, Department of Biology, Sonoma State University

Courses Taught

BIOL 224/Human Physiology
BIOL 131/Diversity, Ecology
BIOL 326/Biology of the Dinosaurs
BIOL 328/Vertebrate Evolutionary Morphology
BIOL500X/Macroevolution

Representative Grants (2009-Present)

2015 Association of Zoos and Aquariums Conservation Grants, “Keeping Western Pond Turtles SAFE in Mountain Lake: A Community Collaboration” (\$20,200)
2010 Sonoma County Fish and Wildlife Commission Research Grant, “Patterns of Habitat Utilization by the Western Pond Turtle in an Urban Sonoma County Stream” (\$5,000)
2008 SSU Office of Research and Sponsored Programs Research Grant. “Habitat Effects on Reproductive Behavior of the Western Pond Turtle, *Emys marmorata*” (\$2,315)
Association of Zoos and Aquariums Conservation Endowment Fund Research Grant. “Western Pond Turtle Recovery - Sex Determination and Head-starting Studies” (\$19,694)

Publications with SSU students

Christie, N. and N.R. Geist. In review. Temperature Effects on Development and Phenotype in a Free-living Population of Western Pond Turtles (*Emys marmorata*). Physiological and Biochemical Zoology.
Geist, N.R., Z. Dallara, R. Gordon, 2015. The Role of Incubation Temperature and Clutch. Herpetological Biology and Conservation. Herpetological Conservation and Biology 10 (Symposium):489–503

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Dallara, Z and N.R. Geist. In Revision. The Role of Maternal Effect, Incubation Temperature, and Gender on Juvenile Growth in Captive-raised Western Pond Turtles, *Emys marmorata*. Journal of Herpetology.

Bettelheim, M. P., N. R. Geist, A. Dallara, and R. Gordon. 2009. *Actinemys*(=*Clemmys*) *marmorata* (Pacific pond turtle) nesting depredation. Herpetological Review. 40 (4): 433.

Representative Invited Seminars

2016 Reintroducing Western Pond Turtles in the Bay Area. North Bay Herpetological Society. March.

2015 The North Bay Western Pond Turtle Project. Western Pond Turtle Workshop, Oct.

2015 The Western Pond Turtle Project: Conservation Biology, of an Endangered Native Species. Lifelong Learning Institute, Sonoma State University. Feb.

2013 The Western Pond Turtle Project: Conservation Biology, Reproductive Biology, and the Future of a Species in Decline. Clear Lake Society Science Series, August.

2012 Plight of the Western Pond Turtle: How understanding reproductive biology can help us bring back a species on the brink. Oakland Zoo Seminar Series. March

2011 Saving Methuselah: Bringing Native Western Pond Turtles Back from the Brink. San Francisco Zoo Science Saturday Series. March.

2010 The Role of Incubation Temperature and Clutch Effects in Development and Phenotype in Headstarted Western Pond Turtles (*Emys marmorata*). Joint Meetings of Ichthyologists and Herpetologists, Head-starting Symposium. Providence RI

2009 Reproductive and Conservation Biology of the Western Pond Turtle. Santa Rosa Jr. College Biology Department Seminar Series. Santa Rosa CA

APPENDIX XII –Derek Girman

CURRICULUM VITAE - DEREK JOHN GIRMAN

PERSONAL DATA

Born: August 8, 1966
E-mail: girman@sonoma.edu
Phone: (707) 664-3055

ADDRESS

Dept. of Biology
Sonoma State University
1801 East Cotati Avenue
Rohnert Park, CA 94928

EDUCATION

Ph.D. 1996 The University of California, Los Angeles. Thesis title: "Molecular genetic and morphologic analyses of the African wild dog (*Lycaon pictus*): Sytematics, population genetics, and social structure." Dr. R.K. Wayne, Advisor.
B.S. 1989 The University of California, Los Angeles. (Biology).

PROFESSIONAL EXPERIENCE

Professor, Department of Biology, Sonoma State University	2007-present
Associate Professor, Department of Biology, Sonoma State University	2002-2007
Assistant Professor, Department of Biology, Sonoma State University	1998-2002

GRADUATE TEACHING EXPERIENCE

Graduate Courses Taught at SSU

Biology 500S History of Life	2016
Biology 500S Current Themes in Biology	2012-2014
Biology 500S Animal Speciation (lecture/discussion)	2010
Biology 511 Conservation Genetics – SSU (lecture/discussion)	2001-2006
Biology 510 Life Science for Rural Teachers, Masters Program in Education	2005
Biology 514 Biological Systematics- SSU (lecture/discussion)	2000
Biology 497 Systematics and Conservation Genetics -SSU (Lecture/Discussion)	1998

Graduate Students Supervised at SSU

Current Students: Dustin Howland, Jonathan Edwards, Kathleen Grady, Julie Wittman, Brian Lavin

Past Students: Natalie Graham (2011 –2014), Tracy Bain (2011 –2014), Kellianne Minarik (2011 –2014), Emily Harvey (2009 –2012), Laura Shaskey (2008 –2012), Diana Humple (2008 –2010), Briana Callahan (2008 –2010), Kiera Adams (2003 – 2009), Kristy Deiner (2002 – 2004), Gary Ouellette (2001 –2003), Joshua Hull (2000 – 2002), Diana Outlaw-Cummings (Spring 1999 - 2001), Jennifer Michaud (1999 - 2001), Molly Stephens (1999 - 2001)

SSU Graduate Committee Member (* since 2009)

*Dipali Visadia, *Dana Terry, *Nicole Karres, *Adriana Lopez, *Wendy ST. John, *Mustafa Gul, *Kevin Roberts, * Zannie Dallara, *Mario Klip, *Blake Foster, *Segal Boaz, Brianna

APPENDIX XII – Derek Girman

Richards, Joe Ward, Curtis Stone, Eric Hawk, Trish Tatarian, Shannon Fearnley, Gary Neargarder, Kasey Yturalde, Mandy Foster

GRADUATE RESEARCH SUPPORT

External Grants Supporting Graduate Students (Total Grant Funding at SSU = \$1,874,530)

- 15-16 U.S. Fish & Wildlife Service. Biotic and Abiotic Factors Affecting California Tiger Salamander Productivity at Breeding Pools, Santa Rosa Plain, Sonoma County. With D. Cook (PI) & J. Meisler. Awarded \$24,072.
- 14-15 U.S. Fish & Wildlife Service. California Tiger Salamander Larval Density and Survival at Natural and Created Breeding Pools, Santa Rosa Plain, Sonoma County, CA. With D. Cook (PI) and J. Meisler. Awarded \$20,654
- 09-10 Mid-Peninsula Regional Open Space District – “Genetic Distinction and Population Structure of the California Giant Salamander in the Midpeninsula Regional Open Space District.” PI - with B. Callahan. Awarded \$4,915.00.
- 07-08 SeaDoc Society - “Matching wintering and breeding populations of Western Grebes (*Aechmophorus occidentalis*) using genetic markers.” PI–Awarded \$33,560
- 03-08 National Science Foundation grant, Major Research Instrumentation program. "MRI/RUI: Acquisition of genetic analyzer and DNA detection system for Core DNA Analysis Facility." PI - with N. Rank, J. Sakanari, and R. Whitkus, Awarded \$340,000.
- 04-06 California Department of Fish and Game -Salmonid Restoration Program. "Ancestry and Gene Flow of *O. mykiss* Populations in Southern California" PI. Awarded \$111,844.
- 02-04 California Department of Fish and Game - Salmonid Restoration Program."Microsatellite Analysis of Steelhead on the Russian River Watershed" P.I. - Awarded \$201,000.
- 00-04 National Science Foundation grant, Systematics Program "Systematics, phylogeny, and biogeography of Amblyoponine ants. Co-PI with B. Fisher. Awarded \$174,000.
- 2000 CSUPERB CSU Entrepreneurial Joint Venture Matching Grant Funds program for supplemental support for a NSF sponsored research program. PI - Awarded \$11,175.
- 1999 CSUPERB CSU Biotechnology Programmatic Development program for supplemental support for Infrastructure for DNA Sequencing Lab. PI - Awarded \$20,000.
- 1999 National Science Foundation grant, Course Curriculum and Laboratory Improvement Program, Division of Undergraduate Education. "A Comprehensive Introductory Biology Curriculum Centered Around Student Participation in Research Experiences." PI with J.H. Cushman, N. Rank, and J. Sakanari - Awarded \$35,000 (+\$35,000 match).

Publications with Graduate Students* (out of 36 Total Publications)

- In rev *Bain, T.K., Cook, D., & **D. Girman**. Evaluating the effect of moisture in wildlife crossing tunnels on the migration of the California tiger salamander, *Ambystoma californiense*. In Review in *Biological Conservation*
- 2016 *Graham, N.R., Fisher, B.L., and **D.J. Girman**. Phylogeography in response to reproductive strategies and ecogeographic Isolation in ant species on Madagascar: Genus *Mystrium* (Formicidae: Amblyoponinae). *PLOS ONE* In Press PONE-D-14-140074R2
- 2011 *Humple, D. L., Nevins, H. M., Phillips, E. M., Gibble, C., Henkel, L. A., Boylan, K., & D. J. Girman. Demographics of aechmophorus grebes killed in three mortality events in California. *Marine Ornithology*, 39(2), 235-242

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- 2008 *Clemento, A.J., E.C. Anderson, D. Boughton, D.J. Girman, and J.C. Garza. Population genetic structure and ancestry of *Oncorhynchus mykiss* populations above and below dams in south-central California. *Conservation Genetics*.
- 2007 *Deiner, K., J.C. Garza, R. Coey, and D.J. Girman. Population structure and genetic diversity of trout (*Oncorhynchus mykiss*) above and below natural and manmade-barriers in the Russian River, California. *Conservation Genetics* 8:437-454.
- 2006 *Ouellette, G. B. Fisher, and **D.J. Girman**. Molecular Systematics of the Subfamily Ponerinae: a Phylogenetic Study of Tribe-Level Relationships. *Molecular Phylogenetics and Evolution* 40:359-369.
- 2005 *Hull, J. and **D.J. Girman**. Population structure and historical demography in migrating Sharp-shinned hawks (*Accipiter velox*): Effects of Holocene climatic variability. In *Molecular Ecology*, 14:159-170.
- 2004 *Michaud, J. T. Gardali, N. Nur, and **D. J. Girman**. Effects of nest predation and brood parasitism on the population viability of Wilson’s warblers in coastal California. *Wilson Bulletin*, 11:41-47.
- 2003 **Girman, D.J.** and *S. McNeil. No Fear: Science achievement tests and integration of content standards through effective teaching. The CSP Connection Vol.4, Nov, 2003.
- 2003 *Outlaw, D.C., G. Voelker, B. Mila, and **D.J. Girman**. Evolution of long-distance migration and historical biogeography of the Catharus thrushes: a molecular phylogenetic approach. *The Auk*, 120:299-310.
- 2002 *Kimura, M; Clegg, SM; Lovette, IJ; Holder, KR; **Girman, DJ**; *Mila, B; *Wade, P; Smith, TB. Phylogeographical approaches to assessing demographic connectivity between breeding and overwintering regions in a Nearctic-Neotropical warbler (*Wilsonia pusilla*). *Molecular Ecology*, V11:1605-1616.
- 2001 **Girman, D. J.**, C. Vilà, E. Geffen, S. Creel, M. G. L. Mills, *J. W. McNutt, J. Ginsberg, P. Kat, K. H. Mamiya, and R. K. Wayne. Patterns of population subdivision, gene flow and genetic variability in the African wild dog (*Lycaon pictus*). *Molecular Ecology*.10:1703-1723.
- 2000 Smith, T.B., K. Holder, **DJ Girman**, *K. O’Keefe, B. Larison, and *Y. Chan. Comparative avian phylogeography of Cameroon and Equatorial Guinea mountains: implications for conservation. *Molecular Ecology*, 9:1505-1516.
- 2000 *Mila, B, **DJ Girman**, *M Kimura, and TB Smith. Pleistocene effects of MacGillivray’s warbler (*Opprornis tolmiei*), a neotropical migratory songbird. *Proceedings of the Royal Society of London, Series B*. 267:1033-1040

Field Work with Graduate Students

Pacific newt surveys – Sonoma/Mendocino Co, CA w/ E. Harvey, K. Minarik	2008-present
California Tiger Salamander Surveys (Adult and Larval)	2011 – present
w/ D. Cook, T. Bain, J. Edwards, D. Howland	
Avian banding - Palomarin Field Station, California, USA w/ K. Grady	2009
California Giant Salamander Surveys – Northern California, w/ B. Callahan	2008-2010
Herpetological surveys – Mojave Desert – w/ B. Callahan	2008
Sandhill Crane Surveys – Central California – w/ L. Shaskey	2008-2009
Ant collecting/studies – Madagascar – w/ B. Fisher, G. Ouellette	2002
Steelhead Sampling(electrofishing) – Russian River watershed w/ K. Deiner	2000-2002
Ant collecting/studies – Chiricahua Mts., Arizona/New Mexico -G. Ouellette	2001
Raptor netting - Golden Gate Raptor Observatory, California w/ J. Hull	1999

APPENDIX XII –Karin Jaffe

KARIN ENSTAM JAFFE

Department of Anthropology
Phone: 707-664-2944, Fax: 707-664-3920
Email: karin.jaffe@sonoma.edu
Website: www.sonoma.edu/users/e/enstam

EDUCATION

Ph.D. in Anthropology; University of California, Davis. June 2002.
Dissertation: “Behavioral Ecology of Perceived Risk of Predation in Sympatric Patas (*Erythrocebus patas*) and Vervet (*Cercopithecus aethiops*) Monkeys in Laikipia, Kenya.”
Committee: Dr. Lynne Isbell (chair), Dr. Alexander Harcourt, and Dr. Peter Rodman
M.A. in Anthropology; University of California, Davis. June 1997.
B.A. in Anthropology; University of California, San Diego; Cum Laude. June 1994.

ACADEMIC & RESEARCH POSITIONS

Research Affiliate, Oakland Zoo, Oakland, CA (July 2015-Present)
Professor, Department of Anthropology, Sonoma State University (August 2013-Present)
Adjunct Faculty, Department of Biology, Sonoma State University (August, 2003-Present)

TEACHING AND MENTORING

Courses Taught that Meet Biology Program Elective Requirements

- ANTH 301: *Human Fossils and Evolution*
- ANTH 302: *Biological Basis of Sex Differences*
- ANTH 318: *Human Development: Sex and the Life Cycle* (GE E)
- ANTH 414: *Primate Observational Methods*

Graduate Advisor

- Nicole Cornelius (Biology). Effects of environmental enrichment on chimpanzee competition and engagement at Oakland Zoo (August 2015-present).
- Louisa Radosevich (Biology). Using social network analysis to assess the social stability of hamadryas baboons at Oakland Zoo (August 2015-present).
- Penelope Wilson (Biology). The effects of predictability of reward on the activity of captive lemurs and the interest of zoo visitors (August 2014-Present).
- Adriana Lopez (Biology). Effects of an alternative rearing strategy on the behavior of African ungulates (August 2013-May 2015).
- Marcia Brown (MA, ITDS). Resocialization of ex-laboratory squirrel monkeys (*Saimiri sciureus*) after migration to the San Francisco Zoo (August 2010-December 2011). Posthumous MA awarded May 2013.
- Brianna Richards (MS, Biology). Effects of stimuli on the behavior of a captive group of ring-tail lemurs (January 2006-July 2008). MS awarded 2008.

APPENDIX XII – Karin Jaffe

Thesis Committees

- Adriana Lopez (Biology). Thesis title: “Effects of an alternative rearing strategy on the behavior of African ungulates.” Defended April 27, 2015. (committee chair)
- Sally Evans (Cultural Resources Management). Thesis title: “Auditory exostosis: A marker of behavior in pre-contact populations from the San Francisco Bay region of California.” Defended April 16, 2014.
- Brianna Richards (Biology). Thesis title: “The effects of stimuli on the behavior of a captive group of ring-tail lemurs (*Lemur catta*).” Defended May 22, 2008. (committee chair)

Qualifying Exam Committees

- Penelope Wilson (Biology) April 24, 2015 (committee chair)
- Adriana Lopez (Biology) May 6, 2014 (committee chair)
- Athena Maguire (Biology) April 23, 2014
- Brian Lavin (Biology) April 23, 2013
- Brianna Richards (Biology) January 29, 2007 (committee chair)
- Holly Gardner-Skolones (Biology) May 28, 2004

RESEARCH, SCHOLARSHIP AND PROFESSIONAL SERVICE

Research Projects

Director, SSUPER (Sonoma State University Primate Ethology Research) Lab (February 2007-present)

- Applied Primate Ethology Research Program (IACUC #2009-41)
 - Effects of enrichment on competition and engagement in captive chimps (Oakland Zoo) (Nov. 2015-present)
 - Assessment of social stability in captive hamadryas baboons (OZ) (Nov. 2015-present)
 - Effects of enrichment on the behavior and enclosure use of captive lemurs (OZ) (Nov. 2014-present)
 - Behavioral indicators of stress in cheetah (Safari West) (Feb. 2014-May 2015)
 - Behavior and enclosure use of patas monkeys (San Francisco Zoo) (June 2014-May 2015)
 - Effects of enrichment on the core behavioral needs of mandrills (SFZ) (October 2013-present)
 - Proximate and ultimate effects of allo-parenting in African antelope (SW) (Sept. 2013-May 2015)
 - Behavior and enclosure use in captive black and white colobus monkeys (SFZ) (July-Dec. 2013)
 - Hair-plucking behavior in captive mandrills (SFZ) (April-December 2013)
 - Male-male aggression in captive patas monkeys (SW) (Dec. 2012-Dec. 2013)
 - Mating behavior in captive cheetah (SW) (Nov. 2012-Dec. 2013)
 - Group cohesion and enclosure use in a captive squirrel monkeys (SFZ) (Aug. 2010-Nov. 2015)
 - Effects changed group dynamics on social behavior of captive mandrills (SFZ) (Nov. 2007-May 2010)
 - Triggers of hyper-aggressive behavior in female green monkeys at the Oakland Zoo (Mar. 2007-Oct. 2007)

APPENDIX XII – Karin Jaffe

Project Manager & Field Researcher, Laikipia District, Kenya (October 1997-October 1999)
Collected ecological and behavioral data on vervet (*C. aethiops*) and patas (*E. patas*) monkeys to 1) characterize the habitat structure of the study groups' home ranges, and 2) evaluate the responses of vervet and patas monkeys to alarm calls. Project advisor: Dr. Lynne Isbell

- Recent Publications** ^Δ Undergraduate student collaborator [#] Graduate student collaborator
Jaffe, K.E. (in prep). A Nile monitor lizard (*Varanus niloticus*) elicits a vervet (*Chlorocebus pygerythrus*) alarm call: Evidence for predator classification. (in prep). *African Primates*.
Wilson, P. [#], **Jaffe, K.E.**, and Minier, D. (in prep.). Predictability of reward affects the activity levels of captive lemurs and the interest of zoo visitors. *Zoo Biology*.
Williams, D.R. ^Δ & **Jaffe, K.E.** (in prep.) Effects of dominance rank and reproductive state on the behavior of female mandrills (*Mandrillus sphinx*) in a captive setting. *Applied Animal Behavior*.
Jaffe, K.E. (under review) *Chlorocebus aethiops* (grivet monkey). In: *All the World's Primates*. (N. Rowe and M. Myers, eds.). Pogonias Press.
Jaffe, K.E. (under review) *Chlorocebus pygerythrus* (vervet). In: *All the World's Primates*. (N. Rowe and M. Myers, eds.). Pogonias Press.
Kassie, A. & **Jaffe, K.E.** (under review) *Chlorocebus djamdjamensis* (bale monkey). In: *All the World's Primates*. (N. Rowe and M. Myers, eds.). Pogonias Press.
Galat-Luong, A., **Jaffe, K.E.** & Galat, G. (under review) *Chlorocebus sabaeus* (green monkey). In: *All the World's Primates*. (N. Rowe and M. Myers, eds.). Pogonias Press.
Jaffe, K.E. (accepted) Guenons, Arboreal. In: *The International Encyclopedia of Primatology*. (A. Fuentes, ed.). Wiley-Blackwell.
Jaffe, K.E. (accepted) Guenons, Semi-terrestrial. In: *The International Encyclopedia of Primatology*. (A. Fuentes, ed.). Wiley-Blackwell.

Recent Presentations

- Jaffe, K.E.** “Applied animal behavior: Collaborative research that enhances the welfare of captive animals and the academic experience of students.” Biology Colloquium, December 8, 2015. (Oral)
Wilson, P. [#] and **Jaffe, K.E.** “Effects of environmental enrichment on captive lemurs.” SSU Research Symposium, April 15, 2015. (Poster)
Lopez, A. [#] and **Jaffe, K.E.** “Effects of an alternative rearing strategy on the behavior of captive African ungulates.” SSU Research Symposium, April 15, 2015. (Poster)
Williams, D.R. ^Δ, & **Jaffe, K.E.** “Female-female competition in zoo living mandrills (*Mandrillus sphinx*): effects of dominance rank and reproductive state.” 38th Meeting of the American Society of Primatologists in Bend, OR, June 17-20, 2015. (Oral)
Jaffe, K.E., Carroll, D., Cusimano, D., and Andrews, J. “University/zoo collaborations: Applied ethological research improves the welfare of captive animals and the academic experience for students.” 12th Regional North American Meeting of the International Society for Applied Ethology in East Lansing, MI, May 30-31, 2014. (Poster)
Jaffe, K.E., Rivoire, S., and Wilson, P. [#] “It takes a village: Building environmental enrichment for captive lemurs requires interdisciplinary collaboration.” SSU Research Symposium, April 15, 2015. (Poster)
Jaffe, K.E. “A.P.E.: Applied Primate Ethology research at Sonoma State University: Enhancing the lives of captive primates through the scientific study of animal behavior.” Biology 500 (*Current Themes in Biological Inquiry*), March 10, 2015. (Oral)

APPENDIX XII – Karin Jaffe

Jaffe, K.E. “Applied ethology in action: Improving the welfare of an all-male group of squirrel monkeys at the San Francisco Zoo.” School of Social Sciences Brown Bag Series, March 3, 2015. (Oral)

Recent External Grants and Other Funding

- 2014-2015 *International Primatological Society* Captive Care Grant (\$1,500)
“An applied ethological study of the potential for former laboratory squirrel monkeys (*Saimiri sciureus*) to be successfully retired to the San Francisco Zoo”
- 2015 Experiment.com Crowdfunding Campaign (\$2584)
“Using smart feeders to increase lemur activity and stimulate human interest”

APPENDIX XII – Joseph Lin

Curriculum Vitae

Joseph Lin

Address Sonoma State University
Department of Biology
1801 East Cotati Avenue
Rohnert Park, CA 94928

Phone office: (707) 664-2931
cell: (314) 412-0739

Email linj@sonoma.edu

Education

1998 - 2003 University of California at San Francisco (UCSF), San Francisco, California
Degree: Ph.D., Biomedical Sciences, December 2003.

1996 - 1998 University of California at San Diego (UCSD)
The Salk Institute for Biological Studies, La Jolla, California
Degree: M.S., Biology, June 1998.

1994 - 1997 University of California at San Diego (UCSD), La Jolla, California
Degree: B.S., Biochemistry/Cell Biology, June 1997., Minor: Music

Academic Positions and Employment

2015 – Present Associate Professor of Biology, Sonoma State University
2009 - 2015 Assistant Professor of Biology, Sonoma State University
2007 - 2008 Adjunct Assistant Professor of Biology, University of Missouri - St. Louis
2004 - 2009 Postdoctoral Research Fellow, Dept. of Pathology and Immunology,
Washington University in St. Louis

Scholarships and Awards

2015 - 2016 Recipient of the Excellence in Teaching Award - Sonoma State University
2014 - 2015 Nominee for the Excellence in Teaching Award - Sonoma State University
2006 - 2009 Cancer Research Institute Postdoctoral Fellowship Award
1994 - 1997 University of California Regent's Scholar
1994 - 1997 Robert C. Byrd Scholar
1994 - 1997 Provost's Honors List

Research Funding

2013 - 2014 **California State University Program for Education and Research in Biotechnology: New Investigator Grant.** Elucidating the Role of Peroxiredoxin 1 in B Cell Signal Transduction (Amount: \$15,000)

2011 - 2012 **California State University Program for Education and Research in Biotechnology: New Investigator Grant.** Generation of antibodies to characterize the alternative adaptive immune response in the sea lamprey, *Petromyzon marinus* (Amount: \$15,000)

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Research Experience

2009 - Present Sonoma State University

Research Projects: My research group focuses on the role of oxidation in regulating immune cell signaling. Following receptor stimulation, immune cells generate hydrogen peroxide, a potent oxidant that can effectively inhibit cysteine-dependent enzymes such as protein tyrosine phosphatases through oxidation of the catalytic cysteine. My lab utilizes both purified recombinant proteins as well as cultured immune cells to investigate this poorly understood regulatory mechanism.

2004 to 2009 Washington University in St. Louis

Advisor: Andrey S. Shaw, M.D.

Research projects:

- 1) Regulation of T Cell Polarization and its Role in Effector Functions
- 2) Analysis of Analog and Digital Signaling Pathways in T Cells

1998 to 2004 University of CA at San Francisco

Advisor: Arthur Weiss M.D., Ph.D.

Thesis project: The Role of LAT and CD148 in T Cell Signaling

1996 to 1998 The Salk Institute for Biological Studies

Advisor: Bartholomew M. Sefton Ph.D.

Thesis project: Factors Involved with the Activation of the Protein Tyrosine Kinase Itk.

1995 to 1996 The Scripps Institution of Oceanography

Advisor: Paul Dayton Ph.D.

Research project: Larval Settlement and Growth Studies of *S. purpuratus* and *S. franciscanus*

Teaching Experience

2009 to present **Assistant/Associate Professor**- Sonoma State University

Molecular and Cellular Biology (Biol 123)

Introductory Genetics and Cell Biology (Biol 130)

Biology of Cancer (Biol 309)

Molecular, Cell Biology, and Physiology (Biol 321)

Virology (Biol 383)

Immunology (Biol 480)

Advanced Molecular and Cellular Techniques (Biol 497R)

Molecular Mechanisms of Diseases (Graduate level; Biol 500S)

Advanced Cell Biology (Graduate level; Biol 544)

Spring 2008 **Course Instructor** - Washington University in St. Louis

Immunology (Bio 424)

Spring 2007 to 2008 **Adjunct Assistant Professor** - University of Missouri – St. Louis

Immunobiology (Bio 4842)

Fall 2005 to 2008 **Lecturer** - Washington University in St. Louis

Team Taught Course; Lectures on B Cell Activation and Development

Foundations in Immunology (Graduate-level; Bio 5051)

APPENDIX XII – Joseph Lin

Publications

1. Saund, S., Sosa, V., Henriquez, S., Nguyen, Q Y., Soeda, S., Bianco, C., Millikin, R., White, C., Le, H., Ono, K., Tantillo, D., Kumagai, Y., Akaike, T., **Lin, J.**, and Fukuto, J. (2015) The Chemical Biology of Hydropersulfides (RSSH): Chemical Stability, Reactivity and Redox Roles. *Arch Biochem Biophys.* 588:15-24.
2. Williamson, R.P., Barker, B.T., Drammeh, H., Scott, J., and **Lin, J.** (2014) Isolation and Genetic Analysis of an Environmental Bacteriophage: A 10-Session Laboratory Series in Molecular Virology. *Biochem Mol Biol Educ.* 42(6):480-5.
3. Ono, K., Akaike, T., Sawa, T., Kumagai, Y., Wink, D.A., Tantillo, D.J., Hobbs, A.J., Nagy, P., Xian, M., **Lin J.**, and Fukuto J.M. (2014) The Redox Chemistry and Chemical Biology of H₂S, Hydropersulfides and Derived Species: Implications to Their Possible Biological Activity and Utility. *Free Radic Biol Med.* 77C: 82-94.
4. Jackson, M.I., Fields, H.F., Lujan, T.S., Cantrell. M.M., **Lin, J.**, and Fukuto, J.M. (2013) The effects of Nitroxyl (HNO) on H₂O₂ metabolism and possible mechanism of HNO signaling. *Arch. Biochem. Biophys.* 538: 120-129.
5. Katsumoto, T.R., Kudo, M., Callahan, E.C., Zhu, J.W., **Lin, J.**, Rosen, C.E., Manz, B., Lee, J.W., Matthay, M.A., Huang, X., Sheppard, D., and Weiss, A. (2013) The phosphatase CD148 promotes airway hyperresponsiveness by positively regulating Src family kinases. *J Clin Invest.* 123(5): 2037-48.
6. Filbert, E.L., Le Borgne, M., **Lin, J.**, Heuser, J.E., and Shaw, A.S. (2012) Stathmin regulates microtubule dynamics and microtubule organizing center polarization in activated T cells. *J Immunol.* 188(11): 5421-7.
7. Whitacre, J.M., **Lin, J.**, Harding, A. (2012) T cell adaptive immunity proceeds through environment-induced adaptation from the exposure of cryptic genetic variation. *Front Genet.* 3:5. 8. **J Lin** and A Weiss. (2010) Proximal tyrosine kinases that initiate T cell activation. *Nature Reviews Immunology*, 10(3). This publication appears as a poster-sized insert in the March 2010 issue of NRI.
9. **Lin, J.**, Hou, K.K., Piwnica-Worms, H., and Shaw, A.S. (2009) The polarity protein Par1b/EMK/MARK2 regulates T cell receptor-induced MTOC polarization. *J Immunol.* 183:1215- 21.
10. **Lin, J.**, Harding, A., Giurisato, E., and Shaw, A.S. (2009) KSR modulates the sensitivity of the MAPK pathway in T cells without altering fundamental system outputs. *Mol Cell Biol.* 29:2082-91.
11. Giurisato, E., **Lin, J.**, Harding A., Cerutti E., Cella M., Lewis R.E., Colonna M., and Shaw, A.S. (2009) The MAP kinase scaffold KSR1 is required for recruitment of ERK to the immunological synapse. *Mol Cell Bio.* 29:1554-64.
12. Kao, H., **Lin, J.**, Littman, D.R., Shaw, A.S., and Allen, P.A. (2008) Regulated movement of CD4 in and out of the immunological synapse. *J Immunol.* 181(12):8248-57.
13. Zhu, J.W., Brdicka, T., Katsumoto, T.R., **Lin, J.**, and Weiss, A. (2008) Structurally distinct receptor-type protein tyrosine phosphatases CD45 and CD148 both regulate B cell and macrophage immunoreceptor signaling. *Immunity.* 28:183-196.
14. Friend, L.D., Shah, D.D., Deppong, C., **Lin, J.**, Bricker, T.L., Juehne, T.I., Rose, C.M., and Green, J.M. (2006). A dose-dependent requirement for the proline motif of CD28 in cellular and humoral immunity revealed by a targeted knockin mutant. *J Exp Med.* 203:2121-2133.
15. **Lin, J.**, Miller, M. J., and Shaw, A. S. (2005). The c-SMAC: sorting it all out (or in). *J Cell Biol.* 170:177-182.
16. **Lin, J.**, and Shaw, A. S. (2005). Getting downstream without a raft. *Cell.* 121:815-816.

APPENDIX XII – Joseph Lin

17. **Lin, J.**, Zhu, J. W., Baker, J. E., and Weiss, A. (2004). Regulated expression of the receptor-like tyrosine phosphatase CD148 on hemopoietic cells. *J Immunol.* 173:2324-2330.
18. Roose, J. P., Diehn, M., Tomlinson, M. G., **Lin, J.**, Alizadeh, A. A., Botstein, D., Brown, P. O., and Weiss, A. (2003). T cell receptor-independent basal signaling via Erk and Abl kinases suppresses RAG gene expression. *PLoS Biol.* 1:E53.
19. **Lin, J.**, and Weiss, A. (2003). The tyrosine phosphatase CD148 is excluded from the immunologic synapse and down-regulates prolonged T cell signaling. *J Cell Biol.* 162:673-682.
20. Kuhne, M. R., **Lin, J.**, Yablonski, D., Mollenauer, M. N., Ehrlich, L. I., Huppa, J., Davis, M. M., and Weiss, A. (2003). Linker for activation of T cells, zeta-associated protein-70, and Src homology 2 domain-containing leukocyte protein-76 are required for TCR-induced microtubule-organizing center polarization. *J Immunol.* 171:860-866.
21. Hartgroves, L. C., **Lin, J.**, Langen, H., Zech, T., Weiss, A., and Harder, T. (2003). Synergistic assembly of linker for activation of T cells signaling protein complexes in T cell plasma membrane domains. *J Biol Chem.* 278:20389-20394.
22. Kane, L. P., **Lin, J.**, and Weiss, A. (2002). It's all Rel-ative: NF-kappaB and CD28 costimulation of T-cell activation. *Trends Immunol.* 23:413-420.
23. **Lin, J.**, and Weiss, A. (2001). Identification of the minimal tyrosine residues required for linker for activation of T cell function. *J Biol Chem.* 276:29588-29595.
24. Lee, J. C., Smith, S. B., Watada, H., **Lin, J.**, Scheel, D., Wang, J., Mirmira, R. G., and German, M. S. (2001). Regulation of the pancreatic pro-endocrine gene neurogenin3. *Diabetes.* 50:928-936.
25. del Bosque-Plata, L., **Lin, J.**, Horikawa, Y., Schwarz, P. E., Cox, N. J., Iwasaki, N., Ogata, M., Iwamoto, Y., German, M. S., and Bell, G. I. (2001). Mutations in the coding region of the neurogenin 3 gene (NEUROG3) are not a common cause of maturity-onset diabetes of the young in Japanese subjects. *Diabetes.* 50:694-696.
26. **Lin, J.**, and Weiss, A. (2001). T cell receptor signalling. *J Cell Sci.* 114:243-244.
27. Tomlinson, M. G., **Lin, J.**, and Weiss, A. (2000). Lymphocytes with a complex: adapter proteins in antigen receptor signaling. *Immunol Today.* 21:584-591.
28. Kane, L. P., **Lin, J.**, and Weiss, A. (2000). Signal transduction by the TCR for antigen. *Curr Opin Immunol.* 12:242-249.
29. **Lin, J.**, Weiss, A., and Finco, T. S. (1999). Localization of LAT in glycolipid-enriched microdomains is required for T cell activation. *J Biol Chem.* 274:28861-28864.
30. Finco, T. S., Yablonski, D., **Lin, J.**, and Weiss, A. (1999). The adapter proteins LAT and SLP-76 are required for T-cell activation. *Cold Spring Harb Symp Quant Biol.* 64:265-274.

APPENDIX XII – Karina Nielsen

KARINA JOHANNE NIELSEN

Romberg Tiburon Center for Environmental Studies: <http://rtc.sfsu.edu/>

Department of Biology
San Francisco State University
3150 Paradise Dr.
Tiburon, CA 94920
email:knielsen@sfsu.edu
office:415.338.3713; mobile:415.819.2070

EDUCATION

Ph.D., Oregon State University, 1998

Dissertation: *Bottom-up and top-down forces in tidepools: the influence of nutrients, herbivores, and wave exposure on community structure*. Co-advisors: Jane Lubchenco & Bruce A. Menge
B.S., *Summa Cum Laude*, Brooklyn College - City University of New York, 1992

PROFESSIONAL EXPERIENCE

2014 – Director, Romberg Tiburon Center for Environmental Studies, San Francisco State University

2014 – Professor, Department of Biology, San Francisco State University

2013 – 2014 Professor, Department of Biology, Sonoma State University

2007 – Senior Research Associate, Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)

2010 – 2011 Faculty Research Associate, Academic Affairs, Office of Research & Sponsored Programs, Sonoma State University

2008 – 2013 Associate Professor, Department of Biology, Sonoma State University

2003 – 2008 Assistant Professor, Department of Biology, Sonoma State University

GRANTS AND FELLOWSHIPS

2014 – 2017 **California Ocean Science Trust** \$450,000. The Ecological State of Northern California's Sandy Beaches and Surf Zones: A Baseline Characterization for MPA Assessment. PI: Nielsen, KJ (San Francisco State University); co-PIs: Milligan, T (Humboldt State University); Dugan, JE (University of California, Santa Barbara); Craig, S (Humboldt State University); Laucci, R. (Smith River Rancheria).

2012 – 2013 **California Sea Grant** \$10,000 Cultivation and molecular identification of Gonyaulacoid dinoflagellates associated with mortalities of abalone. PIs: O'Kelly, C.J. (Friday Harbor Laboratories, University of Washington) & K. J. Nielsen (Sonoma State University).

2011 – 2012 **California Sea Grant** \$10,000 Molecular identity of Gonyaulacoid dinoflagellates associated with mortalities of abalone, urchins and other marine invertebrates in Sonoma County, California, August – September 2011. PIs: O'Kelly, C.J. (Friday Harbor Laboratories, University of Washington) & K. J. Nielsen (Sonoma State University).

2011 – 2014 **National Science Foundation** \$1,119,999 Collaborative Research: The role of calcifying algae as a determinant of rocky intertidal macrophyte community structure at a meta-ecosystem scale. PIs: Menge, BA (Oregon State University) & Nielsen, KJ (Sonoma State University)

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State University/ San Francisco State University); co-PIs: Hacker, S & Chan, F (Oregon State University)

- 2011 – 2016 **National Oceanographic and Atmospheric Administration** \$1,800,000 (\$146,000 to Nielsen/SFSU) in 2011-2015 (additional years pending) CeNCOOS: Integrating marine observations to inform decision makers and the general public. PIs: Primary contact: Leslie Rosenfeld, Director (CeNCOOS @MBARI); (co-investigators in alphabetic order): Barbara Block (Hopkins Marine Lab), Mark Carr (PISCO, UC Santa Cruz), Yi Chao (Jet Propulsion Lab/UCLA), Francisco Chavez (MBARI), Jim Doyle (Naval Research Laboratory) Chris Edwards (UC Santa Cruz) Oliver Fringer (Stanford), Toby Garfield (San Francisco State / Romberg Tiburon Center), Raphe Kudela (UC Santa Cruz), Rik Kvittek (CSUMB), John Largier (UC Davis / Bodega Marine Lab), Steven Le (Science Applications International Corporation), Erika McPhee-Shaw (Moss Landing Marine Laboratory), Mark Moline (California Polytechnic Institute), Andy Moore (UC Santa Cruz), Hanna Nevins (Marine Wildlife Veterinary Care & Research Center), Karina Nielsen (Sonoma State), Jeff Paduan (Naval Postgraduate School), Frank Shaughnessy (Humboldt State University), Igor Shulman (Naval Research Laboratory), Bill Sydeman (Farallones Institute)
- 2011 – 2014 **California Ocean Science Trust** \$290,000 Sandy beach ecosystems: Baseline characterization and evaluation of monitoring metrics for MPAs along the south coast of California PI: Dugan, JE (University of California, Santa Barbara; co-PIs: Page, H (University of California, Santa Barbara); Nielsen, KJ (Sonoma State University); Bursek, J (Channel Islands National Marine Sanctuary)
- 2010 – 2013 **California Ocean Science Trust** \$288,667 Baseline Monitoring of Ecosystem and Socioeconomic Indicators for MPAs along the North Central Coast of California: Sandy Beaches. PI: Karina J Nielsen (Sonoma State University); co-PIs: Steven Morgan (UC-Davis, Bodega Marine Lab), Jenifer Dugan (UC- Santa Barbara, Marine Science Institute).
- 2008 – 2011 **National Oceanographic and Atmospheric Administration** \$3,281,529 (\$120,000 to Nielsen/SSU). CeNCOOS: Long-term monitoring of environmental conditions in support of protected marine area management in central and northern California total award. PI: Steven Ramp (Monterey Bay Aquarium Research Institute (MBARI)); Co-PIs: Francisco Chavez (MBARI), Frank Shaughnessy & Greg Crawford (Humboldt State University), Toby Garfield (San Francisco State University), Mitchell Craig (CSU – East Bay), Mark Moline (California Polytechnic State University), Kenneth Coale (Moss Landing Marine Lab), Raphael Kudela (UC- Santa Cruz), John Largier (UC-Davis, Bodega Marine Lab), et al.
- 2007 – 2010 **National Science Foundation** \$678,398 Collaborative Research: Scaling up from community to meta-ecosystem dynamics in the rocky intertidal - a comparative-experimental approach; PIs: Bruce Menge (Oregon State University)& Karina Nielsen (Sonoma State University); Co-PIs: Sally Hacker (Oregon State University) & Francis Chan (Oregon State University).

PUBLICATIONS (PEER-REVIEWED) (*Student co-author)

- Barner, A.K., S. D. Hacker, B. A. Menge & K. J. Nielsen. 2016. The complex net effect of reciprocal interactions and recruitment facilitation maintains an intertidal kelp community. **Journal of Ecology** 104:33-43.
- Murray, S., Weisberg, Raimondi, P., S. Ambrose, R., Bell, C., Blanchette, C., Burnaford, J., Dethier, M., Engle, J., Foster, M., Miner, M., Nielsen, K.J., Pearse, J., Richards, D. and Smith, J. 2016. Level of Agreement in Evaluating the Ecological States of West Coast Rocky

APPENDIX XII – Karina Nielsen

Intertidal Communities: A Best Professional Judgment Exercise. **Ecological Indicators** 60:802-814.

Menge, B.A., T.C. Gouhier, S.D. Hacker, F. Chan and K. J. Nielsen. 2015. Are meta-ecosystems organized hierarchically? A model and test in rocky intertidal habitats. **Ecological Monographs** 85:213-233.

Heather Tallis, Jane Lubchenco, and 238 co-signatories including K.J. Nielsen. Working together: A call for inclusive conservation. 2014. **Nature** 515:27-28

Burnaford, J., K.J. Nielsen & S.L. Williams. 2014. Celestial mechanics affect emersion time and patterns of abundance of an ecosystem engineer, the intertidal kelp *Saccharina sessilis*. **Marine Ecology Progress Series** 509:127-136.

Krenz, C., B. A. Menge, T. L. Freidenburg, J. Lubchenco, F. T. Chan, M. M. Foley & K. J. Nielsen. 2011. Ecological subsidies to rocky intertidal communities: linear or non-linear changes along a consistent geographic upwelling transition? **Journal of Experimental Marine Biology and Ecology** 409: 361-370.

McPhee-Shaw, E. K. J. Nielsen, J. L. Largier & B. A. Menge. 2011. Nearshore Chlorophyll-a events and wave-driven transport. **Geophysical Research Letters** 38

Thompson, S. A.*, H. Knoll*, C. A. Blanchette & K. J. Nielsen 2010. Population consequences of biomass loss due to commercial collection of the wild seaweed *Postelsia palmaeformis*. **Marine Ecology Progress Series** 413:17-31.

Sanford, E., M. E. Wood*, K. J. Nielsen. 2010. A non-lethal method for estimation of gonad and pyloric caecum indices in sea stars. **Invertebrate Biology** 128:372-380.

Menge, B. A., F. T. Chan, K. J. Nielsen, E. D. Lorenzo & J. Lubchenco. 2009. Climatic variation alters supply side ecology: impact of climate patterns on phytoplankton and mussel recruitment. **Ecological Monographs** 79:379-95.

Kavanaugh, M. T.*, K. J. Nielsen, B. A. Menge, F. T. Chan, R. M. Letelier, L. M. Goodrich. 2009. Experimental assessment of the effects of shade on an intertidal kelp: do phytoplankton blooms inhibit growth of open coast macroalgae? **Limnology & Oceanography** 54:276-288.

GRADUATE COURSES AT SSU

Applied Data Analysis (Spring 2009, 2010, 2011)

Professional Skills (Fall 2008)

Philosophy of Science (Fall 2006)

Sound Science and Sound Bites: Ecology in the News (Fall 2004)

GRADUATE STUDENT ADVISEES AT SSU

Athena Maguire; MS expected spring 2016; **Jill Stokes**; MS expected Spring 2016; **Preston Malm**; MS expected Spring 2016; **Mustafa Gül** (*International Graduate Fellow, Ministry of National Education, Turkey*); MS 2015; **Adele Paquin** ; MS 2012; **Marian Parker**; MS 2009; Heather Knoll (*CA Sea Grant Trainee*); MS not completed; **Megan Wood** (*EPA STAR Fellow*); MS 2008; **Sarah Ann Thompson** (*CA Sea Grant Trainee*); MS 2007

APPENDIX XII – Murali Pillai

Murali C. Pillai, PhD.

Education:

1988 Ph.D., University of California, Davis
1982 M.Phil., University of Calicut, India
1980 M.Sc., University of Poona, India
1977 B.Sc., University of Kerala, India

Professional Positions:

2014-present Chair, Department of Biology, Sonoma State University
1994-present Assistant, Associate and Professor of Biology, Sonoma State University
2010-present Member, Faculty Consensus Group, California State University Program for Education and Research in Biotechnology (CSUPERB)
2013-present CSU Council on Ocean Affairs, Science and Technology (COAST)
2001-2014 Director, Health Professions Advisory Program, Sonoma State University
2002-present Co-Director, Keck Microanalysis Laboratory, Sonoma State University
1992-present Research Associate, University of California Davis, Bodega Marine Laboratory
1993 Lecturer, Sonoma State University
1990-1992 Post-doctoral Fellow, University of California, Davis.
1989 NIH Post-doctoral Fellow, Department of Human Anatomy and Cell Biology, School of Medicine, University of California, Davis
1988 Research Assistant, University of California, Davis
1983-1987 California Sea Grant (NOAA) Trainee, University of California, Davis

Honors, Awards and Fellowships:

2009 Sabbatical Leave Award for the fall semester of 2009
2003 Visiting Professor, University of Tokyo, Japan.
2000 Sabbatical Leave Award for the fall semester of 2001
1998 Nominated for Excellence in Teaching Award, Sonoma State University
1995 Invited Speaker, UC Toxic Substances Teaching and Research Program
1994 Andrew Mellon Research Fellow, University of California, Davis
1993 Invited Speaker, Gamete Research Conference, University of California, Davis
1993 Invited Speaker, Gordon Research Conference on Fertilization and Activation of Development, Plymouth, New Hampshire
1989 Invited Speaker, 5th International Congress of Invertebrate Reproduction, University of Nagoya, Japan

Research Grants Funded:

- Total research funding (collaborative and independent): Over \$1,115,000.00. Funding agencies included: Sonoma State Research, Scholarship, and Creative Activity Program, California Sea Grant, California Department of Fish & Game, US Environmental Protection Agency, US Department of Interior, National Science

APPENDIX XII – Murali Pillai

Foundation, and CSUPERB (California State University Program for Education and Research in Biotechnology).

Publications

- Cherr, G.N., Vines, C.A., Smith, E.H., **Pillai**, M., Griffin, F., and Yanagimachi, Y. 2015. Sperm motility initiation in Pacific herring. In: Flagellar Mechanics: Its Contribution to Sperm and Flagellar Guidance. J. Cosson (Ed.), Bentham Science Publishers, Illinois.
- Yanagimachi, R., Cherr, G., Matsubara, T., Andoh, T., Harumi, T., Vines, C., **Pillai**, M., Griffin, F., Matsubara, H., Weatherby, T. and Kaneshiro, K. 2013. Sperm attractant in the micropyle region of fish and insect eggs. *Biology of Reproduction*, 88: 1-11.
- **Pillai**, M.C., Vines, C.A. and Cherr, G.N. 2010. Developmental effects of polycyclic aromatic hydrocarbons: disruption of embryonic axis development in sea urchins through a β -catenin dependent pathway. Biotechnological Solutions to Environmental Sustainability, Vellore Institute of Technology Press, India.
- Cherr, G.N., M. Morisawa, **Pillai**, M., Vines, C.A., and Griffin, F.J. 2008. Role of two egg derived molecules in motility initiation and fertilization Pacific herring. *International Journal of Developmental Biology*, 52: 743-752
- **Pillai**, M.C., Vines, C.A., Wikramanayake, A.H. and Cherr, G.N. 2004. Polycyclic aromatic hydrocarbons disrupt axial development in sea urchin embryos through β -catenin dependent pathway. *Toxicol.* 186: 93-108
- Vines, C.A., Kiroku, K., Griffin, F.J., **Pillai**, M.C., Morisawa, M., Yanagimachi, R. and Cherr, G.N. 2002. Motility initiation in herring sperm is regulated by reverse sodium-calcium exchange. *Proc. Natl. Acad. Sci. (USA)*. 99: 2026-2031
- Griffin, F.J., **Pillai**, M.C., Vines, C.A., Hibbard-Robbins, T., Yanagimachi, R. and Cherr, G.N. 1998. Effect of salinity on fertilization and development in the Pacific herring, *Clupea pallasii*. 1998. *Biol. Bull.*, 194: 25-35.
- Shamseldin, A., Clegg, J.S., Friedman, C.S., Cherr, G.N. and **Pillai** M.C. 1997. Induced thermotolerance in the Pacific oyster, *Crassostrea gigas*. 1997. *J. Shell Fish Res.*, 16: 487-491.
- **Pillai**, M.C., Blethrow, H.S., Higashi, R.M. and Cherr, G.N. Inhibition of the sea urchin sperm acrosome reaction by a lignin-derived macromolecule. 1997. *Aquat. Toxicol.* 37: 139-156.
- Vines, C.A., Griffin, F.J., **Pillai**, M.C., Yanagimachi, R., Hibbard-Robbins, T., and Cherr, G.N. 1996. A specialized role for the Pacific herring egg chorion in sperm motility initiation. In The Fish Egg: Its Biology and Culture Symposium Proceedings (D. MacKinlay and M. Eldridge, eds.). International Congress on the Biology of Fishes, San Francisco State University, pp. 167-172.
- Griffin, F.J., Vines, C.A., **Pillai**, M.C., Yanagimachi, R. and Cherr, G.N. 1996. The sperm motility initiation factor (SMIF) of the Pacific herring egg chorion: A minor component of major function. *Develop Growth & Differ.* 38: 193-202.
- Cherr, G.N. and **Pillai**, M.C. 1995. Environmental Factors affecting reproduction and development of Pacific herring in the San Francisco Estuary. *California Dept. of Fish and Game Publication*. pp. 8-9.

APPENDIX XII – Murali Pillai

- Garman, G.D., **Pillai, M.C.**, and Cherr, G.N. 1994. Nuclear events during early development in gametophytes of *Macrocystis pyrifera*, and the temporal effects of a marine contaminant. *Marine Biology*, 121: 355-363.
- Garman, G.D., **Pillai, M.C.**, and Cherr, G.N. 1994. Inhibition of cellular events during algal gametophyte development: Effects of select metals and an aqueous petroleum waste. *Aquatic Toxicology*. 28: 127-144.
- **Pillai, M.C.**, R. Yanagimachi and Cherr, G.N. 1994. *In Vivo* and *in vitro* initiation of sperm motility using fresh and cryopreserved gametes from the Pacific herring, *Clupea pallasii*. *Journal of Experimental Zoology*. 265: 336-342.
- Cherr, G.N., Fan, T.W.-M., **Pillai, M.C.**, Shields, T. S., and Higashi, R.M.. 1993. Electrophoretic separation, characterization, and quantification of biologically active lignin-derived macromolecules. *Analytical Biochemistry*. 214: 521-527.
- **Pillai, M.C.**, Shields, T.S., Yanagimachi, R. and Cherr, G.N. 1992. Isolation and partial characterization of the sperm motility initiating factor from eggs of the Pacific Herring, *Clupea pallasii*. *Journal of Experimental Zoology*, 265: 336-342.
- Fan, T.W.-M., Higashi, R.M., Cherr, G.N. and **Pillai, M.C.** 1992. Produced water perturbs reproduction in mussels as monitored *in vivo* by NMR spectroscopy and imaging. In: Environmental Science Research (J.P. Ray and F.R. Engelhardt, eds.) 46: 403-414.
- Yanagimachi, R., Cherr, G.N., **Pillai, M.C.** and Baldwin, J.D. 1992. Factors controlling sperm entry into the micropyles of salmonid and herring eggs. *Development, Growth and Differentiation*, 34: 447-461.
- Baldwin, J.D., **Pillai M.C.** and Cherr, G.N. 1992. The response of sea urchin embryos to aqueous petroleum wastes includes the expression of a high molecular weight glycoprotein. *Marine Biology*, 114: 21-30.
- **Pillai, M.C.**, Baldwin, J.D. and Cherr, G.N. 1992. Early development in an algal gametophyte: role of cytoskeleton in germination and nuclear translocation. *Protoplasma*, 170: 34-45.
- Clark, W.H., Jr., Chen, T.-I., **Pillai, M.C.**, Uhlinger, K., Shoffner-McGee J. and Griffin, F.J. 1991. The biology of gamete activation and fertilization in *Sicyonia ingentis* (*Penaeoidea*): present knowledge and future directions. 1991. *Bull. Inst. Academia Sinica, Monograph*, 16: 553-571.
- Clark, W.H. Jr. and **Pillai, M.C.** 1991. Egg production, release and activation in the marine shrimp, *Sicyonia ingentis*. In: *Crustacean Issues*. Vol. 7, (A.M. Wenner and A. Kuris, eds.). Balkema Press, Rotterdam, pp. 3-8.
- Lynn, J.W., **Pillai, M.C.**, Glas, P. and Green, J.D. 1991. Comparative morphology and physiology of egg activation in selected Penaeoidea. In: *Frontiers in Shrimp Research*. (P. DeLoach, M.A. Davidson, W.J. Dougherty, eds.). Elsevier Science Publishers, Amsterdam, pp. 47-63.
- **Pillai, M.C.** and Meizel, S. 1991. Trypsin inhibitors prevent the progesterone-initiated increase in intracellular calcium required for the human sperm acrosome reaction. *Journal of Experimental Zoology*, 258: 384-393.
- **Pillai, M.C.**, Griffin, F.J. and W.H. Clark, Jr. 1991. Post-spawning alterations of the extracellular matrices in the eggs of *Sicyonia ingentis*. (M. Hoshi and O. Yamashita, eds.). *Advances in Invertebrate Reproduction*, 5: 201-207.

APPENDIX XII – Murali Pillai

- Meizel, S., **Pillai, M.C.**, Diaz-Perez, E. and Thomas, P. 1990. Initiation of the human sperm acrosome reaction by components of human follicular fluid and cumulus secretions including steroids. In: *Fertilization in Mammals*. (B.D. Bavister, J. Cummins, E.R.D. Roldan, eds.). Serono Symposia USA, Norwell, Massachusetts, pp. 205-222.
- Clark, W.H., Jr., Yudin, A.I., Lynn, J.W., Griffin, F.J. and **Pillai, M.C.** 1990. Jelly layer formation in the penaeoidean shrimp eggs. *Biological Bulletin*, 178: 295-299.

Invited Seminars, Lectures and other Presentations (~20)

Manuscript Reviews:

Aquaculture, Journal of Thereogenology, Biological Bulletin, Journal of the Marine Biological Association of the United Kingdom, Developmental Biology, Journal of Experimental Zoology, Molecular Reproduction and Development, Cell & Tissue Structure.

Courses Taught: Sonoma State University Courses

SCI 150, Introduction to Careers in the Health Professions

BIOL 115, Introduction to Biology

BIOL 123, Molecular and Cell Biology

BIOL 344, Cell Biology

BIOL 390, Biology Colloquium

BIOL 472, Developmental Biology

BIOL 495, Independent Studies

BIOL 496, Senior Research

BIOL 498, Biology Practicum

BIOL 544, Advanced Cell Biology

BIOL 595, Graduate Independent Studies

BIOL 598, Graduate Practicum

BIOL 599, M.A. Thesis

Professional Associations:

American Society for Cell and Molecular Biology

California Consortium for Marine Biotechnology

National Association of Advisors for the Health Professions

California State University Program for Education and Research in Biotechnology

(CSUPERB) Faculty Consensus Group

Graduate Student Advisory Committee Activities (2010-present):

Major Advisor

R. Kalmoni, K. Descalso

Advisory Committee

D. Somo, R. Spaeth, R. Goddu, N. Karres, P. Arnold

Orals Committee

Z. Dallara, C. Hare, S. Boaz, T. Ellis, D. Terry, J. Hancock, N. Cornelious

APPENDIX XII – Sean Place

Sean P. Place Curriculum Vitae

Education

Ph.D. 2005 University of California Santa Barbara Ecology, Evolution and Marine Biology

B.S. 1998 University of New Mexico Biology

Positions and Employment

2014 – Present Assistant Professor, Sonoma State University, Department of Biology

2009 – 2014 Assistant Professor, University of South Carolina, Dept. of Biological Sciences & the Environment and Sustainability Program

2007 – 2008 NIH – NRSA Postdoctoral Fellow, University of California Santa Barbara Dept. of Molecular, Cellular, and Developmental Biology

2005 – 2006 Postdoctoral Research Fellow, Mayo Clinic, Dept. of Biochemistry and

Grants & Awards in Support of Research

Active/ Awarded

National Science Foundation – Polar Programs (EAGER): PLR- 1522865 \$99,972 (PI)

08/15/15 – 07/31/17. “RUI: Functional Characterization of micro RNAs and their role in the cellular stress response of polar fish”.

National Science Foundation – Office of Polar Programs: PLR-1447291 \$85,127 (PI)

08/18/14 – 04/30/16. “Identifying adaptive responses of polar fishes in a vulnerable ecosystem”.

Completed

National Science Foundation – Office of Polar Programs: ANT-1040945 \$628,673 (PI)

05/01/11 - 04/30/14. “Ocean Acidification - Category 1: Identifying adaptive responses of polar fishes in a vulnerable ecosystem”.

National Institutes of Health – National Institute on Aging: 1R01AG037969-01 \$1,771,841 (co-PI) 09/16/10 - 09/15/15. “Characterization and genetic analysis of aging in Daphnia”.

CSU Council on Ocean Affairs, Science and Technology – Undergraduate Student Research Support Program: \$1,250 (PI). 11/1/14 – 05/31/15. “Do global methylation patterns change with exposure to sewage effluent?”

South Carolina Research Foundation – 13010-11-26286 \$2,500 5/01/11 – 12/31/11 (PI)

“MSG: Pisaster ochraceus falling to pieces under stress: Heat shock protein response”.

National Science Foundation – OISE: 0853437 - US-Chile Planning Visit \$18,645 03/01/09 – 02/28/10 (co-PI) “Ecological Forecasting of Intertidal Ecosystems in Chile”

National Institutes of Health – Ruth L. Kirschstein NRSA - Individual Postdoctoral Fellowship \$94,772 (PI) 01/01/2007 – 12/31/2008. “Identification of the 1-Methyladenine Receptor”.

APPENDIX XII – Sean Place

Publications (5 most recent out of 20 total)

Peer Reviewed Journals

- Huth, T. J. and **S. P. Place** (2016) RNA-seq reveals a diminished acclimation response to the combined effects of ocean acidification and elevated seawater temperature in *Pagothenia borchgrevinkii*. *Marine Genomics*. DOI: 10.1016/j.margen.2016.02.004
- Huth, T. J. and **S. P. Place** (2016) Transcriptome wide analyses reveal a sustained cellular stress response in the gill tissue of *Trematomus bernacchii* after acclimation to multiple stressors. *BMC Genomics*. DOI: 10.1186/s12864-016-2454-3.
- Tolomeo, A.M., A. Carraro, R. Bakiu, S. Toppo, **S. P. Place**, D. Ferro, G. Santovito (2015). Peroxiredoxin 6 from the Antarctic emerald rockcod: molecular characterization of its response to warming. *Journal of Comparative Physiology B* 186: 59-71.
- Enzor, L. A. and **S. P. Place** (2014). Is warmer better? Decreased oxidative damage in notothenioid fish after long-term acclimation to multiple stressors. *J. Exp. Biol.* doi: 10.1242/jeb.108431
- Huth, T. L. and **S. P. Place** (2013). Next generation sequencing and assembly of tissue specific transcriptomes in the emerald notothen, *Trematomus bernacchii*. *BMC Genomics* 14:805 DOI: 10.1186/10.1186/1471-2164-14-805

Invited Symposium Presentations & Seminars (5 most recent out of 25)

Invited Seminars

- Scientific Committee on Antarctic Research Open Science Conference, Kuala Lumpur, August 22-26, 2016 * Keynote speaker, Physiological Adaptations in Antarctic Organisms Symposium.
- California State University San Francisco, San Francisco, CA April 6, 2016
- California State University East Bay, Hayward, CA February 5, 2016
- Northeastern University, Boston, MA October 22, 2015
- American Fisheries Society, Portland, OR, August 17 2015
- Ecological Genomics Symposium, Kansas City, MO, Oct. 31 – Nov. 2, 2014

Student & Postdoctoral Associates Research Supervision (start date noted)

Postdoctoral fellows – Eunsuk Kim (3/2011 – 2/013)

PhD advisees – Laura Enzor (08/2010), Ph.D. awarded Dec. 2014

Troy Huth (1/2013), Ph.D. awarded Dec. 2015

MS advisees – Josh Hancock (8/2014)

Brennan Chen (1/2015)

Dipali Vasadia (1/2015)

Undergraduate Researchers – Azza Abdalla (2010 – 2011), Sam Johnson (2010), Katelyn Mead (*Magellan Scholar 2011 - 2012), Madeline Kinsey (2012-2013), Russel Clink (2012), Catherine Bowler (2013), Jaelyn Fisher (2013), Kristen Winkler (2014), Melissa Tarrant (2014), Athena Maguire, (2014), Orlando Martinez (2014-2015), Jordan Lankford (2014 – 2015), Alena Faulkner (2015), Evan Morgan (2015) Melissa Pilling (2014-15), Kiera Craig (2015-16), Lauren Blakney (2015-16), Richard Regello (2016), Shannon Dryer (LSAMP Scholar 2016)

APPENDIX XII – Nathan Rank

Biographical sketch- Nathan E. Rank

(a) **Expertise:** Population and evolutionary genetics, evolutionary ecology, plant-herbivore enemy interactions, plant-pathogen interactions

(b) **Professional preparation**

Kalamazoo College	Biology	B.A. 1983
University of California, Irvine	Ecology & Evolutionary Biology	Ph.D. cand. 1987
University of California, Davis	Zoology	Ph.D. 1990
Univ. of Brussels; Univ. of Basel	Post-doc, Evolutionary Ecology	1990-1992

(c) **Appointments**

2004-	Professor, Sonoma State University
2011-2014	Chair, Department of Biology, Sonoma State University
2000-2009	Director, Fairfield Osborn Preserve
1999-2003	Associate Professor, Sonoma State University
1995-1999	Assistant Professor, Sonoma State University
1992-1995	Assistant Professor, Swiss Federal Institute of Technology-Zurich

(d) **Publications**

i. Five publications most relevant to proposed project

Boyчук, EC, JT Smiley, EP Dahlhoff, MA Bernards, **NE Rank** and BJ Sinclair. 2015. Cold tolerance of the montane Sierra leaf beetle, *Chrysomela aeneicollis*. *Journal of Insect Physiology*, in press.

Dick*, CA, **NE Rank**, M McCarthy*, S McWeeney*, D Hollis* and EP Dahlhoff. 2013. Effects of temperature variation on male behavior and mating success in a montane beetle. *Physiological and Biochemical Zoology*, 86(4): 432-440.

Dahlhoff, EP, SL Fearnley, DA Bruce, AG Gibbs, R Stoneking*, DM McMillan*, K. Deiner*, JT Smiley and **NE Rank**. 2008. Effects of temperature on physiology and reproductive success of a montane leaf beetle: implications for persistence of native populations enduring climate change. *Physiological and Biochemical Zoology*, 81(6): 718-732.

Rank, NE, DA. Bruce, DM McMillan*, C Barclay* and EP Dahlhoff. 2007. Phosphoglucose isomerase genotype affects running speed and heat shock protein expression after exposure to extreme temperatures in a montane willow beetle. *Journal of Experimental Biology*, 210: 750-764.

McMillan*, DM, SL Fearnley, **NE Rank** and EP Dahlhoff. 2005. Natural temperature variation affects larval survival, development and Hsp70 expression in a leaf beetle. *Functional Ecology*, 19: 844-852.

APPENDIX XII – Nathan Rank

ii. Five other significant publications

Dellicour, S., SL Fearnley, A Lombal, SJ Heidl, EP Dahlhoff, **NE Rank**, and P Mardulyn. 2014. Inferring past and present connectivity across the range of a North American leaf beetle from multi-locus sequence data: combining ecological-niche modeling and a geographically explicit model of coalescence. *Evolution*, 68(8): 2371-2385.

Otto, SB, EL Berlow, **NE Rank**, J Smiley and U Brose. 2008. The diversity and identity of predators drive interaction strengths and trophic cascades in a montane food web. *Ecology*, 89: 134-144.

Meentemeyer, RK, **NE Rank**, BL Anacker, DM Rizzo and JH Cushman. 2008. Influence of land-cover change on the spread of an invasive forest pathogen. *Ecological Applications*, 18: 159-17.

Rank, NE and EP Dahlhoff. 2002. Allele frequency shifts in response to climate change and physiological consequences of allozyme variation in montane insect. *Evolution* 56: 2278-2289.

Dahlhoff, EP and **NE Rank**. 2000. Functional and physiological consequences of genetic variation at *phosphoglucose isomerase*: heat shock protein expression depends on enzyme genotype in a montane beetle. *Proceedings of the National Academy of Sciences USA*. 97: 10056-10061.

**Undergraduate co-authors*

(e) Synergistic activities

Supervision of undergraduate and graduate research- I have supervised research of over 80 undergraduates, two high-school students, and 14 graduate students since 1994. The majority of my students (60%) are female, 20% are from groups under-represented in STEM, and another 20% the first person in their families to attend college. Thirty students gave a poster or talk at a regional or national meeting. These studies have resulted in 24 publications to date. I gave 33 invited seminars at universities in Europe and North America and co-authored 40 posters and papers at scientific meetings. Undergraduates have presented 14 papers at scientific meetings. My former graduate students have all pursued careers in science and education. After graduation, 27 of research undergraduates went into graduate programs in Biology (15 PhD, 12 MS), 8 to medical school, 4 teach middle or high school science, and 22 are pursuing other scientific or technical careers.

Curricular development and educational outreach- I am participating intensively on development of an interdisciplinary science Freshman Year Experience course that incorporates biology, critical thinking, and mathematics content into a combined course that also emphasizes research with community partners and development of scientific skills. This work is funded by NSF and I am a Co-PI on the award (\$994,826, DUE-1068445 S3: STEPPing up STEM at Sonoma State University). As Chair of the Biology Department, I facilitated revisions of the lower and upper division Biology curriculum. The first phase was completed last year and simplified requirements for graduation with the BS degree. The second phase involves redesigning the lower division curriculum and developing a Freshman Year Experience course in critical thinking and scientific method for incoming Biology majors. I also introduced service learning to an upper division course (Entomology) and to a

APPENDIX XII – Nathan Rank

high-enrollment first-year course (Genetics, Evolution and Ecology). In 1997, I lead efforts to revise introductory courses to emphasize scientific research, supported by NSF CCLI Program (\$70,000, DUE-9950874), which positioned us for NSF support for a core DNA sequencing facility (\$340,000 EIA-0321367) in 2003. I developed the curricular structure for upper division biology majors (1999-2000), and traveled to other CSU campuses to discuss curriculum (2004) and coordinate the Biology curriculum at state institutions of higher education (2005). I served as Chair of the campus General Education Committee for three years (2006-2009), where I led efforts to develop and assess learning outcomes for General Education breadth areas. I also completed a program review in 2009 and participated in statewide and national meetings concerning undergraduate education by AACU and CSU. I am faculty advisor to the Entomology Outreach Program. The program participates in the Bay Area Science Festival, an event that attracts hundreds of members of the public. The program also sends Sonoma State undergraduates to elementary school classrooms, nature preserves, and public events to explain the ecological importance of insects and insect biodiversity.

Director of Fairfield Osborn Preserve, Sonoma State University (2000-2009)- I promoted the Preserve as a center for environmental education and ecological research and identified funding sources to enhance Preserve programs and improve infrastructure. In 2001, I organized a symposium about the disease caused by the pathogen *Phytophthora ramorum*, “Sudden Oak Death” (SOD). I was co-PI on a C-RUI award (\$810,657, DBI-0217064) to study spread of SOD. These activities helped the Preserve play an important role in research and outreach, including visits by researchers across the globe as a part of a symposium organized by the Oak Mortality Task Force (2004) and by the President of the University of California (2004). I conducted interviews with local and regional media and presented information about SOD to members of the public (California Native Plant Society, Sonoma County Fish and Wildlife, Mark West Watershed Group, Bay Area Biosystematists). I supervised construction of the education center (2003). The Preserve joined the Organization of Biological Field Stations in 2006 and I participated in OBFS initiatives such as Congressional Visits Day and outreach committee activities. In 2008, I participated in the search that recruited Dr. Claudia Luke as Director of Sonoma State University Preserves.

Contributions to Bay Area scientific community- I serve on the steering committee for the Bay Area Biosystematists, a group of evolutionary biologists founded in the 1940’s. I also serve on the science advisory boards of the Laguna de Santa Rosa Foundation and of the Pepperwood Preserve.

Reviews- I reviewed 37 manuscripts and 26 grant proposals (24 NSF, 1 Swiss NSF, 1 CSUPERB) in the past 10 years. I also served on NSF and CSUPERB grant advisory panels. I reviewed several chapters in the Evolution textbook by Stearns & Hoekstra and several chapters in a biometry textbook by Whitlock & Schluter.

APPENDIX XII – Richard Whitkus

RICHARD WHITKUS, Ph.D.

Professor of Biology
Sonoma State University
1801 E. Cotati Avenue
Rohnert Park, CA 94928
(707) 664-2303
whitkus@sonoma.edu

EDUCATION

Ph.D., Botany, Ohio State University, OH, 1988
M. S., Botany, University of Alberta, Canada, 1981
B. A., Botany, Rutgers University, Newark, NJ, 1978

PROFESSIONAL EXPERIENCE

SONOMA STATE UNIVERSITY

Interim Associate Vice President for Undergraduate Studies 2015-present
School of Sciences and Technology, Director of Academic Planning and Resources, 2012 to 2015
Chair, Dept. of Biology, 2008 to 2011
Professor, Dept. of Biology, 2003 to present
Graduate Program Coordinator, 2000 to 2006
Associate Professor, Dept. of Biology, 1999 to 2003

CALIFORNIA BOTANICAL SOCIETY

Copy Editor, MADROÑO – A West American Journal of Botany, 2008 to 2013

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science & Technology Policy Fellow, placement in U.S. Environmental Protection Agency,
Office of Science Coordination and Policy, Washington, DC, 2006 to 2007

BOTANICAL SOCIETY OF AMERICA, GENETICS SECTION

Chair, Graduate Student Research Award Committee, 2000 to 2009

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Asst. Professor of Botany and Assistant Botanist, Dept. of Botany and Plant Sciences, 1991-1998

UNIVERSITY OF MINNESOTA

Postdoctoral Associate, Dept. of Plant Biology, 1989-1990

OHIO WESLEYAN UNIVERSITY

Visiting Assistant Professor, Dept. of Botany and Microbiology, 1989

HONORS/AWARDS

Sabbatical leave, Sonoma State University, 2006 to 2007
Margaret Y. Menzel Award (outstanding paper in plant genetics), 47th annual meeting of the
American Institute of Biological Sciences, 1996

APPENDIX XII – Richard Whitkus

PUBLICATIONS (publication with graduate Student indicated by *)

- Hipp, A. L., P. E. Rothrock, R. Whitkus, and J. A. Weber. 2010. Chromosomes tell half of the story: the correlation between karyotype rearrangements and genetic diversity in sedges, a group with holocentric chromosomes. *Molecular Ecology* 19: 3124-3138.
- *Anacker, B. L., N. E. Rank, D. Huberli, M. Garbelotto, S. Gordon, T. Harnik, R. Whitkus, and R. Meentemeyer. 2008. Susceptibility to *Phytophthora ramorum* in a key infectious host: landscape variation in host genotype, host phenotype, and environmental factors. *New Phytologist* 177:756-766.
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- Whitkus, R. 1998. Genetics of adaptive radiation in Hawaiian and Cook Islands species of *Tetramolopium* (Asteraceae). II. Genetic linkage map and its implications for interspecific breeding barriers. *Genetics* 150: 1209-1216.
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- Brunell, M. S. and R. Whitkus. 1997. RAPD marker variation in *Eriastrum densifolium* (Polemoniaceae): Implications for subspecific delimitation and conservation. *Systematic Botany* 22: 543-553.

APPENDIX XII – Richard Whitkus

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- Whitkus, R., J. Doebley, and J. F. Wendel. 1994. Nuclear DNA markers in systematics and evolution, p. 116-141. In Phillips, R. L. and I. K. Vasil (eds.), *DNA-Based Markers in Plants*. Kluwer Acad. Publ., The Netherlands.
- Whitkus, R., J. Doebley, and M. Lee. 1992. Comparative genome mapping of sorghum and maize. *Genetics* 132: 1119-1130.
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- Les, D. H., R. Whitkus, F. A. Bryan, and L. E. Tyrrell. 1989. Biochemical basis of floral color polymorphism in a heterocyanic population of *Trillium sessile* (Liliaceae). *American Journal of Botany* 76: 23-29.
- Crawford, D. J., B. J. Post, and R. Whitkus. 1988. Allozyme variation within and between populations of *Coreopsis latifolia* (Asteraceae). *Plant Species Biology* 3: 1-5.
- Crawford, D. J. and R. Whitkus. 1988. Allozyme divergence and mode of speciation for *Coreopsis gigantea* and *C. maritima* (Compositae). *Systematic Botany* 13: 256-264.
- Whitkus, R. 1988. Modified version of GENESTAT. A program for computing genetic statistics from allelic frequency data. *Plant Genetics Newsletter* 4: 10.
- Whitkus, R. 1988. Experimental hybridizations among chromosome races of *Carex pachystachya* and the related species *C. malcoviana* and *C. preslii* (Cyperaceae). *Systematic Botany* 13: 156-153.
- Whitkus, R., F. A. Bryan, D. H. Less, and L. E. Tyrrell. 1987. Genetic structure in a heterocyanic population of *Trillium sessile* (Liliaceae). *Plant Species Biology* 2: 67-73.
- Wolf, S. J. and R. Whitkus. 1987. A numerical analysis of flavonoid variation in *Arnica* subgenus *Austromontana* (Asteraceae). *American Journal of Botany* 74: 1577-1584.
- Crawford, D., J., R. Whitkus, and T. F. Stuessy. 1987. Plant evolution and speciation on oceanic islands, pp. 183-199. In Urbanska, K. M. (ed.), *Differentiation Patterns in Higher Plants*. Acad. Press, London.
- Whitkus, R. 1985. A FORTRAN program for computing genetic statistics from allelic frequency data. *Journal of Heredity* 76: 152.

APPENDIX XII – Richard Whitkus

RECENT COURSES

Biological Inquiry (undergraduate, non-majors)
Ecology & Evolution: An Integrated Approach (undergraduate, lower division)
Plant Biology (undergraduate, upper division)
Plant Taxonomy (undergraduate, upper division)
Speciation (graduate)

DEPARTMENT SERVICE (SSU)

2008 – 2011 Department Chair
2007 – 2008 Program Review Coordinator
2002 – 2004 Department Undergraduate Advisor
2002 Contributor to organizing 22nd Annual Association of North Bay Scientists Meeting at SSU (4/27/02)
2001 – 2006 Faculty advisor for TA orientation
2001 Co-authored (with S. McNeil and S. Thiebault) TA Training Manual for Department
2001 Department Representative (with S. McNeil), CSU Biology Departments Teaching Assistant Training Workshop, June 23-24, Fullerton, CA
2000 – 2006 Graduate Program Coordinator
1999 – present Director, North Coast Herbarium

Editorial Board

Journal of Plant Research (2015-2018)

PROFESSIONAL REVIEWS (last 5 years)

Agencies

Austrian Science Fund
Natural Sciences and Engineering Research Council of Canada
National Science Foundation
Organisation for Economic Co-operation and Development – through USDA
U.S. Department of Agriculture

Journals

American Journal of Botany
Australian Journal of Botany
Canadian Journal of Botany
Genetics
Molecular Ecology
New Phytologist
Taxon

PROFESSIONAL ASSOCIATIONS

American Association for the Advancement of Sciences
American Society of Plant Taxonomists
Botanical Society of America
California Botanical Society
Genetics Society of America

APPENDIX XII – Mackenzie Zippay

SHORT CV MACKENZIE L. ZIPPAY

Assistant Professor, Department of Biology, Sonoma State University
1801 E. Cotati Ave., Rohnert Park, CA 94928-3609
zippay@sonoma.edu, 707.664.4349

EXPERTISE

Dr. Zippay is an environmental physiologist that focuses on the underling process that enables an organism to respond and tolerate environmental change. With interest in comparative and molecular physiology, much of my research has centered on understanding how variation in the natural environment translates to an organism's physiological performance by coupling molecular, cellular and biochemical processes in an ecological context. More recently, my research has focused on clarifying the linkages between the environment, physiology and species distributions through the combination of field-and laboratory-based questions using bioenergetics models.

PROFESSIONAL PREPARATION

BS 2002 Arizona State University, Biology (*cum laude*)
PhD 2009 University of California, Santa Barbara, Ecology, Evolution and Marin Biology

APPOINTMENTS

Fall 2015 Assistant Professor, Sonoma State University
2014-2015 Lecturer, Department of Biology, Sonoma State University
2013-2014 Associate Research Scientist, Department of Marine & Environmental Sciences, Northeastern University
2011-2013 Post Doctoral Researcher, Department of Biological Sciences, University of South Carolina
2012 Instructor, University of South Carolina, Environmental & Sustainability Program
2009-2011 Post Doctoral Scholar, Department of Marine Biomedicine and Environmental Sciences, Medical University of South Carolina

GRANTS & AWARDS IN SUPPORT OF RESEARCH

2016 (awarded) Assistant Professor, NSF; Integrative Organismal Systems; Project Title:
Collaborative: Using an energetics framework to forecast the interactive effects of abiotic and biotic stressors on intertidal mussels (total award amount: \$550,00; SSU PI: \$176,196).
2015 Assistant Professor, SSU's Office of Undergraduate Research and Creative Experiences (SOURCE), Faculty Award with undergraduate (\$897).

Undergraduate Student Research Awards

2015 Jack Arnold Award from SSU's Biology Department, Undergraduate Research Award (Emily Nazareno; \$498.27).
2015 SSU's Office of Undergraduate Research and Creative Experiences (SOURCE), Undergraduate Research Award (Kathryn Schwan; \$650).
2015 CSU's Council on Ocean Affairs, Science and Technology (COAST), Undergraduate Research Award (Kathryn Schwan; \$821).

APPENDIX XII – Mackenzie Zippay

PRODUCTS

Most recent 5 publications (out of 14; † post doc; ‡ graduate student- not from SSU):

- Matzelle, A.‡, G. Sarà, V. Montalto, **M. Zippay**, G. Trussell, B. Helmuth. 2015. A framework for integrating multiple stressors through metabolic theory: opening a ‘black box’ in climate change research. *Amer. Malacological Bulletin* 33: 1-11.
- Matzelle A. ‡, Montalto V., Sarà G. **Zippay M.**, Helmuth B. 2014. Dynamic Energy Budget model parameterization for the bivalve *Mytilus californianus*: Application of the covariation method. *J of Sea Research*, 94: 105-110.
- Burnett ‡, N.P., R. Seabra, M. de Pirro, **M.L. Zippay**, C. Monaco, S. Woodin, B. Helmuth, D.S. Wethey, F.P. Lima. 2013. An improved non-invasive method for measuring heartbeat of intertidal animals *Limnology and Oceanography: Methods* 11:91-100.
- Enzor ‡, L.A., **M.L. Zippay**, S.P. Place. 2013. High latitude fish in a high CO2 world: Synergistic effects of elevated temperature and carbon dioxide on the metabolic rates of Antarctic notothenioids. *Journal of Comparative Biochemistry and Physiology, Part A* 164: 154-161.
- Zippay, M.L.**, B. Helmuth. 2012. Effects of Temperature Change on mussels, *Mytilus* (Linnaeus 1798). *Integrative Zoology* 7: 312-327.

PRESENTATIONS (* indicates student coauthor- not from SSU)

- *Matzelle, A., Zippay, M.L., Sarà, G., *Montalto, V., Choi, F., *Gulledge, S., Helmuth, B. 2013. Moving beyond Mortality: A biophysical-metabolic framework for forecasting impacts of climate change on intertidal ecosystems. *World Congress of Malacology*. Ponta Delgada, Azores.
- Zippay, M.L., *Burnett, N., and Helmuth B. 2013. Does heating rates matter for measurement of cardiac output in intertidal mussels? *Society for Integrative and Comparative Biology Annual Meeting*, San Francisco, CA.
- *Burnett, N., Zippay, M.L., and Helmuth, B. 2012. Cardiac responses of two species of intertidal bivalve mollusks to near-lethal body temperatures. *Benthics Ecology Meeting*, Norfolk, Virginia.

COURSES TAUGHT at Sonoma State University

Term	Course #	Course Title
SP16	Biol 349	Animal Physiology
F15	Biol 500s	Professional Skills in Biology Graduate Seminar
F15	Biol 347	Environmental Physiology
S15	Biol 115	Introduction to Biology
S15	Biol 349	Animal Physiology
F14	Biol 347	Environmental Physiology
F14	Biol 115	Introduction to Biology

THESIS COMMITTEES at Sonoma State University

- 2016 Brennan Chin (from Place Lab)- M.S. in progress
- 2016 Caprice Lee (from Cushman Lab) – M.S. in progress
- 2015 Julie Byrne-Wittmann (from Girman Lab) – M.S. in progress

APPENDIX XII – Mackenzie Zippay

ADVISOR (2 graduate students and 13 undergraduate students)

2016 Kathryn Schwan (B.A., 2016), Mahala Kuehne (B.S. 2016), Christina Collins (B.S. 2016), Teija Isotalo (B.S. 2017), Samantha Jensen (B.A., 2016)- undergraduates at Sonoma State University

2015 Melissa Pilling (B.S. 2016), Emily Nazareno (B.S., 2016), Brianna Barajas (B.A. 2015)- undergraduates at Sonoma State University

2013 Allison Matzelle (Ph.D. 2017), Graduate student, Northeastern University

2012 Nick Burnett (B.S. 2012), undergraduate, University of South Carolina (now graduate student at University of California, Berkeley)

UNIVERSITY SERVICE

2015 Faculty Sponsor for University Club; “Biology Graduate Student Club”