GRADUATE PROGRAM REVIEW

SONOMA STATE UNIVERSITY
DEPARTMENT OF BIOLOGY

Spring 2021

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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: Spring 2021

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 617 graduate students enrolled at SSU, comprising 7% 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

Basic Statistical Data
Number of students currently enrolled in Biology Graduate Program: 35
Number of Biology theses completed since 1966: 277
Number of full-time permanent Biology faculty: 13
Number of participating faculty from other departments: 1 (Anthropology)
Number of degrees: 1 (Masters of Science)
Program Coordinator: Mackenzie Zippay

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 research program (and thus become the applicant's major thesis advisor). The faculty advisor serves as primary research

advisor and mentor for the student including financial support of the research and the student. 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. Historically, these graduate advisors included several faculty from Environmental Studies and Chemistry but currently include a single faculty member from Anthropology.

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 ensuring 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, receives 2 WTUs of release time per semester for workload, which was recommended during our last program review and recently reinstated in 2018.

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) developing critical thinking skills that are preparing students to become future leaders in biology, but also informed members of society, and 3) prepare for a career or career shift either by pursuing a Ph.D. or by obtaining a job that uses their biological knowledge and skills. In addition, assessment of achievement of learning objectives will also be conducted by the faculty Thesis committee via two oral presentations (Oral Examination and Thesis Defense) and two written documents (Thesis proposal and Master's Thesis).

Below are our MS Program Learning Objectives:

A. Demonstrates Knowledge Base
1. Student demonstrates appropriate use of scientific literature related to project
2. Student demonstrates mastery of fundamental concepts for subdiscipline in Biology through oral and written assessments

B. Displays Critical Thinking
1. Student presents Thesis research in sound theoretical context
2. Student tests insightful, skillfully designed hypotheses through original research
3. Student establishes significance of scientific research in a broader context
4. Student demonstrates appropriate Interpretation of results
5. Student thoughtfully analyzes and evaluates evidence
6. Student draws warranted, judicious conclusions from scientific results

C. Demonstrates Mastery of Research Approaches
1. Student develops methods of investigation that are sufficient to answer research questions
2. Student conducts analyses that are appropriate to answer research questions
3. Student uses and reports statistics appropriately
4. Student makes use of figures and tables that are well constructed and presented
5. Student develops conclusions that are based logically on the results of analyses.

D. Effective Written Communication Skills
1. Student uses appropriate formats for proposal and Thesis
2. Student uses form and language that is crisp, clear, and succinct
3. Student demonstrates effective organization to contribute to understanding of subdiscipline

E. Effective Oral Communication Skills
1. Student demonstrates use of appropriate presentation format and organization
2. Student demonstrates an engaging presentation style

Rationale for Learning Objectives

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. We recently (2020) modified our Master's programmatic learning objectives to better align with the university's graduate studies learning goals (Appendix IV). Together, these learning objectives emphasize some of the strategic priorities for our campus, specifically, student success, academic excellence, leadership cultivation and providing a transformative impact.

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 V). Also, the past four years, Dr. Matthew Paolucci from the Psychology Department and the Faculty Fellow for Teaching and Learning, has been providing

the incoming graduate students a 2-hour workshop focused on unintentional bias and sexual harassment in STEM. In addition, the students meet 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 VI) 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. The 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 Canvas.

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, 597 and 599). BIOL 595 (Special Studies) is a graduate course that can be taken to obtain credits for exploring thesis related topics. Up to a total of 8 units of BIOL 595 may be applied toward the degree. BIOL 597 (Thesis Preparation) is for graduate students to obtain credits for their research efforts in preparation for advancement to candidacy. Up to 9 units of BIOL 597 may be applied toward their degree. 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 599 may be applied to the degree.

Table 1. Graduate course offerings 2016 – 2021 and alignment with learning objectives.

				Program Learning Objectives															
Sem/Year	Course	Title	Instructor	A1	A2	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	D1	D2	D3	E1	E2
F2016	BIOL 500S	Applied Biology	Cohen	x	x			x	x		x		x			x		x	x	x	x
F2016	BIOL 500S	Professional Skills	Cushman	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
F2016	BIOL 590	Colloquium	Cohen		x			x	x								x	x	x	x	x
SP2017	BIOL 500S	Adaptations for Sex Repro	Girman	x	x			x	x		x							x	x	x	x
SP2017	BIOL 500S	Current Topics in Science	Place	x	x				x	x	x	x	x	x	x			x	x	x	x
SP2017	BIOL 590	Colloquium	Bentley		x			x	x								x	x	x	x	x
F2017	BIOL 497	TA Instructional Skills	Girman		x													x	x	x	x
F2017	BIOL 500S	Professional Skills	Bentley	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
F2017	BIOL 500S	GMOs	Lin	x				x	x	x	x				x	x		x	x	x	x
F2017	BIOL 590	Colloquium	Rank		x			x	x								x	x	x	x	x
SP2018	BIOL 500S	Phenotypic Plasticity	Zippay	x	x			x	x	x	x	x	x	x	x			x	x	x	x
SP2018	BIOL 500S	Current Topics in Science	Place	x	x				x	x	x	x	x	x	x			x	x	x	x
SP2018	BIOL 590	Colloquium	Cohen		x			x	x								x	x	x	x	x
F2018	BIOL 497	TA Instructional Skills	Girman		x													x	x	x	x
F2018	BIOL 500S	Scientific and Profession Skills	Crocker	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
F2018	BIOL 500S	Adaptation & Evolution	Rank	x	x			x	x	x						x		x	x	x	x
F2018	BIOL 590	Colloquium	Lin		x			x	x								x	x	x	x	x
SP2019	BIOL 500S	Introduction to R	Hughes							x	x	x	x	x	x	x		x	x	x	x
SP2019	BIOL 590	Colloquium	Hughes		x			x	x								x	x	x	x	x
F2019	BIOL 497	TA Instructional Skills	Girman		x													x	x	x	x
F2019	BIOL 500S	Ethics in Research	Place	x	x				x	x	x	x	x	x	x			x	x	x	x
F2019	BIOL 500S	Scientific Communications	Hughes	x	x						x					x	x	x	x	x	x
F2019	BIOL 590	Colloquium	Lin		x			x	x								x	x	x	x	x
SP2020	BIOL 500S	Adaptation Extreme Environ	Cohen	x	x			x	x	x	x					x			x	x	x
SP2020	BIOL 500S	Sexual Repro	Girman	x	x			x	x		x							x	x	x	x
SP2020	BIOL 590	Colloquium	Lin		x			x	x								x	x	x	x	x
F2020	BIOL 497	Biological Stats in R	Hughes							x	x	x	x	x	x	x		x	x	x	x
F2020	BIOL 500S	Manipulating Genomes	Lin	x	x					x	x				x	x		x	x	x	x
F2020	BIOL 500S	Grand Challengers in Bio	Rank	x	x			x	x	x	x				x	x		x	x	x	x
F2020	BIOL 501	TA Instructional Skills	Girman		x													x	x	x	x
F2020	BIOL 590	Colloquium	Lin		x			x	x								x	x	x	x	x
SP2021	BIOL 500S	Scientific Skills	Place/Zippay	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
SP2021	BIOL 500S	Macroevolution	Geist	x	x			x	x	x	x				x	x		x	x	x	x
SP2021	BIOL 590	Colloquium	Lin		x			x	x								x	x	x	x	x
All	BIOL 595	Special Studies in Biology	#	*	*			*	*		*	*	*	*	*	x	*	x	x	x	x
All	BIOL 597	Thesis Preparation	#	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
All	BIOL 599	Thesis Research	#	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
		* depend on students specific sub-discipline																			
		# specific Graduate Faculty serve in this course for specific students																			

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, which we are in the process of cross-listing at the graduate level for graduate students. Students must complete at least 3 graduate seminars (500S) classes and are allowed to count a maximum of 9 units of BIOL 597 and 6 units of BIOL 599 toward the degree. See **Table 2** for example of course plan. 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 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 2. Sample Course Plan

Year 1 of Sample 2-Year Program

Fall Semester (Units)	Spring Semester (Units)
BIOL 597 (3)	BIOL 597 (3)
Option 1: Additional 500 Level (4)	Option 1: Additional 500 Level Course(4)
Option 2: Additional 500 Level, plus 300 or 400 Level (2 + 3-4)	Option 2: Additional 500 Level, plus 300 or 400 Level (2 + 3-4)
Year 1 Total Goal: 15 - 16 Units	

Year 2 of Sample 2-Year Program

Fall Semester (Units)	Spring Semester (Units)
BIOL 599 (3)	BIOL 599 (3)
Additional 500 Level (2)	Additional 500 Level (2)
BIOL 590 (1)	BIOL 590 (1)
One Additional Course (2-4)	One Additional Course (2-4)
Year 2 Total Goal: 16 - 18 Units	

Advancement to Candidacy

Oral Qualifying Examination

Students must pass a two-hour-oral qualifying examination prior to advancing to candidacy. The student's Advisory Committee and an assigned fourth member administers this examination. The Graduate Coordinator selects the fourth member from the biology graduate faculty. The fourth member represents an individual 'outside' the committee tasked with ensuring rigor and fairness to the examination. 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 VII).

Graduate Written English Requirement (GWAR)

The student must also demonstrate proficiency in written English by either having a CSU Bachelor's degree, scoring at least 4.0 on the analytical writing portion of the GRE general test, having passed the Written English Proficiency Exam (WEPT), or now that GRE's have been waived for AY 2020-2021 due to COVID-19, we have implemented a third mechanism, assessing the graduate student's statement of purpose. The objective in this assessment is to

demonstrate their ability to address an audience appropriately, focus on a topic, express ideas clearly and coherently, provide an orderly sequence of ideas, and display knowledge of standard written English. The statement will be read by the student's advisor and assessed according to the rubric provided (Appendix VIII) with student needing at least needing 4 out of 6 to pass.

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 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.

Progress Report

By the end of the fifth semester 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. Students are limited to only three semesters of BIOL 578.

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 their teaching semester, a member of the Graduate Committee or instructor in lower division biology evaluates each student's teaching. This evaluation (see Appendix IX) 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.

Completion of Requirements Evaluation

The student is required to submit a final Completion of Requirements form (GSO2) (Appendix X). 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., etc. 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 eight females and four males. These tenure track searches resulted in the hiring of two female and one male to serve as graduate research faculty, mentors, and role models for all of our students, both graduate and undergraduate. While the male to female faculty ratio within our Department is still low, we are pleased that the number of female research faculty has nearly tripled since our last program review and hope this will continue to grow with future hires.

The Department of Biology has also worked to attract and retain a diverse student body at all levels, undergraduate and graduate. Over the past ten years the Department has embraced the Universities emerging identify as a Hispanic Serving Institution (HSI) and the resulting demographic changes exemplify the transition to serving a more diverse population (see **Figure 1**). Moreover, because a significant portion of our graduate student applicant pool comes from our graduating seniors, we have seen the applicant pool likewise increase in diversity and lead to an increasingly diverse graduate program that has included students from a range of underrepresented groups including a diverse range of ethnic backgrounds, the LBGTQ community, first generation students and students with disabilities. Our program works hard to create an inclusive environment to ensure that all of our graduate students have equitable opportunities to succeed in graduate school.

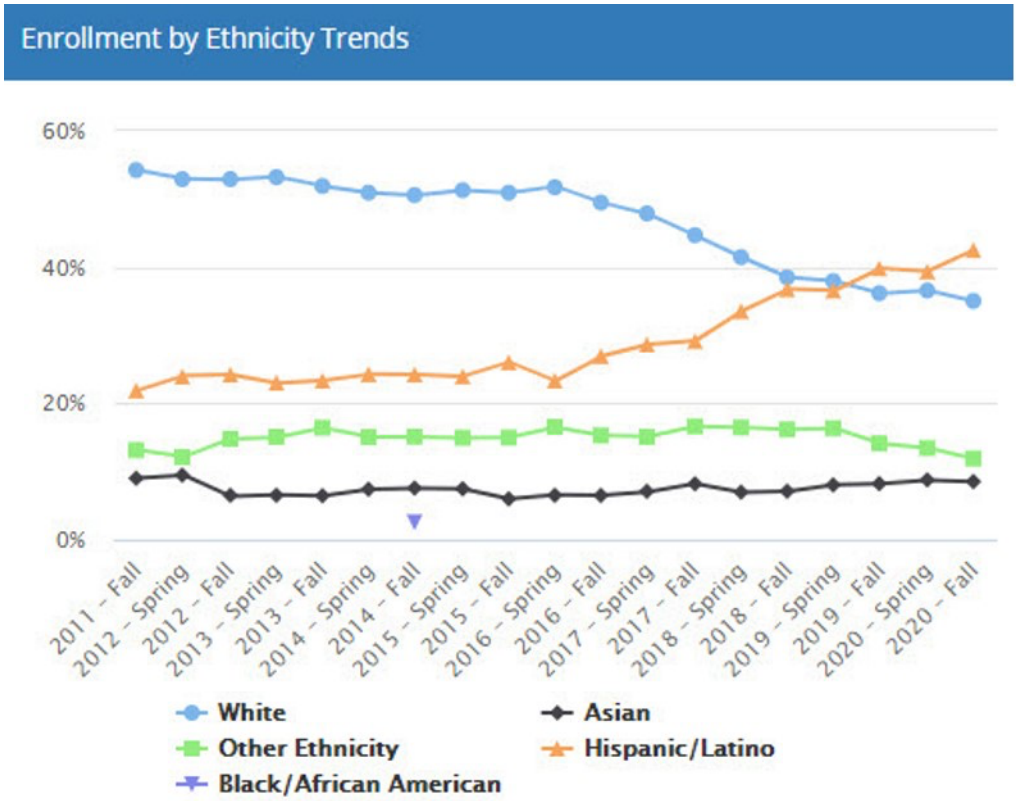

Figure 1. Data showing demographic changes in student ethnicity in the Department of Biology over the previous ten-year period.

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 84 graduate students in the biology graduate program, including 50 that have completed their Master's degrees, 3 students left the program prior to completion of their degree, and 35 are current graduate students. Among those students 57 were female and 27 were male; this includes one transgender student. The three students who left the program were two females and one male. In the last program review, the Department of Biology showed an average annual enrollment of 35 students from 2010-2015 with an average graduation rate of 6.8 students per year. The number of students graduating each year with an MS in Biology from 2016-2021 has fluctuated around 9.8 students per year with an averaged cohort size of 31 (**Figure 2**). Although the average annual enrollment size decreased slightly between the two program reviews, we are encouraged by our increasing graduation rate and the high percentage of students completing the degrees within three years (75%) and 96% completion within 6-years (compared to the previous program review of 72% and 92%, respectively). This

small decline was driven, in part, by the departure of faculty members who were active in the graduate program, one becoming Chair at another university and the other entering the university's early retirement program. Nevertheless, over the past decade, the Graduate Program in Biology has steadily become a more prominent component of the department's activities with the proportion of students in Biology at the graduate level doubling from 4% of the biology students to 10% of the students recently (**Figure 3**). With the recent hiring of three tenure track faculty with extensive research backgrounds, the Biology Graduate program has begun 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.

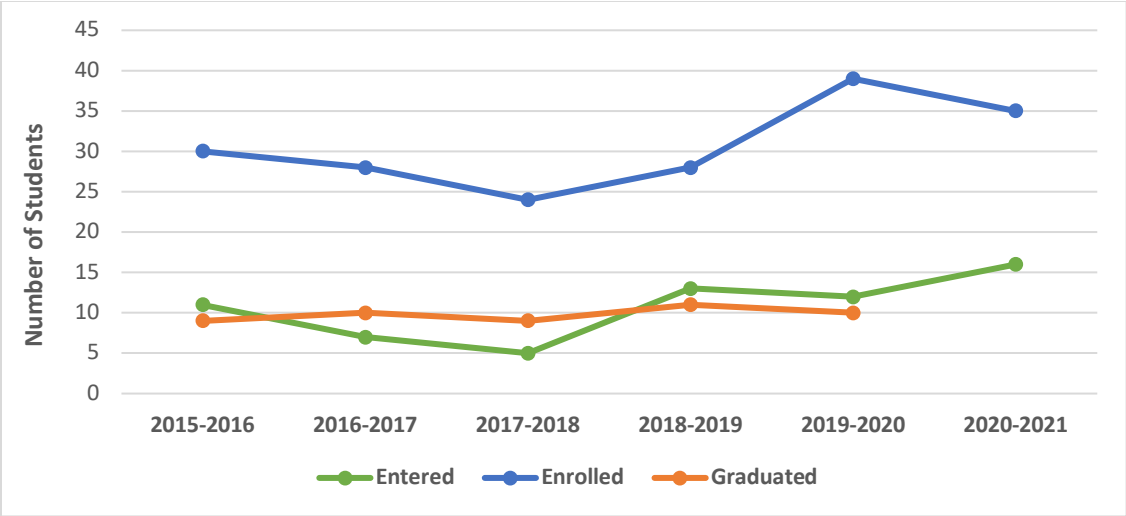

Figure 2. The number of students enrolled, graduating, and entering the Graduate Program in Biology from 2016 to 2021.

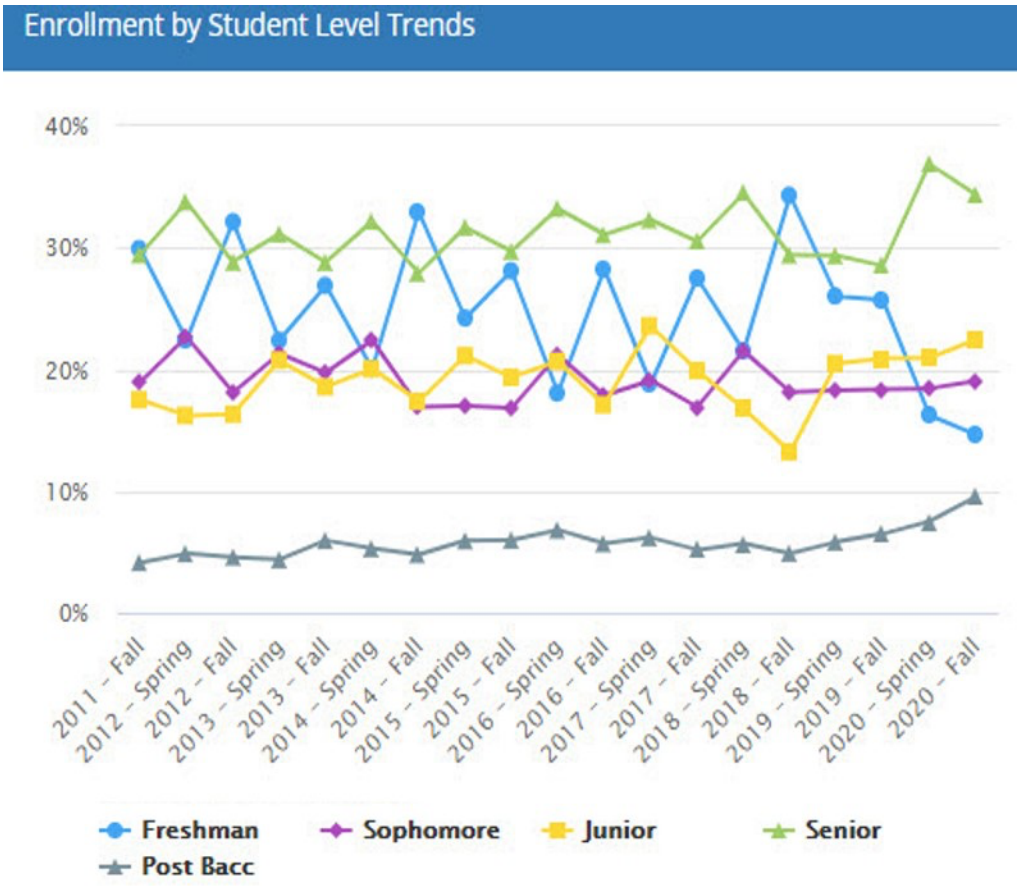

Figure 3. The figure shows an increase in the percentage of graduate students (indicated by Post Bacc) among biology students at Sonoma State over the past ten years.

Acceptance into the Program

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, in-person, or virtual 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;
    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. However, for Spring 2021 applicants and AY 2021-2022 applicants, GREs are waived and not required due COVID-19. GREs will no longer be required starting Fall 2022.
4. Evidence in the statement of purpose and letters of recommendation of potential for conducting independent and original research in biology.

Students are accepted into the program in both Fall and Spring, with the majority of new students entering in the Fall. The program received between 21 and 54 applications per year, accepting between 5 and 16 students per year in the program, which is an increase from the previous review of receiving 22-42 applications (**Figure 4**). The past three years our department has seen a large increase in the number of applicants, likely reflective of our recent tenure-track hires having highly active research programs. However, this trend does not directly translate in the number of applicants admitted. Although, there was a general increase in the number accepted, this has nevertheless resulted in a decreased acceptance rate from 40% to 28% compared to the previous program review. This decrease illustrates that we have interested students that want to achieve a Masters in Biology at Sonoma State University, but likely lack the capacity (research faculty, lab space, support, resources, etc.) to accept more students.

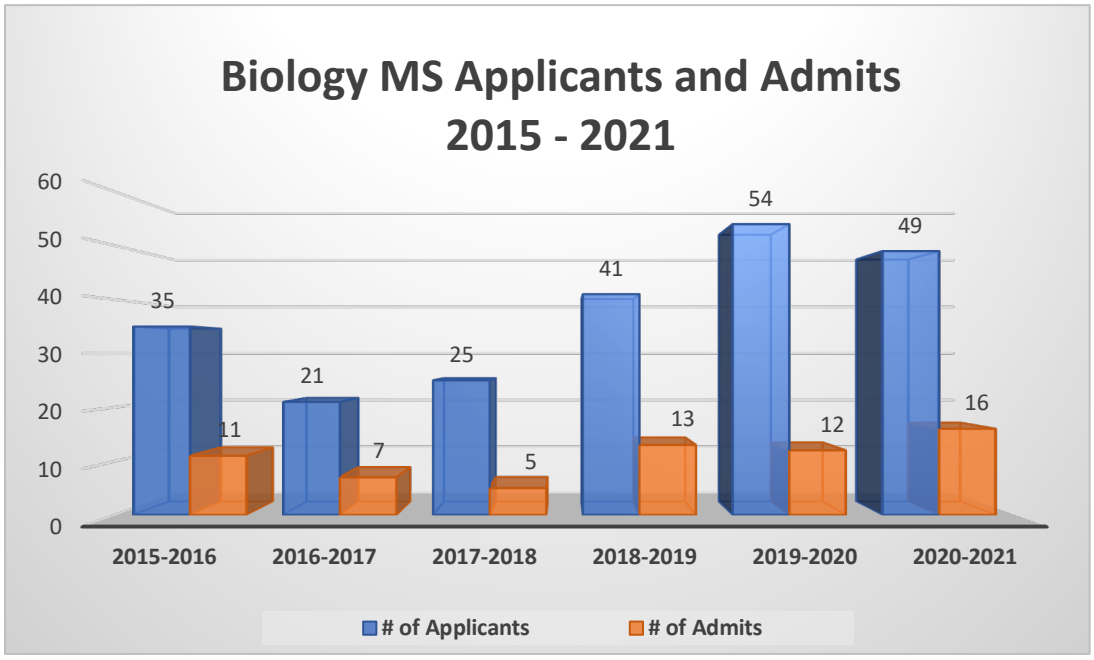

Figure 4. Annual number of applicants and accepted students for the SSU Biology Master's program 2015-2021.

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 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, 16 graduate research faculty members have been affiliated with the Biology Graduate Program (**Table 3**). Fifteen of these faculty participated in mentoring graduate students in the program from 2016-2021 (**Figure 5**). 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 research faculty in Biology with three new tenure-track faculty members in Biology hired in 2016, 2018, and 2019. Additionally, there is currently one Graduate Research Faculty from outside of Biology from Anthropology (Jaffe).

Table 3. Faculty who participated in the Graduate Program in Biology at Sonoma State University (SSU) during the period of review from Spring 2016 to Spring 2021. Faculty no longer in the program are indicated by #.

Graduate Faculty	Graduate Program Service	Current Academic Affiliation
Lisa Patrick Bentley	2016-present	Biology, SSU
Michael Cohen	2005-present	Biology, SSU
Dan Crocker	2000-present	Biology, SSU
Caroline Christian#	2007-2016	Geography, Environment, & Planning, SSU
Hall Cushman#	1995-2016	Natural Res & Envir Science, Univ. of Nevada, Reno
Karin Jaffe	2009-present	Anthropology, SSU
Nick Geist	2000-present	Biology, SSU
Derek Girman	1999-present	Biology, SSU
Lisa Hua	2019-present	Biology, SSU
Brent Hughes	2018-present	Biology, SSU
Joseph Lin	2010-present	Biology, SSU
Sean Place	2014-present	Biology, SSU
Murali Pillai	1994-2019	Biology, SSU- faculty early retirement program
Nathan Rank	1995-present	Biology, SSU
Richard Whitkus	2000-2015	Biology, SSU
Mackenzie Zippay	2015-present	Biology, SSU

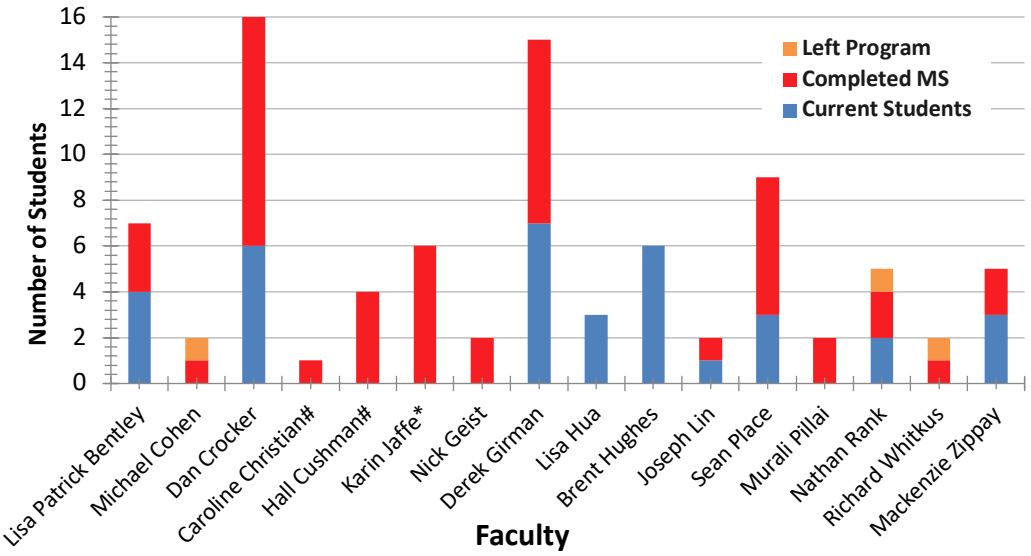

Figure 5. Number of graduate students in biology mentored by each graduate faculty member from 2016-2021. Students are identified as current, completed MS degree, or left the program prior to completing their degree. Graduate research faculty in departments other than biology are indicated by *. Faculty 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, publishing in the highest impact journals (Science, PNAS, etc.), attendance and presentation at scientific international 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 non-SSU research scientists with regards to their scholarship.

Faculty Participation in Graduate Curriculum

Eleven of the thirteen active tenure track faculty in the Department of Biology have participated in teaching the 19 graduate seminars (Biology 500S) offered during the review period (**Figure 6**). 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 but they do provide interdisciplinary opportunities for relevant coursework for our graduate students. 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.

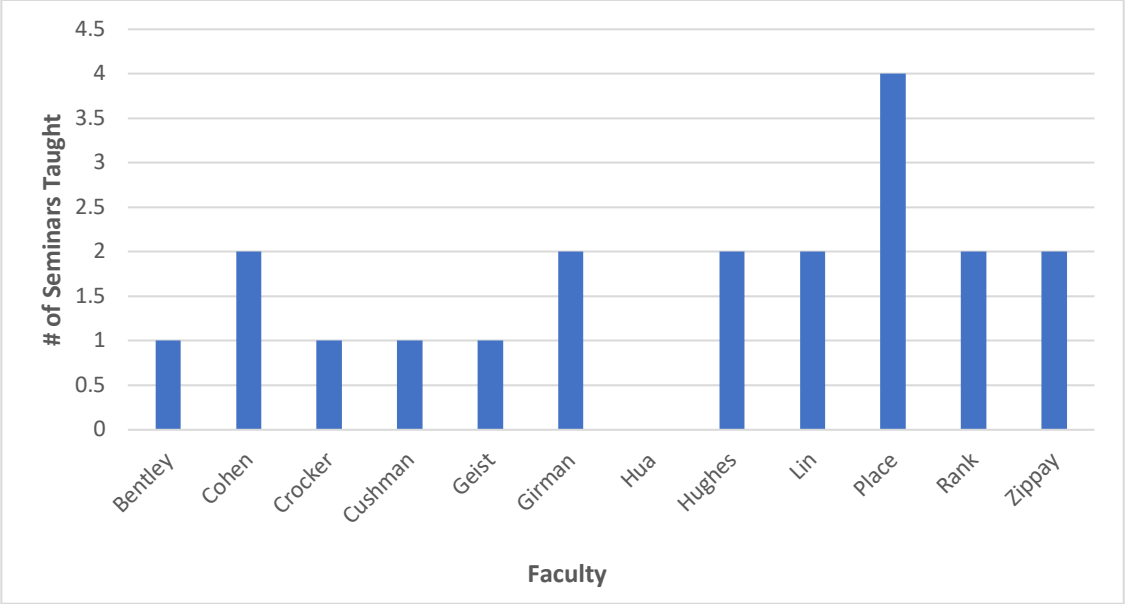

Figure 6. The number of graduate seminars (Biology 500S) taught by each faculty member during Spring 2016-Spring 2021.

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 (Science, PNAS, etc.). 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 San Francisco State University, CSU Agricultural Research Institute, 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, University of Oxford (UK), University College London, Pepperwood Preserve, Sonoma County Ag and Open Space District, CAL FIRE, Oakland Zoo, Lawrence Berkeley National Laboratory, Okinawa Institute of Science and Technology, Okinawa, Japan, Institute of Fundamental Medicine and Biology, Kazan (Volga Region) Federal University, Kazan, Russian Federation, NASA, US Department of Agriculture, US Department of Defense, 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), a core genomics and quantitative PCR facility, a dedicated cell culture and clean room, a dedicated room for long-term freezer storage, 2 stock/lab

preparation rooms, a combined museum (herbarium, vertebrate, insect), Leica TCS SPE-11 confocal microscope with image processing (Leica Application Suite X 3D visualization software) for high resolution imaging, a walk-in cold room with recirculating seawater, a small animal room, and a greenhouse complex of three houses. 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 $23,600 per year. This is to support office, laboratory and field supplies. In addition, the Department receives temporary faculty funds of approximately $350,000 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. In previous years, the university provided tuition waivers for all graduate students who worked as a teaching associate, however due to higher demand and budget cuts, the Academic Programs Office redesigned a graduate tuition wavier program in Fall 2020 (Appendix XI). This change has left several of our teaching associates without a tuition waiver but more importantly has caused our department to lose a few very good applicants to other institutions because of our inability to commit funds to their tuition. Graduate students not only play a crucial role in delivering the undergraduate curriculum but also provide an avenue for undergraduates to be exposed to research science. Even when we can provide a tuition waiver to a student, our university does not allow us to provide 'offer of support' letters to applicants that guarantees support whether it be through the faculty's grant or university provided, and we continue to lose applicants each semester to this oversite. Small research funding opportunities have been generated through the university run Koret Foundation program (private donations), and Office of Research & Sponsored Programs (ORSP).

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 XII). 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), Faculty Research Associate (12 WTU/year) and Graduate Coordinator (4 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 (BIOL 578). 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). In part, as a response to a budget shortfall, as well as to better support and incentivize participation in the graduate program, this workload policy was amended in Fall 2020 by the Dean of the School of Science and Technology so that biology faculty are required to have 2 enrolled graduate students to obtain access to use of supervisory workload.

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 2016. 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 from the last Graduate program review and the program's response since 2016.

Short-term action items from previous program review:

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.

    The Dean of Science and Technology recognized that our graduate program has continued to grow over the last several years and been very successful. With this

additional growth comes a heavier workload for development, implementation, monitoring of new structures, policies, and procedures, thus the Dean granted the Graduate Coordinator 4 WTU of release per year.

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.

   Given the requirement to participate as a teaching associate in the Biology curriculum, the Department Graduate Committee created a "TA Instructional Skills" course in Fall 2017 to provide baseline training for incoming students with teaching, pedagogy and curricular design. This course began as an experimental course and has since become an official graduate course (BIOL 501) that we encourage students to take during their time at SSU. Furthermore, the "Professional Skills/Scientific Skills" seminar provided each Fall that targets incoming graduate students as well as more advanced student, has been redesigned to provide hands-on activities to reinforce some front-loaded concepts related to data management, literature search and reference management, proposal program identification and proposal development, and scientific networking.

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.

   The Department has limited the number of units (9) of BIOL 597 (Thesis Preparation) that can be taken prior to advancement to candidacy (orals) to encourage advancement to candidacy in a timely fashion. Furthermore, the Graduate Coordinator now requires a progress report if all 9 units of BIOL 597 have been taken (or three semesters have passed) and the graduate student still has not advanced to candidacy. Also, the Graduate Coordinator meets with all incoming students in a one-on-one meeting during the first semester to make sure they are all on track (completing the MS Course Work Timeline) to explicitly explain that completion of their orals (advancement to candidacy) can be, and should be, done before the beginning of major data collection to further encourage timely completion of advancement of candidacy. Also, we have taken additional measures to reduce access to teaching associates and/or tuition waivers if they have not done so in a timely manner.

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.

   The Graduate Committee continues to modify our existing "Teaching Observation Rubric" to ensure that it aids in assessment of student learning objectives while also providing encouraging feedback to the teaching associates. We have

developed and implemented an "Orals Exam Rubric"(Appendix XIII) and "Thesis Assessment Rubric"(Appendix XIV) to allow a consistent assessment of student preparation related to both their thesis research efforts as well as to our program learning objectives.

5. Meet with Development office staff to discuss fund raising for graduate research.

   The Graduate Committee has been able to increase the application deadline for our Fall applicants from February 15 to December 15. This earlier deadline allows for prospective incoming graduate students to apply for our University Scholarship program (due 2/1 every year) which has a ~50% funding rate for graduate students. Furthermore, a few additional funding opportunities have become available. We have learned and now encourage all of our students to apply by completing the FAFSA to possibly receive the State University Grant (SUG). Eligible CA students can get as much as a full year of their tuition paid for. Also, the Graduate Studies Program has established the "Graduate Equity Fellowship" and has worked in collaboration with our Office of Research and Support Program (ORSP) to offer research grants to graduate students.

<u>Long-term action items from the previous program:</u>

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.

   Our Department has been successful by having three tenure track hires in the last 5 years, and one of those positions (Dr. Lisa Bentley) replaced our terrestrial ecologist that left for another university. Dr. Bentley's research focuses in plant physiology, which is one of our largest subdisciplines. We lacked a marine ecologist and hired Dr. Brent Hughes to fill this gap who also provides advising assistant and research opportunities for our marine ecology concentration. Most recently, Dr. Lisa Hua was hired to help support one of our other large concentrations, molecular cell biology, and she has been working with students interested in health professions.

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.

   The Graduate Committee did reconsider the RTP requirement and confirmed that it was an appropriate RTP requirement under expectations of scholarship, for our program which emphasizes a strong graduate program with broad support across the spectrum of research faculty.

3. The Graduate Committee will investigate the development of a TA training program through either a short workshop format or semester course format.

Each fall, since 2017, we offer a one-unit seminar "TA Instructional Skills" to provide baseline training for incoming students with teaching, pedagogy and curricular design. Additionally, a graduate orientation is offered right before the Fall and Spring semester begins which includes a 1-2 hour workshop by Dr. Matthew Paolucci on unintentional bias and discrimination that assists our graduate students with teaching in the classroom.

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.

   With the School of Science and Technology hiring a new Dean, we are hoping to make some headway with Dean Elisabeth Wade on this front. During her interview process, she seemed supportive and understands the amount of extra work that is needed to mentor and provide financial support for graduate student research on top of our teaching efforts. Therefore, we will still continue to work on this action item for the future.

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.

   Our Graduate Program has been able to increase our Fall application deadline to allow for incoming students to apply for the University Scholarship program. Furthermore, we encourage all of our students to complete the FAFSA, and if eligible they may receive the State University Grant (SUG), which can fund a full year of their tuition. Also, the Graduate Studies program has established the "Graduate Equity Fellowship" and has worked in collaboration with our Office of Research and Support Program (ORSP) to offer research grants to graduate students. While all of these sources of funding are beneficial, we still encourage all faculty and students to continue to write research grants to help support their research and graduate student expense.

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 to 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.

Standardized Assessment
As of Spring 2020, we have implemented an "Orals Exam Rubric" given to student's committee and outside member for assessment of the student during the 2-hour orals exam (Appendix XIII). This rubric is meant to assess effective written and oral communication, and evaluate if our program learning objectives are being satisfied for advancement to candidacy. During this semester, the "Thesis Assessment Rubric" was initiated such that the main committee can assess the graduate student's written thesis and public defense to identify that the student has met departmental learning objectives for their completed thesis (Appendix XIV). The rollout of these rubrics has only been in place for a year so we do not have a complete set of data from our first cohort of students completing their Master's program, however, the averaged value from ten students who have completed their oral exam since Spring 2020 is 3.28 (out of 4) illustrating that the students are generally attaining the learning objectives.

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. Since COVID, the Graduate Coordinator has had to rely more on email and zoom meetings as the main form of communication, however establishing one-on-one meetings with all incoming graduate students has allowed students to know whether they are on track and encourage a sense of community within the department. Furthermore, the Biology Graduate Student Club, which has a Faculty Advisor who can be the Graduate Coordinator, has been vital during this virtual COVID time. This club was established in 2016 and has officers who organize opportunities (meeting, events, etc.) to foster a supportive community for graduate students to share knowledge, experience and resources to help one another succeed in their academic program. The club serves as an engaging platform to address questions, concerns or ideas for improving the graduate student experience at SSU within Biology. It also promotes team work and socialization through educational explorations both on and off campus. They are able to provide "anonymous" feedback by either communicating to Graduate Student Representative, 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 a few adjustments made to the graduate program. For example, the graduate students wanted to be able to invite seminar speakers for our weekly colloquium and have been able to do so. A couple of years ago, they requested a microwave and refrigerator be purchased for the graduate student/TA office so they would have a place to their lunch. During COVID this club has provided several online game nights or random chat groups, in fact the graduate students have established their own Slack channel so they can be more connected during this virtual time. Furthermore, the graduate program has recently (2019) established an outreach social media coordinator who is responsible for inquiring, gathering and updating recent research, awards and science information on our Facebook page and Instagram profile. This has really helped the department keep in better contact with our former graduate students and enables alumni to keep updated on departmental progress.

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 2016 SSU graduate students have published or have currently in review 24 first authored and 12 co-authored publications in 32 different peer-reviewed journals. Appendix XV lists all 36 manuscripts produced by our graduate students.

In the previous program review we found that students had published 40 manuscripts in peer-reviewed journals, with 21 as first author and 19 co-authored, over the course of seven years (2009-2015). Despite the recent turnover in faculty (loss of two tenure-track faculty) since 2016 and the fact that three of our current 11 tenure track biology faculty have been hired since 2016, our graduate students have nevertheless maintained a strong pattern of publishing their Thesis work. We expect that as our newest 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 50 graduates from our program since 2016, 46 went on to use their Master's degree in Biology in the next step in their career path. The tracking data reveal that 10 students have moved into PhD or DVM programs, 6 hold faculty positions in community colleges, 20 have taken positions with private agencies, 9 with public agencies, and 1 work for non-profit organizations. See Appendix XVI 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. Currently, faculty are responsible for housing their own graduate students in their lab space, but as our department and graduate program continue to grow, faculty lack additional space for growth. 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.

The Department has worked with the School of Science and Technology for the last two academic years (AY 2018-2019 & 2019-2020) to help assist us with maintenance and/or replacement of equipment. For instance, the Dean's office provided ~$4.4K for a milli Q system, $14K for -80 freezer, $45K for an autoclave, and ~$3K for cold-room maintenance. While this has been a huge help to keep our facility and equipment running (or replaced), we plan for this support to be a continued long-term that will exist for years to come because it assures that students are able to receive the most up to date educational experiences associated with the science disciplines.

Resource Use During Pandemic Conditions

The Biology Graduate program was at the forefront of developing, accessing, and implanting a return to research program to support graduate student research. As a two-year degree program, graduate students were particularly vulnerable to loss of access to university resources to carry out scholarship and research activities during extended periods of campus closure during the COVID-19 pandemic. Through efforts of a collection of Biology faculty in collaboration with the Academic Programs Office, the Environmental Health and Safety Office, and University Operations, a process for reinstating and maintaining ongoing scholarship and access to campus resources for graduate students was established, with more than 80% of the personnel re-accessing campus resources for research being associated with graduate research groups in Biology as of the beginning of the Spring semester (2021).

<u>Improvements Needed</u>

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

Through informal student feedback and the Graduate student representative, students have requested an enhanced selection of more specialized courses. To do so, we have been offering the "Professional/Scientific Skills" and "TA Instructional Skills" courses each academic year for the last several years. The Department of Biology will need to develop a subset of courses to be "core" and required by all students to take before graduation to come into compliance with CSU policy that requires a minimum core course requirement associated with the degree. Since each of our students are required to TA as part of their MS degree and many are being placed in the professional world after graduation, these two courses would be valuable for all students to take in addition to BIOL 597 (preparation for Master's Thesis) and BIOL 599 (Thesis).

Historically, our Department has offered "Biometry" (BIOL 485) as an upper division undergraduate course where many of our graduate students take but we have been recently advised by Graduate Studies Program that the Provost will support cross-listing of undergraduate and graduate courses. Therefore, we plan pursue permission to cross-list "Biometry" (BIOL 585) in the upcoming AY 2021-2022 for graduate course units.

Since our last program review, our Department has had more internal collaborations with other SSU departments and community partners that could help increase interdisciplinary curricular interactions for our students and faculty. As is, our campus has incredible resources that can be more formally shared among our graduate students and be brought into our graduate program. For example, emerging non-health fields such as microbiomes, genomic bioinformatics, bioethics, GIS, navigation training, etc., could truly benefit our graduate students, and their respective projects. By investigating and developing additional cross-disciplinary relationships on campus, we may have opportunities to develop more interdisciplinary options and expand the range of study for prospective graduate students with existing personnel and resources available on campus.

Program Growth and Recruitment

As the data suggest in **Figure 4**, our graduate program continues to grow validating our request for more tuition waivers as these students are directly involved in serving and supporting the undergraduate curriculum as teaching associates. Availability of tuition waivers has been a limiting factor in student recruitment. Maintenance and, enhancement of availability of tuition waivers will enable our graduate program to continue to compete with other programs to attract ambitious applicants moving forward. Furthermore, as part of our recent effort to boost enrollment in our undergraduate major we have eliminated impaction in the major. By increasing our graduate student pool, we can more readily incorporate more senior or qualified graduate student Teaching Associates into select upper division courses, thereby further maximizing the use of campus resources and qualified personnel to accommodate an expected expansion in our undergraduate base.

Our graduate program would also like to request permission from the School of Science and Technology and/or the University to enable us to send out 'offer of support' letters to prospective graduate students for recruitment to allow us to be competitive with other universities and not lose a great applicant. This has happened several times over the past years and it is rather frustrating considering many universities around the country do this without a problem, especially when the financial support is being funded from the faculty's grant.

Program Assessment

After trying to implement a Graduate Student Exit Survey 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. Therefore, we'd like to work on developing an "Alumni Survey" where we go back to the last 5 years of graduates as a means of assessing our overall program. The survey will likely be developed in Qualtrics and will provide more anonymity. The Graduate Coordinator will compile the student's personal email address

upon graduation to establish email communication.

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. 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 thereby supporting our ability to support likely increases in enrollment in the Biology major with the elimination of impaction of the Biology major. Despite recent hires, we are about to lose one of our faculty to retirement and have another tenure track faculty who no longer engages in research with graduate students. Thus, we will soon be left to cover an expanding workload due to ongoing increases in numbers of graduate students, elimination of impaction at the undergraduate level, and an expected decrease among the faculty.

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 and undergraduates in supervised research 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.

<u>Dissemination of Findings</u>

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, faculty and former chair of a similar/comparable institution to provide an external assessment of the program fowling the guidelines for external review set forth by Sonoma State University. Dr. Michael Goldman, from San Francisco State University, conducted our external review process and has served as Graduate Coordinator for his department in Biology for a number of years. Below are the recommendations made by Dr. Goldman specific to the Graduate Program and the Department's response.

Recommendation 1: *Enforce exit survey completion for students, while continuing follow-up surveys, e.g., one, five, and ten years after completion. Continue to maintain and extend contact with alumni throughout their careers.*

Response: The Department concurs with the reviewer and plans to begin implementation of exit (and entrance) surveys with anonymity as soon as possible. The value in assessing our graduate program, as a whole, is critical to understand graduate student experiences upon completion of their degree. We are working with Graduate Studies to address this at the university and departmental level. We also have an outreach program within our Department that is helping to facilitate an alumni database for our graduate students.

Recommendation 2: *Increase fraction of students who can obtain assistantships and tuition waivers.*

Response: The Department, Chair and Graduate Coordinator will continue to advocate for more teaching assistantships and tuition waivers as our department continues to grow. We will impress upon the Dean and higher administrators the contributions that graduate students make to the mission of the university. In the recent years, all of our graduate students have been either given a tuition waiver or a State University Grant (SUG), which also covers their tuition.

Recommendation 3: *Increase number of enrolled graduate students when possible, based on increasing availability of funding, on-campus, and off-campus research opportunities.*

Response: The School, Department, Chair and Graduate Coordinator will continue to market our program by advertising open graduate positions through our website and communication among colleagues and other universities. We also hope by adding new hires and continuing to obtain outside research funds this will help foster funding for graduate students. These efforts will complement efforts to convince the university to offer better financial incentives for prospective students to enter the program.

Recommendation 4: *Take advantage of interdisciplinary, outside advisors for student research.*
Response: We thank the reviewer for this suggestion. Historically, we have had faculty from Anthropology, Environmental Studies, and Chemistry, across different schools participating in our graduate program and will continue to advocate for this collaboration. Furthermore, we have already identified faculty within the Geography, Environment, and Planning (GEP) program that would work well with our graduate research program. We will be extending this collaboration and encourage other faculty from different departments who may be interested in advising

graduate students with a biological interest to join our graduate program.

Recommendation 5*: Include "bullying" in anti-harassment training in orientation workshop.*

Response: This request will be implemented during the Biology Graduate orientation before each Fall and Spring semester begins. Specifically, Dr. Matthew Paolucci will continue to give his 1–2 hour workshop on unintentional bias and discrimination to assists our graduate students with teaching in the classroom. He will specifically add "bullying" to his workshop as well.

Recommendation 6: *Take advantage of a recovering market in international students.*
Response: We will continue to do our best to advocate and encourage international students to apply to our program. Currently, we are limited by the lack of funding and the added expense that comes with international students. If the campus returned to a focus on recruiting additional international students, we would be happy to contribute by recruiting from pools of prospective qualified international students.

Recommendation 7: *The faculty should meet with the Associate Vice President responsible for Research and Sponsored Programs to discuss issues like pre-award service, levels of staffing, and efforts to attract new funding. The Associate Vice President should be a regular participant in graduate program review interviews.*

Response: We thank the reviewer for this suggestion. The Graduate Coordinator will continue to foster a relationship with the AVP for Research and Sponsored Programs by inviting them to attend department meetings each year. We hope this will establish a working relationship by enabling him get to know our research and expertise, and promote more funding opportunities to our faculty and graduate students. As a first step, the AVP for Research and Sponsored Programs has expressed interest in our graduate program by participating (and judging) in the first CSU 3-minute presentation.

Recommendation 8: *Study department space utilization, ensuring that a policy is in place to optimize use of existing space and, if necessary, justifying a request for additional space, expanding into other areas of Darwin Hall.*

Response: The Department will make a strong effort to evaluate space utilization across all faculty and ensure optimal use of existing research laboratories. Furthermore, when the time comes for our department to expand within other areas of Darwin, faculty will forward requests for more space to the Dean of SST.

Recommendation 9: *Faculty should meet regularly with the Vice President for Advancement and team members to discuss potential fundraising to support graduate programs and research, and to discuss how student success in research might be used to enhance the University's visibility in the community.*

Response: This is a very good suggestion. The Graduate Coordinator of Biology, and any other graduate programs that conduct graduate research on campus, will meet with the Director of Graduate Studies and the AVP of Advancement annually to discuss how to make research more visible and aware to the University community.

Recommendation 10: *Consider providing a larger common meeting and study space for graduate students rather than having laboratory and desk space in the same room. The latter practice is becoming less acceptable in view of laboratory safety requirements. There is a space currently, but it is the size of a single faculty office to accommodate more than thirty graduate students*.

Response: The department agrees in principle with this suggestion and the motivation for it. It has proven difficult in the past to populate office space for graduate students outside of Darwin Hall, even when space was offered to the department for this use. At this moment in time, there is not an easily identifiable space within Darwin that is available. However, the Grad Coordinator and Chair will work on trying to identify additional space, and encourage faculty members to take advantage of any space that is provided by encouraging their students to move to it.

Recommendation 11: *The faculty should meet with the Associate Vice President for Facilities Management and ensure that high-priority issues related to building infrastructure, such as HVAC, are dealt with in a timely manner.*

Response: We will work through the appropriate channels to organize a meeting with Facilities management to fix infrastructure issues.

Action Plan

Action Items for the short-term:

1. Establish a small subset of core classes (e.g., Professional Skills & TA Instructional Skills) that are required to be taken before graduation.

2. Develop and begin cross-listing common upper division courses taken by graduate students so they can deepen engagement in these courses and earn graduate units. This also establishes more graduate courses in our Department.

3. Develop and implement an anonymous "Alumni Survey" to capture those that have graduated more recently (within the year) to capture real-time data of the program and learning objectives. Also, ask their participation in a more long-term survey (back to the last 5 years) to give us a perspective for how the program has assisted in the career decisions.

Action items for the long-term:

1. Work with university administrators to develop a "offer of support" letter that can be sent to prospective applicants that the faculty member would like to recruit for our MS program, especially if the faculty member has grant funding for the position.

2. Increase interdisciplinary opportunities for our students and faculty by enhancing cross-disciplinary interactions on campus.

3. 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.

4. Make a strong case to hire additional graduate faculty in areas of programmatic deficit. The program will soon be deficit in some disciplines and will work with the School of Science and Technology to identify key faculty hiring needs in the Department that will improve the program.

5. Explore mechanisms for generating additional faculty work load 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.

Mackenzie Zippay

Program Coordinator, Mackenzie Zippay

Prior Program Coordinator, Derek Girman

D.G.C.

Department Chair, Dan Crocker

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://biology.sonoma.edu/faculty-staff

To Apply, you will need to complete an online University application via CalStateApply where all of your materials will be uploaded and submitted which include:

- Official copies of all undergraduate transcripts
- Unofficial copies of all undergraduate transcripts
- One to two-page Statement of Purpose detailing your background in biology, objectives for graduate school and career goals. Specifically, we list some suggested topics that may help guide you writing the statement of purpose (or personal statement) for your application:
    - Describe your research interests
    - Reason for choosing MS degree and expectations for the MS program,
    - Any evidence that demonstrates you adding value to the MS program,
    - Appropriate experience that demonstrate likelihood of success for completion of Thesis research, and
    - Goals beyond Master's degree.
- Two letters of recommendation from individuals familiar with your background in biology and able to comment on your potential for conducting primary research.
- Graduate Record Examination or GRE scores for the General Test are required. However, Biology Subject scores are recommended, but not required. ***(PLEASE NOTE: For Spring 2021 applicants and AY 2021-2022 applicants, GREs are waived and not required due COVID-19).***

All of this information can be found on our Biology Graduate homepage (https://biology.sonoma.edu/programs/master/applying).

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. Mackenzie Zippay
Graduate Coordinator

Department of Biology
Sonoma State University

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 597, and 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
    d. Collect/maintain program assessment

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
    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 Educational Policy Committee
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 Educational Policy Committee

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
3. Contact applicants regarding status of application
4. Encourage all applicants to apply for FAFSA and University Scholarships
5. Initial review of applicants

6. Coordinate applicants with potential major advisors
7. Present applications to Department/Graduate Committee for selection
8. Contact applicants regarding acceptance/non-acceptance of application to Graduate Program
9. 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
9. Organize/lead Instructional Skills seminar for new Teaching Assistance

C. Post-graduation

1. Develop anonymous post-graduation assessment of program (WASC)

APPENDIX IV

Graduate Level Learning Goals
Sonoma State University

Disciplinary Knowledge: Expand mastery of a field of knowledge, both foundational and specific.

Critical Thinking/Analysis: Demonstrate advanced skills of creative, analytical and critical thinking.

Communication: Demonstrate advanced oral and written communication skills.

Practical Application: Engage with practical and professional aspects of the field, such as research, projects, or professional experience.

Professional Integrity: Demonstrate advanced knowledge and skills related to cultural and ethical aspects of the field.

Integrative Dimension: Engage with competencies that integrate cultural, technological, ethical, practical, and/or professional aspects of the field.

APPENDIX V

Overview of the Program

There are typically about 28-35 Biology Graduate Students
12 Research faculty associated with Biology Program
    11 in Biology
    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 an important resource, provides an immediate concern
        Thesis is longer term concern, so must find a 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, 320, 321
        Occasionally upper division course opportunity for advanced TA
    Provides opportunity to gain teaching experience
    Provides Tuition Waiver Opportunity

- must be TA for at least 2 WTUs
- Complete financial aid (FAFSA) by the published priority deadline
- Be ineligible for a State University Grant (SUG), however if eligible, students must take the SUG
- Complete a Sonoma State University scholarship application if in their second year
- Maintain a 3.0 GPA.

Coursework
    30 units required to complete degree
    Full time for Graduate Student is 8 units
    21 units must be done in residence at SSU
    18 units of Biology Graduate coursework must be in Biology
    Minimum of 15 units must be 500 level (597, 599, 500S, 595)
    All remaining units must be 300 or higher (no 100 or 200 level or Community College courses)

- Requirement of three (3) graduate seminars (2 units each) - **Biol 500S**
- Up to 9 units of **Biol 597** (Thesis Preparation)- Taken to explore scientific literature, learn research and analysis techniques associated with their discipline and prepare for thesis proposal. Taken prior to advancement to candidacy (orals)
- Up to 8 units can be **Biol 595** (Special Studies)— More 595 can be taken, but only 8 units 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).** Three unit minimum required, only up 6 units count towards MS
- Encouraged to enroll in Fall TA training course (**Biol 501** (1 unit)-

Instructional Skills)
- Up to 2 units can be **Biol 590** (Colloquium)- weekly seminar speaker

Example of Coursework plan
6 units 597
6 units 599
8 units 595
2 units 590
1 unit 501
6 units 500s
3 units of any upper division coursework

If additional semesters are needed to complete Thesis:
Biol 578 – Continuing Enrollment
Through Extended Ed. (~$350)
First semester, no requirements, automatically approved by coordinator
Additional semester requires progress report – Complete **Progress Report Form**
Review of work completed
Plan for completion of thesis with timeline
Approval of committed

Forming Committee
Composition
Major Advisor
One member from SSU faculty associated with Biology Graduate Program
One qualified individual – Preferred to 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)
Course Plan
- Once Committee is formed, have meeting to approve Course Plan
- See **Course Plan form** on Biology Grad homepage
- 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

APPENDIX V

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
    - Each committee member must complete an **orals rubric** (on Biology Grad forms page) for the student, average the scores and submit final score to the graduate coordinator for assessment

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

- 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
- Fail – If fail will work with Advisor to determine path from that point

Written English Requirement: Each student must demonstrate proficiency in written English. This may be met by: 1) a bachelor's degree from a CSU institution, 2) a score of at least 4.0 in the analytical writing portion of the GRE general test, 3) passing the campus Written English Proficiency Examination (WEPT), or 4) by assessing student's personal statement or statement of purpose.

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 2020 the Thesis due dates are:

- December 6, 2019 for Fall 2019 graduation
- May 8, 2020 for Spring 2020 graduation
- July 17, 2020 for Summer 2020 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

- Each committee member must complete a **thesis rubric** (on Biology Grad forms page) for the student, average the scores and submit final score to the graduate coordinator for assessment
- 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 r review.

Graduate studies will review for formatting compliance.

Teaching Assistant

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 320, 321

1-hour section discussing readings, going over calculations

Each discussion section is 1 Teaching Unit (need at least 2 sections to full fill tuition waiver req.)

APPENDIX VI

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; a minimum of 21 units done in residence with a maximum of 30% of coursework allowed in transfer; no more than 6 units allowed for the thesis (Biol 599); A maximum of 8 units of special studies (Biol 495 or 595), 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	

Student Signature

Committee	Printed Name	Signature	Date
Chair (required)			
Second Member (required)			
Third Member (required)			
Fourth Member (optional)			
Graduate Coordinator			

APPENDIX VII

SONOMA STATE UNIVERSITY

Graduate Studies
Advancement to Candidacy GSO1

Name		Student ID Number	
Local Address		Telephone Home/Cell	
Permanent Address			
Email Address			
Master's Program	Biology		

Proposed Title and Short Description of Thesis:

Special Requirements for Advancement **Date**

Oral Exam passed	

Writing Proficiency Requirement (select one) **Date**

	WEPT Passed	
	GRE score of at least 4.0 on Analytical Writing	
	Assessment of Statement of Purpose	

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 (Digital Signature Acceptable)	**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)**	**Signature (Digital Signature Acceptable)**	**Date**
Chair			
Second Member			
Third Member			
Fourth Member (assigned)			
Fifth Member (optional)			
Graduate Coordinator			

For Graduate Studies Office Use Only:

Review and Data Update:	**Signature**	**Date**
Graduate Studies Clearance		
Status Updated to REC3 in Peoplesoft		

APPENDIX VIII

Writing Proficiency Assessment – Personal Statement/Statement of Purpose

Now that the GREs are waived for Spring 2021 applicants and AY 2021- 2022, an evaluation of writing proficiency needs to be implemented, especially if students did not graduate from a CSU and have not taken the WEPT.

The objective in the assessment is to demonstrate your ability to address an audience appropriately, focus on a topic, express ideas clearly and coherently, provide an orderly sequence of ideas, and display your knowledge of standard written English.

Passing statements

- address their audience appropriately
- organization and flow
- are focused
- have sentence and word variety
- are relatively free of spelling, grammar, and other errors in language use

Scoring Procedure

The statement will be read by the student's advisor and scored between 1 to 6, according to the scoring guide. A total score of **4 out of 6** is necessary to pass.

Evaluation Criteria

This "**holistic**" evaluation of student writing, compared to the common "analytic" evaluation, the advisor focuses upon the total impression the statement makes and does not mark the statement. The advisor looks for the central ideas in the statement, expects them to be clearly expressed, organized and presented in a logical sequence. This allows for the occasional lapses in writing, but does not expect the writing to be interrupted by unclear language, misused words, or frequent or gross errors in punctuation, spelling, or grammar. The specific criteria used by the advisor is contained in a scoring guide below:

A 6 statement demonstrates a high degree of competence in writing, though it may have minor errors. A statement in this category:

- addresses the topic clearly and responds effectively to all aspects of the task.
- explores the issues thoughtfully and in depth
- appeals to the audience specifically and appropriately
- is clearly focused, well organized, and well developed
- uses pertinent examples and detail for support
- displays syntactic variety and a clear command of the language
- demonstrates clear facility in expression and diction

A 5 statement demonstrates competence in writing though it may have minor errors. A statement in this category:

- clearly addresses the topic, but may respond to some aspects of the task more effectively than others

- is focused, well-organized, and developed
- uses examples and details for support
- displays syntactic variety
- demonstrates facility in expression

A 4 statement demonstrates adequate competence in writing; it may have occasional errors in mechanics and syntax. A statement in this category:

- addresses the topic, but may slight some aspects of the task
- may treat the topic somewhat simplistically
- appeals to the audience appropriately
- is focused and adequately organized and developed
- uses some details or examples but may tend to generalize
- demonstrates adequate facility in expression and diction

A 3 statement demonstrates some ability in writing, but it will be clearly flawed, an inappropriate and inadequate response to the task at hand. A statement in this category will have one or more of the following weaknesses:

- distorts or neglects aspects of the task
- lacks focus or demonstrates confused or simplistic thinking
- lack of consideration of audience's needs and interests
- unclear focus, inadequate organization or development
- lack of variety in sentence patterns
- limited facility in clear expression and diction
- an accumulation of errors in mechanics, syntax or usage

A 2 statement suggests minimal writing ability. It will reveal one or more of the following weaknesses

- confusion about the topic or neglect of important aspects of the task
- lack of focus and coherence; failure to communicate ideas
- inappropriate response to audience
- disorganization or incomplete development
- excessive generalization or irrelevant detail
- serious and multiple errors in mechanics, syntax or usage

A 1 statement demonstrates incompetence. A paper in this category is marked by any of the following weaknesses:

- inappropriate response to audience
- incoherence of expression or illogical connection between ideas
- severe under-development
  major and repeated problems in grammar and sentence formation

APPENDIX IX

Biology TA Observation Rubric

- Observed lab introduction and interaction during lab activity
- Meet with student to discuss review
- Provide electronic version of review to Graduate Coordinator and TA

Revised October 2017

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 TA links exercise to course content*		
Protocols and procedures explained clearly		
TA is well prepared TA is familiar with lab content Laboratory ready for instruction Content Competency		
Classroom Management Command of classroom/Accessibility Responsiveness to student inquiry Professionalism		
Teaching style and methods Use of blackboard or powerpoint Ability to engage students in their learning		

Recommendations and additional comments for TA:

APPENDIX X

SONOMA STATE UNIVERSITY

Graduate Studies
Completion of Requirements

GSO 2

Name		Student ID Number	
Local Address		Telephone Home/Cell	
Permanent Address			
Email			
Program	Biology		

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	*Requires Review by Graduate Studies Office*	
	Title		
	Oral Defense		

Student Signature Date

Final Review and Approval:
Culminating Project & Program

	Date	Grade

Signature, Faculty Chair

	Date		Date

Signature, Graduate Coordinator Signature, Graduate Studies

GSO 2 6/06 Distribution: 1) A & R 2) Grad Studies 3) Department 4) Student

APPENDIX XI

Policies and Processes
2021-2022 Graduate Tuition Waiver Program

Based on Executive Order 611, University Presidents may waive the State University Fee (tuition) for individual students who are enrolled in a California State University graduate program as classified or conditionally classified graduate students and who are employed by the California State University as Graduate Assistants (Class Code 2355) or Teaching Associates (Class Code 2353 or 2354). In an associated memo from the Office of the Chancellor of the California State University, the Chancellor stated that "This authority is not associated with any additional funding at this time."

Although many CSU campuses do not provide graduate tuition waivers at all, those that do generally require a 2 WTU (Humboldt) or 3 WTU (Fresno, SJSU) equivalent minimum contribution to the training or education of undergraduates.

Sonoma State's current practice is for the Provost to allocate funding for a limited number of tuition waivers for graduate students in academic programs serving as either Teaching Associates (TA) or a Graduate Assistants (GA). Note that funding for the tuition waivers is provided by the Provost's Office while funding for the TA and GA positions (salaries) is provided by the schools or units. Tuition waivers support TA or GA positions for classified or conditionally classified graduate students in existing degree programs.

The Office of Graduate Studies and the Provost's Office permits academic units (including centers and institutes) to participate in the Graduate Tuition Waiver program provided those units offer TA or GA positions to classified or conditionally classified graduate students in existing degree programs.

Each stakeholder in the Graduate Tuition Waiver Program has a separate role. Program Coordinators develop eligible positions in consultation with deans and department chairs, post job announcements, and work with faculty in the program to determine the allocation of tuition fee waivers to eligible applicants. Department Chairs ensure positions support the mission and needs of the department. Deans determine the funding available to support the compensation for these TA and GA positions and work with program coordinators and department chairs to determine whether positions contribute to values and priorities of the SSU Strategic Plan. Graduate Studies manages the TA/GA waiver process and assists with the process at all levels. The President's Designee determines the funding available to support tuition fee waivers and with the Dean of Graduate Studies determines the allocation of waivers to schools and units.

The Graduate Tuition Waiver program for the 2021-22 academic year involves the following process (see Procedure Summary outlined beginning on p. 3):

- For each program requesting waivers, the graduate coordinator, faculty, and dean will determine the number of TA and GA positions desired and take into consideration the contributions of the positions to student success, a diverse student

- body, academic excellence, and leadership cultivation.
- The graduate program or unit, in consultation with the department chair and dean or appropriate administrators, must demonstrate the ability to provide training and oversight for TAs and GAs. The Office of Graduate Studies can help programs and units develop these processes.
- Graduate coordinators must verify that funding is available to offer a minimum equivalent of 2 WTUs for TAs or 10 hours per week for GAs. This workload must be approved by the departmentchair and the dean of the school, or in the case of the units, by the unit's appropriate administrator, using the **Teaching Associate and Graduate Assistant Commitments form.**
- Deans or unit administrators will submit a Teaching Associate and Graduate Assistant Commitment form for each program in the fall semester to the Office of Graduate Studies, detailing requests for numbers of TA and GA positions, according to published deadlines.
- The Provost, in collaboration with the Dean of Graduate Studies, determines available resources for the Graduate Tuition Waiver Program and allocates waivers to the schools and units. Note that funding availability may not be sufficient to cover the number of positions requested. The Office of Graduate Studies provides notification of allocation of Tuition Waivers to deans and unit administrators in early spring semester.
- Deans will allocate waivers to programs in early spring semester.
- Programs and units allocate available waivers to eligible students according to their own criteria. Note that students are eligible for a second year in the Tuition Waiver Program, and programs and units may make those allocations provided the students meet criteria. Students who receive a second year of funding will, however, be counted in the total allocations to the program each year. Eligibility criteria must include the following:
    - Be admitted to an approved graduate degree program
    - Complete FAFSA application by the published priority deadline
    - complete a Sonoma State University scholarship application if in their second year
    - Be ineligible for a State University Grant (SUG)
    - Be enrolled as full-time student
    - Maintain a 3.0 GPA
    - Student's ability to support the core values and strategic priorities of the Sonoma State University Strategic Plan, including contributions to student success, a diverse student body, academic excellence, and leadership cultivation.
- Program coordinators and unit leads will be required to report on TA/GA academic progress and waiver program impacts on an annual basis. A brief reporting template will be provided to program coordinators each spring. Timely reports will be required for the program to be eligible to request waivers. Graduate Studies will develop a report template.

Allocation of tuition waivers within programs provides the most appropriate mechanism for fair evaluation of individual applicants among peers within their field of study. Programs may establish additional criteria best suited to each discipline.

APPENDIX XI

Proposed timing of allocation to Schools and programs, ranking of applicants by programs, and allocation of waivers by Graduate Studies allows programs to make “hard” offers of TAships or GAships and tuition waivers to prospective applicants whom they seek to recruit. As a result, expectations are that recruitment success for a diverse cohort of strong applicants will improve for all programs that strive to provide graduate students experiences in supporting the training and education of students at SSU.

APPENDIX XII

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 XIII

Student Evaluated _____

Date: _____ Avg Score_____

Biology MS Oral Exam Rubric
Fall 2019

Generic Rubric For Assessing Program Objectives for Advancement to Candidacy			
Unacceptable =1 Evidence that the student has mastered this objective is not provided, unconvincing, or very incomplete	**Conditional = 2** Evidence that the student has mastered this objective is provided, but it is weak or incomplete	**Acceptable = 3** Evidence shows that the student has generally attained this objective	**Exemplary = 4** Evidence demonstrates that the student has mastered this objective at a high level

	Score	**Comments:**
Demonstrates Knowledge Base Appropriate use of literature related to project Demonstrates mastery of fundamental concepts for subdiscipline		
Displays critical thinking: Introduces study in sound theoretical context Insightful, skillfully designed hypotheses Establishes significance of original research		
Demonstrates understanding of research methods:* Subscale 1: Methods and skill level appropriate for appropriate data collection		
Subscale 2: Analyses approach appropriate to address hypotheses. Sound reasoning for statistical methods		
Effective written communication skills: Appropriate proposal format Form and language are crisp, clear, and succinct; Effective organization contributes to understanding.		
Effective oral communication skills: Appropriate presentation format and organization Engaging presentation style		

Average score of 2 or better required to pass
Scores of 1 or 2 in any category require conditional pass (write in conditions below)

APPENDIX XIII

Comments on conclusions reached:
If conditional Pass, write in conditions of completion of degree below

Conditions of Admission (list any conditions and how met): Date Conditions Met

Committee Chair _____ Student _____

Graduate Coordinator _____

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APPENDIX XIV

Student Evaluated _____

Date: Avg Score:

Biology MS Thesis Assessment Rubric
Fall 2019

Generic Rubric For Assessing Program Objectives for Thesis Projects			
Unacceptable =1 Evidence that the student has mastered this objective is not provided, unconvincing, or very incomplete	**Conditional = 2** Evidence that the student has mastered this objective is provided, but it is weak or incomplete	**Acceptable = 3** Evidence shows that the student has generally attained this objective	**Exemplary = 4** Evidence demonstrates that the student has mastered this objective at a high level

	Score	Comments:
Demonstrates Knowledge Base Appropriate use of literature related to project Demonstrates mastery of fundamental concepts for subdiscipline		
Displays critical thinking: Introduces study in sound theoretical context Insightful, skillfully designed hypotheses Establishes significance of original research Appropriate Interpretation of evidence; Thoughtfully analyzes and evaluates evidence; Draws warranted, judicious conclusions.		
Demonstrates mastery of research approaches:* Subscale 1: Methods of investigation were sufficient to answer research question.		
Subscale 2: Analyses was appropriate to answer research questions. Statistics were used and reported appropriately. Figures and Tables were well constructed and presented.		
Subscale 3: Conclusions based logically on the results of the analysis.		
Effective written communication skills: Appropriate Thesis format Form and language are crisp, clear, and succinct; Effective organization contributes to understanding.		
Effective oral communication skills: Appropriate presentation format and organization Engaging presentation style		

APPENDIX XIV

Comments on conclusions reached:

Conditions of Advancement to Candidacy Met (list conditions and how met):

Date Met

Committee Chair _____ Student _____

Graduate Coordinator _____

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APPENDIX XV

SSU Master Student's Peer-Reviewed Publications 2016-2021

Bentley, L.P., M. Clark, **B. Forbes**, **P. Krause**, S. Reilly, L. Blesius, A. Kelly. Remote sensing of 3D forest structure for fuels management and carbon accounting. In review, *CSU Geospatial Review.*

O'Gorman, C., M. Purser, C. McKay, K. Everly, L.P. Bentley. Examining abiotic and biotic drivers influencing *Quercus kellogii* in northern California to reimplement traditional ecological knowledge and promote ecosystem resilience post-wildfire. In revision for *Ecology and Society.*

Kamennaya N, **Gray J**, Ito S, Kainuma M, Nguyen MV, Khilyas IV, Birarda G, Bernie F, Hunt M, Vasadia D, Lin J, Holman H-Y, Torok T, Cohen MF (2020) Deconstruction of plant biomass by a *Cellulomonas* strain isolated from an ultra-basic (lignin-stripping) spring. Arch Microbiol 202(5):1077-1084. DOI 10.1007/s00203-020-01816-z.

Mazzola M, **Agostini A**, Cohen MF (2017) Incorporation of Brassica seed meal soil amendment and wheat cultivation for control of *Macrophomina phaseolina* in strawberry. Eur. J. Plant Path. 149(1): 57-71.

Rzucidlo, C.L., E.S. Sperou, R.R. Holser, J.I. Khudyakov, D.P. Costa, D.E. Crocker. Changes in serum adipokines during natural extended fasts in female northern elephant seals. General and Comparative Endocrinology (in press).

C. Debier, L. Pirard, M. Verhaegen, **C. L. Rzucidlo**, G. Tinant, C. Dewulf, Y. Larondelle, D. Smith, J. Rees, D.E. Crocker. *In vitro* lipolysis and leptin production of elephant seal blubber using precision-cut adipose tissue slices. Frontiers in Physiology (in press).

Arango, B.G., M. Harfush-Meléndez, J. A. Marmolejo-Valencia, H. Merchant-Larios, D.E. Crocker. Blood oxygen stores of olive ridley sea turtles, *Lepidochelys olivacea*, are highly variable among individuals during arribada nesting. Journal of Comparative Physiology B (in press).

Strahan, M.G., D.S. Houser, J.J. Finneran, J. Mulsow, D.E. Crocker. 2020. Behaviorally measured tactile sensitivity in the common bottlenose dolphin, *Tursiops truncatus.* Marine Mammal Science. 36:802-812.

Whitman, J., D.J. Girman, D.E. Crocker. 2019. Using iNaturalist in a coverboard protocol to measure data quality: suggestions for project design. Citizen Science: Theory and Practice. 4:1.

DeRango, E.J., K.C. Prager, D.J. Greig, **A.W. Hooper**, and D.E. Crocker. 2019. Climate variability and life history impact stress, thyroid, and immune markers in California sea lions (*Zalophus californianus*) during El Niño conditions. Conservation Physiology. 7:coz010. doi:10.1093/conphys/coz010.

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Hooper, A.W., R.W. Berger, L.S. Rubin, B.I. McDonald, D.E. Crocker. 2019. Maternal age influences offspring behavior and growth efficiency during provisioning in northern elephant seals. Animal Behaviour. 151:121-130.

DeRango, E.J., D.J. Greig, C. Gálvez, T.A. Norris, L. Barbosa, F.R. Elorriaga-Verplancken, and D.E. Crocker. 2019. Response to capture stress involves multiple corticosteroids and is associated with serum thyroid hormone concentrations in Guadalupe fur seals (*Arctocephalus philippii townsendi*). Marine Mammal Science. 35:72-92.

Chinn S.M., D.H. Monson, M.T. Tinker, M.M. Staedler, D.E. Crocker. 2018. Lactation and resource limitation affect stress responses, thyroid hormones, immune function and antioxidant capacity of sea otters (*Enhydra lutris*). Ecology and Evolution. 8: 8433-8447.

Crocker, D.E., **B.K. Wenzel**, C.D. Champagne, D.S. Houser. 2017. Adult male northern elephant seals maintain high rates of glucose production during extended breeding fasts. Journal of Comparative Physiology B. 187:1183-1192.

Jelincic, J.A., **M.S. Tift**, D.S. Houser, D.E. Crocker. 2017. Variation in adrenal and thyroid hormones with life-history stage in juvenile northern elephant seals (*Mirounga angustirostris*). General and Comparative Endocrinology. 252:111-118.

Ferraro, M.S, R.R. Decker, D.P. Costa, P.W. Robinson, D.S. Houser, D.E. Crocker. 2017. Evaluating gain functions in foraging bouts using vertical excursions in northern elephant seals. Animal Behaviour 129:15-24..

Codde, S.A., S.G. Allen, D.S. Houser, D.E. Crocker. 2016. Effects of environmental variables on surface temperature of breeding adult female northern elephant seals, *Mirounga angustirostris,* and pups. Journal of Thermal Biology. 61:98-105.

Peck, H.E., D.P. Costa, D.E. Crocker. 2016. Body reserves influence allocation to immune responses in capital breeding female northern elephant seals. Functional Ecology. 30:386-397.

Wittman*, J., D. Girman, and D. Crocker. 2019. Using iNaturalist in a coverboard protocol to measure data quality: Suggestions for project design. Citizen Science Theory and Practice. 4:1-13.

Lavin*, B.R. and D.J. Girman. 2019. Phylogenetic relationships and divergence dating in the Glass Lizards (Anguinae). Molecular Phylogenetics and Evolution 133:128-140.

Bain*, T.K., Cook, D., & D.J. Girman. 2017. Evaluating the effect of moisture in wildlife crossing tunnels on the migration of the California tiger salamander*, Ambystoma californiense*. Herpetological Conservation & Biology.

Graham*, N.R., Fisher, B.L., and D.J. Girman. 2016. Phylogeography in response to reproductive strategies and ecogeographic isolation in ant species on Madagascar: Genus *Mystrium* (Formicidae: Amblyoponinae). PLOS ONE PONE-D-14-140074R2

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Henderson CF, Bica I, Long F, **Irwin D**, Stull CH, Baker BW, Suarez Vega V, Taugher ZM, Fletes ED, Bartleson JM, Humphrey ML, Álvarez L, Akiyama M, Kumagai Y, Fukuto JM, and Lin J**.** 2020. Cysteine Trisulfide Protects *E. coli* from Electrophile-Induced Death Through the Generation of Cysteine Hydropersulfide. *Chem Res Toxicol.* 33(2):678-686.

Lin J, Akiyama M, Bica I, Long FT, Henderson CF, **Goddu RN,** Suarez V, Baker B, Ida T, Shinkai Y, Nagy P, Akaike T, Fukuto JM, and Kumagai Y. 2019. The Uptake and Release of Polysulfur Cysteine Species by Cells: Physiological and Toxicological Implications. *Chem Res Toxicol.* 32(3):447-455.

Goddu RN, Henderson CF, Young AK, Muradian BE, Calderon L, Bleeg LH, Fukuto JM, and Lin J. 2018. Chronic Exposure of the RAW246.7 Macrophage Cell Line to H2O2 Leads to Increased Catalase Expression. *Free Radic Biol Med.* 126:67-72.

Bianco CL, Akaike T, Ida T, Nagy P, Bogdandi V, Toscano JP, Kumagai Y, Henderson CF, **Goddu RN,** Lin J, Fukuto JM. 2018. The Reaction of Hydrogen Sulfide with Disulfides: Formation of a Stable Trisulfide and Implications to Biological Systems. *Br J Pharmacol*. May 29.

Tercero, A.D. and Place, S.P. 2020. Characterizing Gene Copy Number of Heat Shock Protein Gene Families in the Emerald Rockcod, Trematomus bernacchii. Genes, 11, 867. https://doi.org/10.3390/genes11080867

Bogan, S.N and S.P. Place. 2019. Accelerated evolution at chaperone promoters among Antarctic notothenioid fishes. BMC Evol. Biol. https://doi.org/10.1186/s12862-019-1524-y

Vasadia, D.J., Zippay, M.L., Place, S.P. 2019. Characterization of thermally sensitive miRNAs reveals a central role of the FoxO signaling pathway in regulating the cellular stress response of an extreme stenotherm, Trematomus bernacchii. Marine Genomics. DOI: 10.1016/j.margen.2019.100698.

Hancock, J. R. and S.P. Place. 2016. Impact of ocean acidification on the hypoxia tolerance of the woolly sculpin, Clinocottus analis. Conserv Physiol. 4: DOI 10.1093/conphys/cow040.

Rank, N. E., P. Mardulyn, **S. J. Heidl, K. T. Roberts**, N. A. Zavala and E. P. Dahlhoff. 2020. Mitonuclear interactions influence performance and reproductive characters in a montane leaf beetle. *Evolution* 74(8): 1724-1740.

Dahlhoff E. P., V. C. Dahlhoff, C. A. Grainger, N. A. Zavala, D. Otepola-Bello, **K. T. Roberts, S. J. Heidl**, B. A. Sargent, J. T. Smiley and N. E. Rank. 2019. Getting chased up the mountain-high elevation may limit performance and fitness characters in a montane insect. *Functional Ecology* 33(5): 809-818.

Wininger, K. and N. E. Rank. 2017. Evolutionary dynamics of interactions between plants and their enemies: comparison of herbivorous insects and pathogens. *Annals of the New York Academy of Sciences* 1408(1): 46-60.

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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* 106(1): 47-55.

Torossian, J.L., **Hosek, K.E.**, Donelan, S.C., Trussell, G.C., Helmuth, B.S., and **Zippay, M.L.** 2020. Physiological and biochemical responses to acute environmental stress and predation risk in the blue mussel, Mytilus edulis. Journal of Sea Research 159.

Collins C., Burnett N., Ramsey M., Wagner K., **Zippay M.** 2019. **Physiological responses to heat stress in an invasive mussel** *Mytilus galloprovincialis* **depend on tidal habitat.** Marine Environmental Research.

APPENDIX XVI

Year Def	Last	First	Advisor	Position after Masters
F2016	Chinn	Sarah	Crocker	Ph.D. Program University of Georgia
F2017	Chin	Brennan	Place	Lecturer Santa Rosa Junior College
F2017	Vasadia	Dipali	Place	Lecturer Sonoma State University
F2017	Zhang	Bo	Rank	Biotechnology Corporation
F2017	Gilmore	Kandis	Rank	SSU Department of Biology Technnician
F2018	Hosek	Kristen	Zippay	Science Teacher - US Naval base- Marshall Islands
F2018	Bogan	Sam	Place	Ph.D. Program UC Santa Barbara
F2018	Goddu	Robert	Lin	Biotechnology Corporation
F2018	Gray	Justine	Cohen	Biotechnology Corporation
F2018	Howland	Dustin	Girman	Biological Consulting
F2019	Surber	Lisa	Girman	Ph.D. program University of Illinois
F2019	Lewis	Ryan	Girman	Staff Biologist- Snaqualmie Indian Tribe, Washington
S2016	Ender	Cody	Cushman	Point Reyes National Seashore
S2016	Early	Michelle	Christian	UC Davis Coop
S2016	Malm	Preston	Nielsen/Crocker	Investment Counselor, Fisher Investments
S2016	Stokes	Jill	Nielsen/Crocker	LGC Biosearch Tecnologies
S2016	Ferraro	Michelle	Crocker	Medical Coder at Avanti Hospital
S2016	Hancock	Joshua	Place	Research Technician University of Hawaii
S2016	Thomas (Wilson)	Penelope	Jaffe	
S2017	Lavin	Brian	Girman	Lecturer- Diablo Valley College
S2017	Cecil	Eric	Cushman	Teaching Credential Program - Biology Teacher
S2017	DeRango	Eugene	Crocker	Ph.D. Program Univeristat Bielfield, Germany
S2017	Cornelius-White	Nicole	Jaffe	Technician with CA Fish and Wildlife Services
S2017	Radosevich	Louisa	Jaffe	Animal Behaviorist, San Diego Zoo
S2018	Lee	Caprice	Cushman	Faculty Napa Community College
S2018	Barber	Jessica	Jaffe	Faculty Idaho Community College
S2018	Hooper	Amanda	Crocker	MS Nursing Program, University of San Francisco
S2018	Terry	Dana	Geist	Environmental Consulting
S2019	Strahan	Madelyn	Crocker	Scientist, National Marine Mammal Foundation
S2019	Arango	Blanca (Gaby)	Crocker	Ph.D. Program UC Berkeley
S2020	Rzucidlo	Caroline	Crocker	Ph.D. program at WHOI- MIT
S2020	Sperou	Emily	Crocker	Ph.D. program at Baylor
S2020	Tercero	Anthony	Place	Ph.D. program at UC Davis
S2020	Ghavamian	Yasmeen	Jaffe	Intern at San Francisco zoo
S2020	Molinaro	Holly	Jaffe	Collaborate with AnimalConcetps
S2020	O'Gorman	Cory	Bentley	Agriculture

APPENDIX XVI

S2020	Hernandez	Manuel	Bentley	
Su2016	Maguire	Athena	Nielsen/Crocker	California Department of Fish and Wildlife
Su2016	Karres	Nicole	Geist	
Su2017	Dodge	Vanessa	Cushman	Lecturer- SSU, & Napa Cmmunity College
Su2017	Grady	Kathleen	Girman	Point Blue Conservation NGO
Su2017	Pierson	Meredith	Lin/Place	teaching private school santa rosa
Su2017	Wittman	Julie	Girman	Center for Environmental Inquiry, SSU
Su2018	Edwards	Jonathan	Girman	Biological Consulting
Su2019	Descalso	Kimberly	Pillai	Biotechnology Corporation
Su2019	Collins	Christina	Zippay	Research Associate at GenEdit
Su2019	Gaitan	Megan	Bentley	Research Technician, Virginia Commonwealth University
Su2019	Murakami	Emily	Geist/Crocker	
Su2020	Hudson	Daniel	Girman	Staff Biologist and Arborist- Mountain G Enterprises Environmental Services, CA
dropped	Wininger	Kerry	Rank	

APPENDIX XVII- Lisa Bentley

Dr. Lisa Patrick Bentley
Assistant Professor, Sonoma State University, Department of Biology
lisa.bentley@sonoma.edu

EDUCATION

2008 **Ph.D., Biological Sciences**, Texas Tech University, Lubbock, TX.
2002 **B.A., Environmental Science**, Barnard College of Columbia University, New York, NY.

PROFESSIONAL EXPERIENCE

2016-present Assistant Professor, Department of Biology, *Sonoma State University*
2013-2016 Postdoctoral Fellow, School of Geography and the Environment, *University of Oxford, UK*
2012-2016 Visiting Researcher, Department of Ecology and Evolutionary Biology, *University of Arizona*
2009-2011 NSF Postdoctoral Fellow Biological Informatics, *University of Arizona* & *Arizona State Univ*
2008-2009 Postdoctoral Research Associate, *University of Arizona*
2005-2008 Environmental Protection Agency STAR/GRO Fellow, *Texas Tech University*
2002-2003 U.S. Fulbright Scholar, *University of Costa Rica*, *Organization for Tropical Studies*

GRANTS

2021-2024	**NASA ROSES Biodiversity *(pending)***, "Understanding the global 3D signature of tree biodiversity" $689K (Co-I)
2021	**Save the Redwoods League Research Starter Grant for BIPOC students *(pending)***, "Using quantitative structure models to explore redwood biomass allometries" $5K (Undergraduate mentor)
2020–2021	**SSU RSCAP Mini-Grant Award**, "Evaluating the scaling of canopy fire fuels at Pepperwood Preserve using diverse approaches," $7K (PI).
2020–2021	**BLM JFSP Graduate Research Innovation (GRIN)**, "Evaluating canopy fuels across multiple spatial scales for improved fire modeling", $25K (PI)
2019–2022	**California State University Agricultural Research Initiative (CSU ARI)**, "Quantifying aboveground carbon stocks and fire fuels across diverse gradients to inform natural resource management in light of climate change", $450K (PI)
2019–2021	**CAL FIRE Forest Health**, "Evaluating Plot-level Remote Sensing Tools to Increase Accuracy and Efficiency of Fuels Management Approaches", $450K (PI)
2017–2020	**National Environment Research Council (NERC) Standard Grant**, "Understanding tree architecture, form, and function in the tropics", £800,000 (co-PI)
2015–2018	**National Science Foundation Grant, "**Collaborative Research: Developing integrated trait-based scaling theory to predict community change and forest function in light of global change", $540,000 total (co-PI)

SELECTED PUBLICATIONS

1. Brummer, A., P. Lymperopoulos, J. Shen, E. Tekin, **L.P. Bentley**, V. Buzzard, A. Gray, I. Oliveras, B.E. Enquist, V.M. Savage. (2020) Branching principles of animal and plant networks identified by combining extensive data, machine learning and modelling. J. R. Soc. Interface 20200624. https://doi.org/10.1098/rsif.2020.0624.
2. Shenkin, A., **L.P. Bentley**, I. Oliveras, N. Salinas, S. Adu-Bredu, B.H. Marimon, B. Marimon, T. Peprah, E. Lopez, L. Trujillo, E. Clemente, C. Adonteng, J. Seidu, F. Barbosa, S. Matias, B. Blonder, M. Silman, B. Enquist, G. Asner, Y. Malhi. (2020) The influence of ecosystem and phylogeny on tropical tree crown size and shape. *Frontiers in Forests and Global Change* https://doi.org/10.3389/ffgc.2020.501757.

3. Calders, K., J. Adams, J. Armston, H. Bartholomeus, S. Bauwens, **L.P. Bentley**, J. Chave, F.M. Danson, M. Demol, M. Disney, R. Gaulton, S.M.K. Moorthy, S. Levick, N. Saarinen, C. Schaaf, A. Stovall, L. Terryn, P. Wilkes, H. Verbeeck. Terrestrial Laser Scanning in Forest Ecology: Expanding the Horizon. (2020) *Remote Sensing of the Environment* https://doi.org/10.1016/j.rse.2020.112102.
4. Martin, R., G. Asner, **L.P. Bentley**, A. Shenkin, N. Salinas, K. Quispe, M. Montoya, F. Ccori, B. Enquist, S. Diaz, Y. Malhi. Covariance of Sun and Shade Leaf Traits Along a Tropical Forest Elevation Gradient. (2020) *Frontiers in Plant Science*. https://doi.org/10.3389/fpls.2019.01810.
5. Oliveras, I., **L.P. Bentley**, N. Fyllas, A. Gvozdevaite, A. Shenkin, T. Prepah, P. Morandi, K. Peixoto, M. Boakye, S. Adu-Bredu, B. Marimon, B.H. Marimon-Junior, R. Martin, G. Asner, S. Diaz, B. Enquist, Y. Malhi. The influence of taxonomy and environment on leaf trait variation along tropical abiotic gradients. *Frontiers in Forests and Global Change*. 3:18. doi: 10.3389/ffgc.2020.00018.
6. Duran S, GP Asner, RE Martin, **LP Bentley**, S Diaz, BS Maitner, Y Malhi, N Salinas, VM Savage, A Shenkin, M Silman, DJ Wieczynski, BJ Enquist. (2019) Informing trait-based ecology by assessing remotely-sensed functional diversity across a broad tropical temperature gradient. *Science Advances*, DOI: 10.1126/sciadv.aaw8114.
7. Lau A, C Martius, H Bartholomeus, A Shenkin, T Jackson, Y Malhi, M Herold, **LP Bentley**. Estimating architecture-based metabolic scaling exponents of tropical trees using terrestrial LiDAR and 3D modeling. (2019) *Forest Ecology and Management*, 439:132-145.
8. Wieczynski D, B Boyle, V Buzzard, SM Duran, AM Henderson, CM Hulshof, AJ Kerkhoff, MC McCarthy, ST Michaletz, NG Swenson, GP Asner, **LP Bentley**, BJ Enquist, VM Savage. (2018) Climate shapes and shifts functional biodiversity in forests worldwide. *PNAS*, https://doi.org/10.1073/pnas.1813723116.
9. Lau A, **Bentley LP**, Bartholomeus H, Herold M, Martius C, Malhi Y, Shenkin A, and Raumonen P. (2018) Tree architecture in tropical trees using terrestrial LiDAR and 3D tree modelling. *Trees*, 32:1219–1231.
10. Malhi Y, Jackson T, **Bentley LP**, Lau A, Shenkin A, Herold M, Calders K, Bartholomeus H, Disney M. (2018) New perspectives on the ecology of tree structure and tree communities through terrestrial laser scanning. *Interface Focus* 20170052. http://dx.doi.org/10.1098/rsfs.2017.0052.
11. Neyret, M., **L.P. Bentley**, I. Oliveras, B. S. Marimon, B-H. Marimon, E. Almeida de Oliveira, F. Barbosa Passos, R. Castro Ccoscco, J. dos Santos, S. Matias Reis, P. S. Morandi, G. Rayme Paucar, A. Robles Cáceres, Y. Valdez Tejeira, Y. Yllanes Choque, N. Salinas, A. Shenkin, G. P. Asner, S. Diaz, B. J. Enquist, Y. Malhi. (2016) Examining community assembly mechanisms across two contrasting tropical gradients using leaf mass per area. *Ecology and Evolution*, 6:5674-5689.

SYNERGISTIC ACTIVITIES

- Direct supervision Sonoma State University Biology undergraduates (38 students since 2016), Master's students (5 since 2017)
- Grant/manuscript reviewer, editorial board member (*Frontiers in Forests and Global Change)*
- Expanding Your Horizons Women STEM conference, a nonprofit organization dedicated to providing gateway STEM experiences to middle and high school girls (organizing committee and event volunteer) (April 2018-present)
- Organizing committee member, instructor, and mentor for Sonoma Mountain Connection, a two-year cohort program for first-time, first-year underrepresented minority students in STEM majors (January 2020-present

- Co-creator of GEMTraits: A database and R package for accessing and analyzing plant functional traits from the Global Ecosystems Monitoring Network. (2017) doi: 10.5287/bodleian:v0BD04N7o.
- Member NSF ADVANCE COPLAC PLAN STEM Affinity Group for Leadership (2020-present)

APPENDIX XVII- Michael Cohen

Michael F. Cohen

Professor
Sonoma State University
Department of Biology, Darwin Hall 222
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Rohnert Park, CA 94928

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Email: cohenm@sonoma.edu

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

PROFESSIONAL EXPERIENCE

Aug. 2005 to present
Professor of Biology Sonoma State University (Assist. Prof. 2005-10; Assoc. Prof. 2010-2015)

Jan. 2015 to May 2016
Group Leader Okinawa Institute of Science and Technology, Biological Systems Unit

Aug. 2002 to Jul. 2005
Research Plant Pathologist (Postdoctoral Researcher); USDA-Agricultural Research Service, Tree Fruit Research Laboratory; Supervisor, Mark Mazzola
Research on biologically-based treatments systems for control of soilborne diseases of fruit trees.

Apr. 1999 to Jul. 2002
Postdoctoral Researcher *University of the Ryukyus, Japan; Supervisor, Dr. Hideo Yamasaki,*
Research on applied and basic aspects of *Azolla* water fern interactions with bacteria.

Aug. 1998 to Jul. 2001
Lecturer in Biology University of Maryland, Asian Division, Okinawa, Japan

Nov. 1997 to Aug. 1998
Health Science Specialist (Postdoctoral Researcher) VA Medical Center; Laboratory of Cardiovascular Molecular Biology. Characterization and cloning of mammalian folate and pantothenic acid transporters.

Sept. 1996 to Oct. 1997
General Science & Medical Microbiology Instructor *United States Peace Corps; United States Peace Corps/Nepal*
Instructor of microbiology at a community health vocational school and science at an elementary school; assisted in tree planting and toilet building projects.

Aug. 1995 to May 1996
Full-time Instructor (one-year replacement); Department of Biology, California State University, Fresno Microbiology and Bacterial Physiology lecture/lab courses. Coordinated service-learning microbiology projects sponsored by governmental and non-governmental organizations.

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Fellowships and Awards

- Lawrence Berkeley National Laboratory Visiting Faculty Program, U.S. Department of Energy Center for Science and Engineering Education, $14,000 (summer 2012)
- Green Giant Green Award, "Fuel from Aquatic Biomass (FAB) project" $25,000 (2011)
- Association of California Water Agencies Theodore Roosevelt Environmental Award, "Wastewater to Fuel" project (2009)
- Pearson Sustainable Solutions Award, "Wastewater to Fuel" project, $1,000 (2008)
- Interstate Renewable Energy Council Innovation Award, "Aquatic Biomass to Fuel" project (2008)
- International Council for Local Environmental Initiatives (ICLEI) 2008 Climate Innovation Invitational Award, "Aquatic Biomass to Fuel" project, $1,000 (2008)
- USDA Performance Bonus Award, $1,500 (2003)
- Japan Society for the Promotion of Science Fellowship, $100,000 (2000 to 2002)
- Schwall Medical Research Fellowship, $50,000 (1990 to 1995)

Grants

Cohen MF, "Testing of a pilot-scale microbial fuel cell system for on-site winery wastewater treatment", Sonoma County Water Agency, Watershed Academics To Enhance Regional Sustainability (WATERS) Program (*funding of ~$1,000 per academic year since 2015-2016 to present*) ~$5,000.

Cohen MF "Developing Microbial Fuel Cell-Based Wastewater Treatment" SSU Research, Scholarship and Creative Activity Program (*Academic year 2019-2020*) $5,781.

Cohen MF, "Testing of a pilot-scale microbial fuel cell system for on-site winery wastewater treatment", SSU Research, Scholarship and Creative Activity Program (*July 2016 – June 2017*) $4,345.

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.

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

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

Weisman M, **Cohen MF**, Farahmand F, Lavoipierre F, Rank N "SWEEP: Sustainable watershed environmental education project", SSU's component of a CSU STEM grant proposal to the Learn and Serve America Higher Education Consortium. $75,000 (*Sept. 2010 – Aug. 2013*)

Mazzola M, **Cohen MF, "**Active management of soil microbial communities to limit soilborne disease development in strawberry production systems" California Strawberry Commission. $90,565 (*Feb. 2009 – May 2011*)

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*)

Cohen MF, "The potential of leaf-colonizing microorganisms for biocontrol of *Phytophthora ramorum*," US Forest Service Sudden Oak Death Research Program Award, $14,805 (*Sept. 2007 – Dec. 2008*)

Cohen MF, Duckworth RS, "Construction, monitoring and analysis of experimental channelized aquatic wastewater scrubbers," City of Santa Rosa, $75,000 (*Jul. 2007 – Jun. 2010*)

APPENDIX XVII- Michael Cohen

Cohen MF, "Plant byproduct utilization by microbial cultures: Strategies for bolstering the economic feasibility of various biotechnological applications," SSU Research, Scholarship and Creative Activity Program. $2,358 (*Mar. 2006 – Jun. 2007*)

Cohen MF, "Control of *Phytophthora ramorum* through foliar application of a surfactant producing plant-colonizing bacterium," US Forest Service Sudden Oak Death Research Program Award, $15,000 (*Oct. 2005 – Dec. 2006*)

Peer-Reviewed Publications

1. **Cohen MF**, Kubota CM, Quintero Plancarte G, Kainuma M (2021) Biological polishing of liquid and biogas effluents from wastewater treatment systems. *In:* Integrated and hybrid technology for water and wastewater treatment. Ang WL, Mohammad A., Eds., Elsevier, ISBN: 595806, *in press*
2. Khilyas IV, Sorokina AV, Markelova MI, Belenikin M, Shafigullina L, Tukhbatova RI, Shagimardanova EI, Blom J, Sharipova MR, **Cohen MF** (2020) Genomic and phenotypic analysis of siderophore-producing *Rhodococcus qingshengii* strain S10 isolated from an arid weathered serpentine rock environment. Arch Microbiol, doi: 10.1007/s00203-020-02057-w
3. Kamennaya N, Gray J, Ito S, Kainuma M, Nguyen MV, Khilyas IV, Birarda G, Bernie F, Hunt M, Vasadia D, Lin J, Holman H-Y, Torok T, **Cohen MF** (2020) Deconstruction of plant biomass by a *Cellulomonas* strain isolated from an ultra-basic (lignin-stripping) spring. Arch Microbiol 202(5):1077-1084. doi 10.1007/s00203-020-01816-z
4. Khilyas IV, Sorokina AV, Elistratova AA, Markelova MI, Siniagina MN, Sharipova MR, Shcherbakova TA, D'Errico ME, **Cohen MF** (2019) Microbial diversity and mineral composition of weathered serpentine rock of the Khalilovsky massif. PLoS One. 2019, 14(12):e0225929 DOI 10.1371/journal.pone.0225929
5. Yamasaki H, Ogura M, Katsumi Kingjoe K, **Cohen MF** (2019) D-cysteine-induced rapid root abscission in the water fern *Azolla pinnata*: Implications for the linkage between D-amino acid and reactive sulfur species (RSS) in plant environmental responses. Antioxidants 2019, 8(9), 411.
6. Khilyas, IV, Sorokin, AA, Kiseleva, L, Simpson DJ, Fedorovich V, Sharipova, MR, Kainuma M, **Cohen MF** and Goryanin I, (2017). Comparative metagenomic analysis of electrogenic microbial communities in differentially inoculated swine wastewater-fed microbial fuel cells. Scientifica, 2017: Article ID 7616359.
7. Mazzola M, Agostini A, **Cohen MF** (2017) Incorporation of *Brassica* seed meal soil amendment and wheat cultivation for control of *Macrophomina phaseolina* in strawberry. Eur. J. Plant Path. 149(1): 57-71.
8. Yamasaki H, **Cohen MF** (2016) Biological consilience of hydrogen sulfide and nitric oxide in plants: Gases of primordial earth linking plant, microbial and animal physiologies. Nitric Oxide. 55:91-100.
9. 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.
10. 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. KJ Gupta, Ed. Humana Press, Totowa, NJ. 1424:1-14.
11. 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.
12. 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.

13. **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.
14. Kiseleva L, Garushyants SK, Briliute 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.
15. **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.
16. **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.
17. 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.
18. 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, RH Steinhorn, Eds. Springer-Verlag, New York, p. 35-54.
19. **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.
20. 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.
21. 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.
22. Yamasaki H, Itoh RD, Bouchard JN, Dghim AA, **Cohen MF** (2011) Nitric oxide synthase-like activities in plants. Annu Plant Rev 42:103-125.
23. 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.
24. **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.
25. 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.
26. Mazzola M, Zhao, Z, **Cohen, MF**, Raaijmakers, JM (2007) Cyclic lipopeptide surfactant production by *Pseudomonas fluorescens* SS101 is not required for suppression of complex *Pythium* spp. populations. Phytopathology 97:1348-1355.
27. Mazzola M, Brown J, Izzo AD, **Cohen MF** (2007) Mechanism of action and efficacy seed meal-induced pathogen suppression differ in a Brassicaceae species and time-dependent manner. Phytopathology 97:454-460.
28. Arita NO, **Cohen MF**, Tokuda G, Yamasaki H (2006) Fluorometric detection of nitric oxide with diaminofluoresceins (DAFs): applications and limitations for plant NO research. *In:* Nitric Oxide in Plant Growth, Development and Stress Physiology, Springer Book Series: Plant Cell Monographs. L. Lamattina, J.C. Polacco, Eds., Springer, Plant Cell Monogr 6:269-280.

29. Yamasaki H, **Cohen MF** (2006) NO signal at the crossroads: polyamine-induced nitric oxide synthesis in plants? Trends Plant Sci 11(11):522-524.
30. **Cohen MF**, Mazzola M (2006) Effects of *Brassica napus* seed meal amendment on soil populations of resident bacteria and *Naegleria americana*, and the unsuitability of arachidonic acid as a protozoan-specific marker. J Protozool Res 16:16-25.
31. **Cohen MF**, Mazzola M (2006) Resident soil bacteria, nitric oxide emission and particle size modulate the effect of *Brassica napus* seed meal on disease incited by *Rhizoctonia solani* and *Pythium* spp. Plant Soil 286:75-86.
32. **Cohen MF**, Yamasaki H, Mazzola M (2006) Nitric oxide research in agriculture: Bridging the plant and bacterial realms. *In*: Abiotic Stress Tolerance in Plants: Toward the improvement of global environment and food. A.K. Rai and T. Takabe, Eds., Springer Verlag, p. 71-90.
33. Mazzola M, Brown J, Izzo A, Abi-Ghanem R, **Cohen MF** (2006) Progress towards development of biologically-based strategies for the management of apple replant disease. Phytopathologia Polonica 39:11-18.
34. **Cohen MF**, Yamasaki H, Mazzola M (2005) *Brassica napus* seed meal soil amendment modifies microbial community structure, nitric oxide production and incidence of Rhizoctonia root rot. Soil Biol Biochem 37(7):1215-1227.
35. **Cohen MF**, Han HY, Mazzola M (2004) Molecular and physiological comparison of *Azospirillum* spp. isolated from *Rhizoctonia solani* mycelia, wheat rhizosphere and human skin wounds. Can J Microbiol 50:291-297.
36. **Cohen MF**, Mazzola M (2004) A reason to be optimistic about biodiesel: Seed meal as a valuable soil amendment. Trends Biotechnol 22(5):210-211.
37. **Cohen MF**, Yamasaki H, Mazzola, M (2004) Bioremediation of soils by plant-microbe systems. Int J Green Energy 1(3)301-312.
38. **Cohen MF**, Meziane T, Yamasaki H (2004) Photocarotenogenesis by a *Rhodococcus* isolated from the symbiotic fern *Azolla*. Endocytobiosis Cell Res 15, 350-355.
39. **Cohen MF**, Yamasaki H (2003) Involvement of nitric oxide synthase in sucrose-enhanced hydrogen peroxide tolerance of *Rhodococcus* sp. strain APG1, a plant-colonizing bacterium. Nitric Oxide 9(1):1-9.
40. **Cohen MF**, Williams J, Yamasaki H (2002) Biodegradation of diesel fuel by an *Azolla*-derived bacterial consortium. J Environ Sci Health 37(9):1593-1606.
41. **Cohen MF**, Meziane T, Tsuchiya M, Yamasaki H (2002) Feeding deterrence of *Azolla* in relation to deoxyanthocyanin and fatty acid composition. Aquatic Bot 74:181-187.
42. **Cohen MF**, Sakihama Y, Takagi YC, Ichiba T, Yamasaki H (2002) Synergistic effect of deoxyanthocyanins from the symbiotic fern *Azolla* on *hrmA* gene induction in the cyanobacterium *Nostoc punctiforme*. Mol Plant-Microbe Interact 15(9):875-882.
43. Sakihama Y, **Cohen MF**, Grace SC, Yamasaki H (2002) Plant phenolic antioxidant and prooxidant activities: phenolics-induced oxidative damage mediated by metals in plants. Toxicology 177(1)67-80.
44. **Cohen MF**, Sakihama, Y, Yamasaki H (2001) Roles of plant flavonoids in interactions with microbes: from protection against pathogens to the mediation of mutualism. Recent Res Devel Plant Physiol 2:157-173.
45. **Cohen MF**, Yamasaki H (2000) Flavonoid induced expression of a symbiosis-related gene in the cyanobacterium *Nostoc punctiforme.* J Bacteriol 182:4644-4646.
46. **Cohen MF**, Cai Y, Wolk CP, Meeks JC (1998) Transposon mutagenesis of heterocyst-forming filamentous cyanobacteria. Methods Enzymol 297:3-17.

47. **Cohen MF**, Meeks JC (1997) A hormogonium regulating locus, *hrmUA*, of the cyanobacterium *Nostoc punctiforme* strain ATCC 29133 and its response to an extract of a symbiotic plant partner *Anthoceros punctatus*. Mol Plant-Microbe Interact 10:280-289.
48. Campbell EL, **Cohen MF**, Meeks JC (1997) A polyketide-synthase-like gene is involved in the synthesis of heterocyst glycolipids in *Nostoc punctiforme* strain ATCC 29133. Arch Microbiol 167:251-258.
49. Campbell EL, Hagen KD, **Cohen MF**, Summers ML, Meeks JC (1996) The *devR* gene product is characteristic of receivers of two-component regulatory systems and is essential for heterocyst development in the filamentous cyanobacterium *Nostoc* sp. strain ATCC 29133. J Bacteriol 178:2037-2043.
50. **Cohen MF**, Wallis JG, Campbell EL, Meeks JC (1994) Transposon mutagenesis of *Nostoc* sp. strain ATCC 29133, a filamentous cyanobacterium with multiple differentiation alternatives. Microbiology 140:3233-3240.

Peer-Reviewed Technical Report

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

APPENDIX XVII- Daniel Crocker

Daniel Edward Crocker
Curriculum Vitae

Address: Department of Biology
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)

Assistant, Associate, Full Professor, Sonoma State University, 2000 – present.
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

National Service

National Academies of Science, Engineering and Medicine: Committee On The Assessment Of The Cumulative Effects Of Anthropogenic Stressors On Marine Mammals

Editorial Service (current)

Associate Editor, Proceedings of the Royal Society B, 2021 - present.
Associate Editor, Marine Biology, 2017 – present.
Associate Editor, Functional Ecology, 2017 – present.
Associate Editor, Physiological and Biochemical Zoology, 2015 – present.
Editorial Board, Comparative Biochemistry and Physiology 2016 - present.

Recent Publications (198 peer-reviewed publications).

Dhillon, J., J.A. Viscarra, J.W. Newman, O. Fiehn, **D.E. Crocker**, and R.M. Ortiz. Exogenous GLP-1 stimulates TCA Cycle and suppresses gluconeogenesis and ketogenesis in late-fasted northern elephant seal pups. American Journal of Physiology: Regulatory, Integrative and Comparative Physiology (in press).

DeRango, E.J., J.F.L. Schwarz, F. Zenth, P. Piedrahita, D. Páez-Rosas, **D.E. Crocker**, O. Krüger. Developmental conditions promote individual differentiation of endocrine axes and behavior in a tropical pinniped. Oecologia (in press).

C. Debier, L. Pirard, M. Verhaegen, C. L. Rzucidlo, G. Tinant, C. Dewulf, Y. Larondelle, D. Smith, J. Rees, **D. E. Crocker**. *In vitro* lipolysis and leptin production of elephant seal blubber using precision-cut adipose tissue slices. Frontiers in Physiology (in press).

Kroeger, C.E., **D.E. Crocker**, R.A. Orben, D.R. Thompson, L.G. Torres, P.M. Sagar, L.A. Sztukowski, T. Andriese, D.P. Costa, and S.A. Shaffer. Similar foraging energetics of two sympatric albatrosses despite contrasting life histories and wind mediated foraging strategies. Journal of Experimental Biology (in press).

APPENDIX XVII- Daniel Crocker

Crocker D.E. and B.I. McDonald. Physiological capacity and constraint impact behavioral phenotype in phocid seals. Ethology and Behavioral Ecology of Phocids. D.P Costa and E.A. McHuron, eds. Springer (in press).

Arango, B.G., M. Harfush-Meléndez, J. A. Marmolejo-Valencia, H. Merchant-Larios, **D.E. Crocker**. Blood oxygen stores of olive ridley sea turtles, *Lepidochelys olivacea*, are highly variable among individuals during arribada nesting. Journal of Comparative Physiology B (in press).

Pujade Busqueta, L., **D.E Crocker**, C.D. Champagne, M.C. McCormley, J.S. Deyarmin, D.S. Houser, J.I. Khudyakov. 2020. A blubber gene expression index for evaluating stress in marine mammals. Conservation Physiology. doi:10.1093/consphys/coaa082.

Delehanty, B., G.D. Bossart, C.D. Champagne, **D.E. Crocker**, K.H. Elliott, D.S. Houser, A.E.M. Newman, P.A. Fair, R. Boonstra. 2020. Measurement of free glucocorticoids: Quantifying corticosteroid binding capacity and its variation within and among mammal and bird species. Conservation Physiology. doi: 10.1093/conphys/coaa057.

Hückstädt, L.A., A. Piñones, D.M. Palacios, B.I. McDonald, M.S. Dinniman, E.E. Hofmann, J.M. Burns, **D.E. Crocker** and D.P. Costa. 2020. Projected shifts in the foraging habitat of crabeater seals along the Antarctic Peninsula. Nature Climate Change. 10:472-477.

Strahan, M.G., D.S. Houser, J.J. Finneran, J. Mulsow, **D.E. Crocker**. 2020. Behaviorally measured tactile sensitivity in the common bottlenose dolphin, Tursiops truncatus. Marine Mammal Science. 36:802-812.

Deyarmin, J.S., R. Hekman, C.D. Champagne, M.C. McCormley, A. Stephan, **D.E. Crocker**, D.S. Houser, J.I. Khudyakov. 2020. Blubber proteome response to repeated ACTH administration in a wild marine mammal. Journal of Comparative Biochemistry and Physiology D. 33:100644: 1-9.

Del Aguila-Vargasa, A.C., J.P. Vázquez-Medina, **D.E. Crocker**, L.C. Méndez-Rodriguez, R. Gaxiola-Robles, J.A. de Anda-Montañeza, L. Javier Ramirez-Jiranoe, O. Lugo-Lugoa, T. Zenteno-Savín. 2020. Antioxidant response to cadmium exposure in primary skeletal muscle cells isolated from humans and elephant seals. Journal of Comparative Biochemistry and Physiology C. 227:108641:1-9.

Houser, D.S., S. Martin, **D.E. Crocker**, and J.J. Finneran. 2020. Endocrine response to simulated U.S. Navy mid-frequency sonar exposures in the bottlenose dolphin (Tursiops truncatus). The Journal of the Acoustical Society of America. 147: 1681-1687.

Kroeger, C., **D.E. Crocker**, D.R. Thompson, L.G. Torres, P. Sagar, and S.A. Shaffer. 2019. Variation in corticosterone levels in two species of breeding albatrosses with divergent life histories: responses to body condition and drivers of foraging behavior. Physiological and Biochemical Zoology. 92:223-238.

DeRango, E.J., D.J. Greig, C. Gálvez, T.A. Norris, L. Barbosa, F.R. Elorriaga-Verplancken, and **D.E. Crocker**. 2019. Response to capture stress involves multiple corticosteroids and is associated with serum thyroid hormone concentrations in Guadalupe fur seals (*Arctocephalus philippii townsendi*). Marine Mammal Science. 35:72-92.

APPENDIX XVII- Daniel Crocker

Current Research funding ($5.22M total funding)

2019 – SERDP – Assessment of the Cumulative Effects of Multiple Stressors on Marine Mammals–Elephant Seals as a Model System. $458,295 to SSU (PI, 4/1/20-3/31/24).

2019. NSF – Integrative Organismal Systems - Collaborative Research: Role of endogenous carbon monoxide (CO) in hypoxia tolerant species. $67,743 to SSU (Co-PI, 8/15/19-8/14/22).

2018. Office of Naval Research - Developing metrics of animal condition and their linkage to vital rates: Further development of the PCOD model. $134,976 to SSU(Co-PI, 8/1/18-7/31/20).

2018. Office of Naval Research - On-board calculation and telemetry of the body condition of individual marine mammals. $40,000 to SSU. (Co-PI, 8/1/18-7/31/20).

Recent Invited Seminars (68 seminars)

Invited seminar, Moss Landing Marine Lab, September, 2020

Invited seminar, University of Nevada, Reno December, 2019

Invited seminar, Naito Symposium, UC Santa Cruz, CA December, 2018.

Invited seminar, University of Southern California, September, 2018.

Invited Seminar, UC Berkeley, April 2018.

Student Mentoring

38 master's students, SSU: Gitte McDonald, Ramona Zeno, Jason Hassrick, Cory Champagne, Melinda Fowler, Nathan Kofahl, Brian Wenzel, Lovisa 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, Amanda Hooper, Blanca Arango, Madelyn Strahan, Emily Sperou, Caroline Rzidicio, Emily Murakami, Allison Northey, Jordan Ashby, Ellen Gallanty, Kyle Donohoe, Barbie Halaska, Garrett Shipway

Doctoral advisor, UCSC: Jason Hassrick, Cory Champagne, Melinda Fowler

Post-doctoral advisor: Dr. Jane Khudyakov, Dr. Cory Champagne

Served on 106 master's and 18 doctoral thesis committees.

Sponsor to 108 undergraduate research theses.

Manuscript Review (invited reviewer for 69 journals).

Proposal Review

National Science Foundation, Biological Oceanography, IOS, OPP; Australian Antarctic Research Division; British National Environmental Research Council, NOAA Office of Ocean Exploration, North Pacific Research Board

External Doctoral reviewer for students at Deakin University, University of Queensland, Macquarie University, Australia; University of Pretoria, South Africa

Society Memberships

Society for Integrative and Comparative Biology

American Physiological Society

Society for Marine Mammalogy

British Ecological Society

APPENDIX XVII- Nicholas 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

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 XVII- Derek Girman

CURRICULUM VITAE - DEREK JOHN GIRMAN
Graduate Program Review 2021

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

Director, Graduate Studies, Sonoma State University	2019-present
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
Director, Core DNA Analysis Facility, Sonoma State University	1999-2012
Post-Doctoral Administrator of NIH Minority International Training and Research Projects, San Francisco State University	1997-1998
Director of the Molecular Genetics Laboratory, Romberg Tiburon Center for Environmental Research, San Francisco State University.	1996-1998

RELEVANT UNIVERSITY LEADRSHIP AND SERVICE

Graduate Coordinator, Department of Biology (see Appendix I for Relevant Duties of Position)	2012-2019
Chair, Graduate Committee for Biology	2012-2019
Graduate Program Review, Analysis and Authorship for Biology	2015-2016
Chair, School of Science Technology RTP Committee	2014-present
School of Science Technology RTP Committee member	2009-2014
Chair, Student Affairs Committee	2009-2010
Student Affairs Committee Member	2006-2008
Academic Senate Member	2000-2003

GRADUATE COURSES TAUGHT

Biology 501	Instructional Skills in Biology (Training Teaching Associates)	2017-present
Biology 500S	Sex & Reproduction	2017-present
Biology 500S	History of Life	2016
Biology 500S	Current Themes in Biology	2012-2014
Biology 511	Conservation Genetics	2001-2006
Biology 510	Life Science for Rural Teachers, Masters Program in Education	2005
Biology 514	Biological Systematics- SSU	2000
Biology 595	Special Studies in Biology	1999-present

Biology 599 Master's Thesis Research 2000-present

GRADUATE STUDENTS SUPERVISED AS THESIS ADVISER AT SSU

Jennaca Hajek, Master's Student (2021-present)
Anna Erway, Master's Student (2020-present)
Victoria Brunal, Master's Student (2020-present)
Julianne Bradbury, Master's Student (2019-present)
Jessica Torres, Master's Student (2018 - present)
Alessandra Phelan-Roberts, Master's Student (2018 - present)
Eric Lynch, Master's Student (2018 - present)
Ryan Lewis, Master's Degree (2018 - 2019)
Lisa Surber, Master's Degree (2017- 2020)
Daniel Hudson, Master's Degree (2016 - 2020)
Dustin Howland, Master's Degree (2016 - 2018)
Jonathan Edwards, Master's Degree (2015 - 2018)
Kathleen Grady, Master's Degree (2014 - 2017)
Julie Wittman, Master's Degree (2013 - 2017)
Brian Lavin, Master's Degree (2011 - 2017)
Natalie Graham, Master's Degree (2011 –2014)
Tracy Bain, Master's Degree (2011 –2014)
Kellianne Minarik, Master's Degree (2011 –2014)
Emily Harvey, Master's Degree (2009 –2012)
Laura Shaskey, Master's Degree (2008 –2012)
Diana Humple, Master's Degree (2008 –2010)
Briana Callahan, Master's Degree (2008 –2010)
Kiera Adams , Master's Degree (2003 – 2009)
Kristy Deiner, Master's Degree (2002 – 2004)
Gary Ouellette, Master's Degree (Spring 2001 –2003)
Joshua Hull, Master's student (Fall 2000 – 2002)
Diana Outlaw-Cummings, Master's Degree (Spring 1999 - 2001)
Jennifer Michaud, Master's Degree (Spring 1999 - 2001)
Molly Stephens, Master's Degree (Spring 1999 - 2001)

SSU GRADUATE THESIS COMMITTEE MEMBER

Committee Member, Ellen Gallanty, Department of Biology, N. Geist - Adviser
Committee Member, Emily Marakami, Department of Biology, N. Geist - Adviser
Committee Member, Meredith Pierson, Department of Biology, S. Place - Adviser
Committee Member, Dipali Visadia, Department of Biology, S. Place- Adviser
Committee Member, Dana Terry, Department of Biology, N. Geist - Adviser
Committee Member, Nicole Karres, Department of Biology, N. Geist - Adviser
Committee Member, Adriana Lopez, Department of Biology, K. Jaffe - Adviser
Committee Member, Wendy St. John, Department of Biology, N. Geist - Adviser
Committee Member, Mustafa Gul, Department of Biology, K. Nielsen- Adviser
Committee Member, Kevin Roberts, Department of Biology, N. Rank- Adviser
Committee Member, Zannie Dallara, Department of Biology, N. Geist - Adviser
Committee Member, Mario Klip, Department of Biology, D. Crocker- Adviser
Committee Member, Blake Foster, Department of Biology, J. Christmann- Adviser

Committee Member, Segal Boaz, Department of Biology, D. Crocker- Adviser
Committee Member, Brieanna Richards, Department of Anthropology, K. Jaffe- Adviser
Committee Member, Joe Ward, School of Education, C. Ayala - Adviser
Committee Member, Curtis Stone, Department of Biology, R. Whitkus - Adviser
Committee Member, Eric Hawk, Department of Biology, C. Kjeldsen - Adviser
Committee Member, Trish Tatarian, Department of Biology, P. Northen - Adviser
Committee Member, Shannon Fearnley, Department of Biology, N. Rank Adviser
Committee Member, Gary Neargarder, Department of Biology, N. Rank- Adviser
Committee Member, Kasey Yturralde, Department of Biology, N. Rank - Adviser
Committee Member, Mandy Foster, Department of Biology, P. Northen - Adviser

RESEARCH EFFORTS SUPPORTING GRADUATE STUDENTS

External Grants and Awards at SSU Supporting Graduate Students

18-21 U.S. Fish & Wildlife Service: Movement Patterns of California Tiger Salamanders in Agricultural and Suburban Interface. Awarded $30,000

18-21 ESA Mitigation Award, California Tiger Salamander Research Fund, Funded $56,000

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 & 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 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 – with D. Humple –Awarded $33,560

03-08 National Science Foundation grant, Major Research Instrumentation program. "MRI/RUI: Acquisition of genetic analyzer and DNA detection system for Sonoma State University 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. Proposal titled "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. Proposal titled "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 Amblyponine ants. Co-PI with B. Fisher. Awarded $174,000.

2000 CSUPERB Supplemental Support Proposal to CSU Entrepreneurial Joint Venture Matching Grant Funds program for supplemental support for a NSF sponsored research program. PI - $11,175 was Awarded.

1999 CSUPERB Supplemental Support Proposal to 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*

In Rev Lewis*, RD, DG Cook, A Phelan-Roberts*, V Brunal*, DE Crocker, **DJ Girman**. Orientation during post-metamorphic dispersal of the California tiger salamander (*ambystoma californisense*). In review in Northwestern Naturalist.

In Rev Lavin*, BL, B Callahan*, R Connell, and **DJ Girman**. Impacts of Landscape Features on the Genetic Structure of the California Giant Salamander (*Dicamptodon Ensatus*). In Review in Zoologica Scripta.

2019 Wittman*, J., **D. Girman,** and D. Crocker. Using iNaturalist in a coverboard protocol to measure data quality: Suggestions for project design. Citizen Science Theory and Practice. 4:1-13.

2019 Lavin*, B.R. and D. Girman. Phylogenetic relationships and divergence dating in the Glass Lizards (Anguinae). *Molecular Phylogenetics and Evolution* 133:128-140.

2017 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. Herpetological Conservation & Biology*

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* 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

2008 Clemento*, A.J., E.C. Anderson, D. Boughton, **D.J. Girma**n, and J.C. Garza. Population genetic structure and ancestry of *Oncorhyncus 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 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.

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 neotrpoical migratory songbird. Proceedings of the Royal Society of London, Series B. 267:1033-1040

1997 Smith, TB, RK Wayne, **DJ Girman**, and MW Bruford*. A role for ecotones in generating rainforest biodiversity. *Science* 276: 1855-1857.

PUBLICATIONS IN EDUCATION with SSU Master's Recipient

The next 10 publications listed can also be viewed as equivalent to a single High School Biology Textbook, developed with a SSU graduate student, for children of migrant workers.

2007 **Girman, DJ** and S McNeil. The Earth in the Balance. Biology B Textbook, Unit 10, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California. 123pp.

2007 **Girman, DJ** and S McNeil. The History of Life: Evidence From Fossils and Molecules. Biology B Textbook, Unit 9, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California. 106pp.

2007 **Girman, DJ** and S McNeil. The Science of Change: Genetic Engineering to Evolution. Biology B Textbook, Unit 8, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California. 119pp.

2007 **Girman, DJ** and S McNeil. Why Sex?. Biology B Textbook, Unit 7, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California.97pp.

2007 **Girman, DJ** and S McNeil. Communication within the Body: The Nervous and Endocrine Systems. Biology B Textbook, Unit 6, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California.120pp.

2006 **Girman, DJ** and S McNeil. Diet, Health, and Nutrition. Biology A Textbook, Unit 1, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California.116pp.

2006 **Girman, DJ** and S McNeil. Physiology and Cellular Energy. Biology A Textbook. Unit 2, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California. 114pp.

2006 **Girman, DJ** and S McNeil. Cancer and Cellular Function. Biology A Textbook, Unit 3, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California. 110pp.

2006 **Girman, DJ** and S McNeil. Forensic DNA and Inheritance of Traits. Biology A Textbook, Unit 4, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California. 110pp.

2006 **Girman, DJ** and S McNeil. Diseases and Immune Defense. Biology A Textbook, Unit 5, Portable Assisted Study Sequence Program. California State Department of Education, Fresno, California. 96pp.

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, No.2, Nov, 2003.

SCHOLARLY REVIEW

Reviewer – National Science Foundation – Systematic Biology
Reviewer – National Science Foundation – Population Biology
Reviewer – California Department of Fish & Game, Resource Assessment Program
Reviewer – *Molecular Ecology*.
Reviewer - *Behavioral Ecology and Sociobiology*.

FIELDWORK WITH GRADUATE STUDENTS

Pacific newt surveys – Sonoma/Mendocino Co, CA w/ E. Harvey, K. Minarik, Daniel Hudson	2008-2019
California Tiger Salamander surveys (Adult and Larval) w/ Tracy Bain, Jon Edwards, Allesandra Phelan-Roberts, Victoria Brunal, Jennaca Hajek	2011-present
Avian banding - Palomarin Field Station, California, USA w/ Kathleen Grady	2004-2016
Herpetological surveys – Mojave Desert w/ Brianna Callahan	2004-2012
Western Grebe Genetic Sampling w/ D. Humple	2010
California Giant Salamander surveys – Northern California w/Brianna Callahan	2008-2010
Sandhill Crane surveys – Central California w/ Laura Shaskey	2008-2009
Ant collecting/studies – Madagascar – w/ G. Ouellette	2002
Steelhead sampling (electrofishing) – Russian River watershed w/ Kristy Deiner, Kiera Adams	2000-2002
Ant collecting/studies – Chiricahua Mts., Arizona/New Mexico w/ G. Ouellette	2001
Raptor netting - Golden Gate Raptor Observatory, California w/ Josh Hull	1999
Bat Mist-netting and Telemetry– Napa, California	1998-1999
Avian banding and genetic sample collection - southern Baja, Mexico; w/ Borja Mila	1997

<u>Additional Field Experience with Students</u>

Trapping/tagging of ringtails (*B. astutus*), Sutter Buttes, CA - w/ David Wyatt (Sac City College)	2015-2017
Mist Netting of bats, Sutter Buttes, CA – w/ David Wyatt (Sac City College)	2015-2017
Small mammal trapping and herpetological surveys, Pepperwood Preserve	2013-2017
Small mammal surveys - various localities, Sonoma County, California	1999-2014
Avian banding – (Volunteer) Point Reyes Bird Observatory, California, USA	96,97,08,10
African wild dog genetic sampling - Kruger National Park, Republic of South Africa; Moremi Game Reserve, Botswana w/ Dr. Gus Mills	1993

APPENDIX XVII- Derek Girman

Channel Island Fox sample collection - San Clemente Island, California, USA	1991
Trapping survey for coyotes, grey fox, and bobcat - Santa Monica Mountains, California, w/ Bob Plantrick (Nat. Park Serv.) and Dr. R. Wayne (UCLA)	1988-1991
African wild dog sample collection - Masai Mara Game Reserve, Kenya; with Dr. Pieter Kat (Kenya Mus.) and Dr. Todd Fuller (UMass)	1989
Mongoose, genet, civet, and jackal sample collection - Southern Kenya	1989
Behavioral study of smooth-billed Ani - Osa Penninsula, Costa Rica	1988
Small mammal survey - Santa Monica Mountains, California, USA w/ Bob Plantrick (Nat. Park Serv.) and Dr. R. Wayne (UCLA)	1988

APPENDIX XVII- Lisa Hua

NSF Biographical Sketch

Lisa Hua, Ph.D.
Assistant Professor
Sonoma State University
Darwin Hall Room 216
1801 East Cotati Ave
Rohnert Park, CA 94928
(707) 664-2717
hual@sonoma.edu

(a) Professional Preparation
University of California, Davis (UCD); Davis CA; Biochemistry and Molecular Cell Biol and Psychology – B.S. 2006

Tulane University, New Orleans, LA; Cell and Molecular Biology – M.S. 2008

Tulane University, New Orleans, LA; Cell and Molecular Biology – Ph.D. 2012

University of California, San Francisco University (UCSF), San Fran., CA; Cell and Developmental Biology – Postdoc 2012-2019

(b) Appointments
Sonoma State University, CSU Sonoma
Assistant Professor, Department of Biology 2019-present

San Francisco State University, CSU San Francisco
Lecturer/Adjunct Professor, Department of Biology 2018

Dominican University
Lecturer/Adjunct Professor, Department of Natural Sciences and Mathematics 2016

(c) Publications
(i)
Hua LL, and Mikawa T (2018). Mitotic anti-pairing of homologous and sex chromosomes via spatial restriction of two haploid sets. *Proc. Natl. Acad. Sci. U.S.A.* 115(52):E12235-E12244. (PMID: 30530674)

Hua LL, Mikawa T. (2018). Chromosome painting of mouse chromosomes. Mouse Embryogenesis: Methods and Protocols. *Methods Mol Biol* 1752:133-143. (PMID29564769; PMC6140340)

Hua LL, Mikawa T. Following Chromosome Movement in 3D (2019). Oxford instruments: Imaris. https://imaris.oxinst.com/learning/view/article/following-chromosome-movement-in-3d

(ii)
Hu J, Verzi MP, Robinson AS, Tang PL, **Hua LL**, Xu S, Kwok P, Black BL.(2015) Endothelin signaling activates Mef2c expression in the neural crest through a MEF2C-dependent positive-

feedback transcriptional pathway. *Development.* 142(16): 2775-80. (PMID26160899; PMC4550968)

Hua LL, Vedantham V, Barnes RM, Hu J, Robinson AS, Bressan M, Srivastava D, Black BL. (2014) Specification of the mouse cardiac conduction system in the absence of Endothelin signaling. *Dev. Biol.* 393(2):245-54. (PMID25050930; PMC4143461)

Maska EL, Cserjesi P, **Hua LL**, Garstka ME, Brody HM, Morikawa Y.(2010) A Tlx2-Cre mouse line uncovers essential roles for hand1 in extraembryonic and lateral mesoderm. *Genesis.* 48(8):479-84. (PMID20506548; PMC2955361)

Zehir A, **Hua LL**, Maska EL, Morikawa Y, Cserjesi P. (2010) Dicer is required for survival of differentiating neural crest cells. *Dev. Biol.* 340(2): 459-67. (PMID20144605; PMC2878775)

Lim RF, Wegelin J, **Hua LL**, Kramer EJ, Servis ME. (2008) Evaluating a lecture on cultural competence in the medical school preclinical curriculum. *Acad Psychiatry*. 32(4):327-31 (PMID18695035)

(d) Synergistic Activities

2019-present

Ad hoc Grant Reviewer, National Science Foundation: Genetic Mechanisms

2020-present

Ad hoc Grant Reviewer, California State University Program for Education and Research in Biotechnology (CSUPERB)

2019-present

Faculty Mentor, McNairs Scholars (federal TRIO program), and NSF Louis Stokes Alliance for Minority Participation (LSAMP) programs
Serve as a research mentor to McNairs and LSAMP Scholars, and participate in McNairs and LSAMP programming to increase, and support low-income, first-generation college students for graduate school.

2020-present

Faculty Representative, NSF: Council of Public Liberal Arts Colleges Organizational Change for Gender Equity in STEM Academic Professions (NSF COPLAC ADVANCE) virtual affinity group

2019-present

Art Docent Volunteer, Petaluma City Schools (PCS)
Teach art with a biological context in elementary schools with a 54% minority (Hispanic) student body population using a variety of techniques, mediums, and subjects.

(e) Grants and Awards

Chromosome organization in cellular development, National Science Foundation (NSF) Research grant (Award #2027746), $600,000, August 2020-July 2023, Role: PI

Non-random chromosome positioning during mitosis, California State University Program for Education and Research in Biotechnology (CSUPERB) New Investigator grant, $15,000, June 2020-December 2021, Role: PI

Chromosome Organization of Umbellularia californica with Phytophthora ramorum Resistance, SSU Office of Research and Sponsored Programs (OSRP) Koret Scholars Award, $8,000, October 2020-December 2021, Role: PI

Developing a curriculum for SSU students for careers in biomedicine, SSU Science and Technology Innovation and Strategic Priorities funding grant, $10,000, October 2019-May 2020, Role: PI

Brent Bancroft Hughes, Ph.D.
Assistant Professor
Sonoma State University
Department of Biology, Darwin 219
(707) 664-2142
hughes@sonoma.edu

EDUCATION

2010-2014	PhD Ecology and Evolutionary Biology University of California Santa Cruz
2003 - 2007	MS Marine Science Moss Landing Marine Laboratories, Moss Landing, CA
2001	Oregon Institute of Marine Biology, Charleston, OR Graduate courses in Marine Ecology and Marine Animal Behavior
1997 - 2001	BA Biology Truman State University, Kirksville, MO

PROFESSIONAL EXPERIENCE AND APPOINTMENTS

2019-present	Adjunct Professor, Estuarine and Ocean Science Center, San Francisco State University
2018	Friday Harbor Labs Postdoctoral Fellowship, University of Washington
2015-2017	David H. Smith Conservation Research Fellow, Duke University
2016	*Course Co-Instructor*, Duke University, Marine Ecology field course
2015	*Postdoctoral Scholar*, University of California Santa Cruz
2015	*Course Co-Instructor*, University of California Santa Cruz, Marine Conservation Biology class
2008 - 2014	*Estuarine Ecologist*, Elkhorn Slough National Estuarine Research Reserve, Watsonville, CA.
2008 - 2010	*Adjunct Faculty*, Cabrillo College, courses taught: Ecology
2005 - 2008	*Research Analyst*, Moss Landing Marine Labs, Moss Landing, CA.
2005	*Instructor*, MLML Teacher Enhancement Program, taught high school marine botany in Watsonville, CA.

Updated 05 January 2021

APPENDIX XVII- Brent Hughes

RESEARCH AND SCHOLARSHIP

Grants & Awards in Support of Research:

Grants and Awards at SSU

2020-2022 California SeaGrant. Co-PI (along with M. Zippay and S. Place from SSU, and colleagues from UC Davis, University of Washington and San Diego State University). A multi-pronged approach to kelp recovery along California's north coast ($156,820 to SSU).

2020-2021 The Nature Conservancy. Determining drivers of resilience and declines in northern California kelp forests ($60,000).

2019-2022 Ocean Protection Council. A Framework for Condition Assessment and Monitoring of Estuary MPAs in California ($123,434).

2020-2021 Anthropocene Institute. Adding resilience to kelp forests through the development of heat tolerant varieties for restoration ($50,000).

2019 Green Earth Book Award ($375).

2019 SSU Professional Development Award ($2,176).

2019 Koret Scholars Award. Scale-dependency in coastal food webs along the California Current ($10,000).

2019-2021 California Coastal Conservancy. Determining habitat extent and population growth of sea otter recolonization of northern California ($60,000).

Previous to SSU (2016-2018):

Anthropocene Institute. Enhancing restoration design of imperiled Olympia oysters in a highly degraded estuary $50,000. 2017-2018. PIs: **BB Hughes**, K. Wasson.

NSF BIO-OCE. Trophic linkages in seagrass ecosystems. $657,000. 2016-2019. PI: G Eckert, Senior Personnel: T. Tinker, **BB Hughes.**

California Ocean Science Trust. Estuarine & Wetland Ecosystems Monitoring Program Integration. $10,000. 2016-2017. PI: **BB Hughes.**

The Ocean Foundation. Ecosystem functioning of restored seagrass beds. $14,000. 2016-2017. PI: **BB Hughes.**

Anthropocene Institute/Ocean Foundation, "Restoration of eelgrass to and its effects to key ecosystem services and water quality". $50,000, 2016-2017. PI: **BB Hughes**.

California Sea Grant, "Enhancement of healthy coastal environments by incorporating species interactions into seagrass mitigation and restoration design", $10,000. 2015-2016. PI: HG Greene. **BB Hughes, Ghost author and project leader**.

Peer-Reviewed Publications (**Undergraduate Researcher, ^Graduate Student Researcher #Citizen Scientist*):

SSU (August 2018 – present)

9. Hughes, B.B., *B.A. Ali, *N.N. Noor, *S.G. Soto, M.N. Dethier. 2020. Native and invasive macrophytes differ in their effectiveness as nurseries for juvenile endangered salmon. *Estuaries and Coasts: Special Issue in Memory of Susan Williams. In press.*

8. ^Grimes, T.M., M.T. Tinker, B.B. Hughes, ^K.E. Boyer, L. Needles, K. Beheshti, R.L. Lewison. 2020. Characterizing the impact of recovering sea otters on commercially important crab in California estuaries. *Marine Ecology Progress Series*. 655:123-137.

7. Anderson, S.C., P.R. Elsen, B.B. Hughes, R.K. Tonietto, M.C. Bletz, D.A. Gill, M.A. Holgerson, S.E. Kuebbing, C. McDonough MacKenzie, M.H. Meek, D. Verissimo. 2020. Trends in ecology and conservation over eight decades. *Frontiers in Ecology and the Environment. In press.*

6. Whalen, M….*27 co-authors*, B.B. Hughes,…*39 co-authors*, J.E. Duffy. 2020. Climate drives the geography of marine consumption by changing predator communities. 2020. *Proceedings of the National Academy of Sciences USA*. 45:28160-28166.

5. ^Rudebusch, J.A., B.B. Hughes, K.E. Boyer. 2020. Assessing anthropogenic risk to southern sea otters (*Enhydra lutris nereis*) for reintroduction into San Francisco Bay. *PeerJ*. 8:e10241.

4. Wasson, K., ^D.J. Gossard, L. Gardner, P.R. Hain, S. Fork, C.J. Zabin, S. Fork, A.D. Ridlon, J.M. Bible, A.K. Deck, B.B. Hughes. 2020. A scientific framework for conservation aquaculture: A case study of oyster restoration in central California. 2020. *Biological Conservation*. 250:108745.

3. Hughes, B.B., K. Wasson, M.T. Tinker, S.L. Williams, ^L.P. Carswell, K.E. Boyer, M.W. Beck, #R. Eby, #R. Scoles, M. Staedler, ^S. Espinosa, M. Hessing-Lewis, ^E.U. Rechsteiner, ^K. Beheshti, ^T.M. Grimes, B.H. Becker, L. Needles, J.A. Tomoleoni, ^J. Rudebusch, E. Hines, B.R. Silliman. 2019. Species recovery and recolonization of past habitats: lessons for science and conservation from sea otters in estuaries. *PeerJ*. 7e8100.

2. Stephens, T.A., B.B. Hughes, K.J. Kroeker, M. Hessing-Lewis, Z. Monteith, M. Morris, ^W.W. Raymond. 2019. Between a rock and a soft place: surfgrass colonizes sediments without attachment to rock. *Ecology*. e02791.

1. Lefcheck, J.S., B.B. Hughes, ^A.J. Johnson, ^B. Pfirrman, D.B. Rasher, A.R. Smyth, B.L. Williams, M.W. Beck, R.J. Orth. 2019. Coastal habitats are nurseries: a comprehensive meta-analysis. *Conservation Letters*. 12:e12645.

Previous (2016 – 2018)

Silliman, B.R., B.B. Hughes, ^L.C. Gaskins, Q. He, M.T. Tinker, A. Read, J. Nifong, R. Stepp. 2018. Are the ghosts of nature past haunting conservation today? *Current Biology*. 28:R532-R537

Toft, J., S. Munsch, J. Cordell, K. Siitari, V. Hare, B. Holycross, L. DeBruyckere, C. Greene, B.B. Hughes. 2018. Impact of multiple Stressors on estuarine nursery function across the northeast Pacific coast.

Global Change Biology. 24:2008-2020.

Jeppesen, R., *M. Rodriguez, *J. Rinde, J. Haskins, B.B. Hughes, L. Mehner, K. Wasson. 2018. Hypoxia increases fish mortality and reduces oyster growth in a highly eutrophic estuary. *Estuaries and Coasts* 41:89-98.

Hessing-Lewis, ^M., E. Rechsteiner, B.B. Hughes, M.T. Tinker, ^A. Olson, ^Z. Monteith, ^M.M. Henderson, J.C. Watson. 2018. Ecosystem features determine seagrass community response to sea otter foraging. *Marine Pollution Bulletin*. 134:134-144.

Hughes, B.B., ^S.C. Lummis, S.C. Anderson, K.J. Kroeker. 2017. Unexpected resilience of a seagrass system exposed to global stressors. *Global Change Biology*. 24:224-234.

Hughes, B.B., ^R. Beas-Luna, ^A. Barner, ^K. Brewitt, D.R. Brumbaugh, ^E. Cerny-Chipman, ^S.L. Close, ^K.E. Coblentz, ^K.L. de Nesnera, ^S.T. Drobnitch, J.D. Figurski, ^B. Focht, ^M. Friedman, J. Freiwald, K.K. Heady, W.N. Heady, ^A. Hettinger, ^A. Johnson, K.A. Karr, ^B. Mahoney, ^M.M. Moritsch, ^A.K. Osterback, ^J. Reimer, ^J. Robinson, ^T. Rohrer, ^J. Rose, ^M. Sabal, ^ L.M. Segui, ^C. Shen, ^J. Sullivan, R. ^Zuercher, P.T. Raimondi, B.A. Menge, K. Grorud-Colvert, M. Novak, M.H. Carr. 2017. Long-term studies contribute disproportionately to ecology and policy. *BioScience* 67:271-281.

Silliman B., B.B. Hughes, ^Y.S. Zhang, Q. He. 2017. Business as usual leads to underperformance in coastal restoration. In: *Effective Conservation Science: Data Not Dogma*. Eds. P. Kareiva, M. Marvier, B. Silliman. Ch. 27.

#Eby, R., #R.S. Scoles, B.B. Hughes, K. Wasson. 2017. Serendipity in a salt marsh: detecting frequent sea otter haul outs in a marsh ecosystem. *Ecology.* 98:2975-2977.

Hughes, B.B., K. Hammerstrom, N. Grant, *U. Hoshijima, #R. Eby, K. Wasson. 2016. Trophic cascades on the edge: fostering seagrass resilience via a novel pathway. *Oecologia* 182:231-241.

Wasson, K., B.B. Hughes, A. Chang, A. Deck, P. Dinnel, S. Dudas, M. Ferner, E. Grosholz, D. Kimbro, J. Ruesink, A. Trimble, D. Vander Schaaf, C. Zabin, D. Zacherl. 2016. Coastwide recruitment of Olympia oysters: spatial scales of synchrony and predictors of recruitment failure. *Ecology* 97:3503-3516.

Silliman, B.R., P.M. Dixon, C. Wobus, Q. He, P. Daleo, B.B. Hughes, J. Willis, M. Hester. 2016. Tipping points in marsh resilience to the Deepwater Horizon oil spill. *Nature Scientific Reports* 6:32520. DOI: 10.1038/srep32520.

Prior to 2016 (2006-2016), see my Google Scholar Page:
https://scholar.google.com/citations?user=9HfQjCEAAAAJ&hl=en&authuser=1

Popsci articles:

SSU (August 2018 – present)

1. Hughes, B.B. River otters in a land without rivers. 2018. San Juan Islander. https://sanjuanislander.com/opinion/columnists/tide-bites/27960/river-otters-in-a-land-without-rivers

Previous

*Ali, B., *N. Noor, *S. Soto, B.B. Hughes. River otters lurking in the sea: further evidence of a paradigm shift in conservation. 2018. Society for Conservation Biology News Blog. https://conbio.org/publications/scb-news-blog/river-otters-lurking-in-the-sea-further-evidence-of-a-paradigm-shift-in-con

Hughes, B.B. 2017. Searching for the southern sea otter. Lost and Found Blog. http://www.lostandfoundnature.com/blog/2017/08/18/searching-for-the-southern-sea-otter/

APPENDIX XVII- Karin Jaffe

Karin Enstam Jaffe
Department of Anthropology
Sonoma State University

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

Sonoma State University

Faculty Associate Dean, School of Social Sciences (July 2019-Present)
Interim Coordinator, Gerontology Minor (September 2018-May 2020)
Faculty Coordinator, Liberal Studies-Napa/Solano, Extended Education (Sept. 2018-Aug. 2019)
Coordinator, Liberal Studies-Ukiah Program (January 2018-July 2019)
Coordinator, Human Development Program (January 2016-May 2020)
Professor, Department of Anthropology (August 2013-Present)
Chair, Department of Anthropology (August 2008-August 2013 and August 2014-August 2015)
Associate Professor, Department of Anthropology (August 2008-August 2013)
Adjunct Faculty, Department of Biology (August 2003-Present)
Assistant Professor, Department of Anthropology (August 2002-August 2008)

Oakland Zoo

Research Associate (July 2015-Present)

RESEARCH & SCHOLARSHIP

Research Projects

Director, SSUPER (Sonoma State University Primate Ethology Research) Lab (February 2007-May 2020)
Enhancing captive animal welfare through scientific observational research (IACUC #2009-41).
Projects:

- Using social network analysis to evaluate OMU formation in captive hamadryas baboons (OZ) (6/19-5/20)
- Effects of enrichment complexity on captive sun bear stereotypies (OZ) (5/19-5/20)
- Effects of food distribution and visitor presence on the behavior of captive sun bears (OZ) (10/16-5/18)
- Using enrichment to reduce inter-individual competition in captive chimpanzees (OZ) (11/15-4/17)
- Using social network analysis to assess social stability in captive hamadryas baboons (OZ) (11/15-4/17)
- Effects of enrichment on the behavior and enclosure use of ring-tailed lemurs (OZ) (11/14-4/16)
- Effects of enrichment on the core behavioral needs of mandrills (SFZ) (10/13-6/15)

- Proximate and ultimate effects of allo-parenting in African antelope (SW) (10/13-5/15)
- Hair-plucking behavior in mandrills (SFZ) (4/13-12/13)
- Group cohesion and enclosure use in a captive group of squirrel monkeys (SFZ) (8/10-11/15)
- Effects of stimuli on the behavior of a captive group of ring-tail lemurs (SW) (1/06-7/08)
- Changes in group dynamics, mating, and social behavior of captive mandrills (SFZ) (11/07-5/10)

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 A. Isbell

Select Publications and Presentations

Books:

Parker, S.T. & **Jaffe, K.E.** (2008) *Darwin's Legacy: Scenarios in Human Evolution*. AltaMira Press, NY.
Named a 2009 *CHOICE* Outstanding Academic Title

Peer-Reviewed Articles:

Jaffe, K.E. (in prep) Reactions of vervet monkeys (*Chlorocebus pygerythrus*) to a Nile monitor lizard (*Varanus niloticus*) provide insights into the cognitive processes of predator classification.

Jaffe, K.E. & Isbell, L.A. (2010) Changes in ranging and agonistic behavior of vervet monkeys (*Cercopithecus aethiops*) after predator-induced group fusion. *American Journal of Primatology*. 72: 634-644.

Isbell, L.A., Young, T.P., **Jaffe, K.E.**, Carlson, A.A., & Chancellor, R.L. (2009) Demography and life histories of sympatric patas monkeys, *Erythrocebus patas*, and vervets, *Cercopithecus aethiops*, in Laikipia, Kenya. *International Journal of Primatology*. 30: 103-124.

Jaffe, K.E. & Isbell, L.A. (2009) After the fire: Benefits of reduced ground cover for vervet monkeys (*Cercopithecus aethiops*). *American Journal of Primatology*. 71: 252-260.

Enstam, K.L. & Isbell, L.A. (2004) Microhabitat preference and vertical use of space by patas monkeys (*Erythrocebus patas*) in relation to predation risk and habitat structure. *Folia Primatologica*. 75: 70-84.

Enstam, K.L. & Isbell, L.A. (2002) Comparison of responses to alarm calls by patas (*Erythrocebus patas*) and vervet (*Cercopithecus aethiops*) monkeys in relation to habitat structure. *American Journal of Physical Anthropology*. 119: 3-14.

Enstam, K.L., Isbell, L.A., & de Maar, T.W. (2002) Male demography, female mating behavior, and infanticide in wild patas monkeys (*Erythrocebus patas*). *International Journal of Primatology*. 23: 85-104.

Chapters in Edited Volumes:

Jaffe, K.E. (2019) Chapter 6: Primate Ecology and Behavior. In: *Explorations: An Open Invitation to Biological Anthropology*. (B. Shook, K. K. Nelson, Aguilera, and L. Braff, eds.). American Anthropological Association, Arlington, VA.

Jaffe, K.E. (2017) Guenon, Arboreal. In: *The International Encyclopedia of Primatology, Volume 1*. (A. Fuentes, ed.). Wiley-Blackwell, Hoboken, NJ. pp. 496-504**.**

Jaffe, K.E. (2016) Grivet monkey, *Chlorocebus aethiops*. In: *All the World's Primates.* (N. Rowe and M. Myers, eds.). Pogonias Press, Charlestown, RI. pp. 471-472.

Mekonnen, A. & **Jaffe, K.E.** (2016) Bale monkey, *Chlorocebus djamdjamensis.* In: *All the World's Primates.* (N. Rowe and M. Myers, eds.). Pogonias Press, Charlestown, RI. pp. 473-474.

Jaffe, K.E. (2016) Vervet monkey, *Chlorocebus pygerythrus*. In: *All the World's Primates.* (N. Rowe and M. Myers, eds.). Pogonias Press, Charlestown, RI. pp. 474-476.

Isbell, L.A. & **Jaffe, K.E.** (2013) *Chlorocebus pygerythrus*: vervet monkey. In: *Mammals of Africa, Volume II: Primates*. (T.M. Butynski, J.S. Kingdon, & J. Kalina, eds.). Bloomsbury Publishing, NY. pp. 277-283.

Jaffe, K.E. & Isbell, L.A. (2011) The guenons: Polyspecific associations in socioecological perspective. In: *Primates in Perspective*, 2nd Edition. (C.J. Campbell, A. Fuentes, K.C. MacKinnon, S.K. Bearder, & R.M. Stumpf, eds.). Oxford University Press, NY. pp. 277-300.

Presentations at Professional Meetings

Radosevich, L.♯, Molinaro, H.♯, **Jaffe, K.E.**, & Minier, D. "Network analysis and zoo management: Social dynamics in a captive group of hamadryas baboons (*Papio hamadryas*)," Animal Behavior Society Virtual Conference, July 28-31, 2020. (Virtual Oral Presentation)

Ghavamian, Y.♯, **Jaffe, K.E.**, & Minier, D. "Effects of complex feeding enrichment on the behavior of captive Malayan sun bears at Oakland Zoo," 2020 Animal Behavior Society Virtual Conference, July 28-31, 2020. (Virtual Oral Presentation)

Barber, J.♯, Minier, D., **Jaffe, K.E.**, Salonga, V., Ghavamian, Y.Δ & Humphrey, E.Δ "Food distribution as a form of enrichment for captive sun bears." Presented at 3rd International Symposium on Zoo Animal Welfare at Brookfield Zoo, Chicago, IL, October 8-10, 2017. (Poster)

Radosevich, L.M.♯, **Jaffe, K.E.**, Minier, D., Clack, W.Δ & Gretler, K.Δ "Centrality and social power: Individual roles in social network of a group of hamadryas baboons (*Papio hamadryas*). Presented at the 40th Meeting of the American Society of Primatologists in Washington, D.C., August 25-28, 2017. (Oral)

Cornelius, N.♯, **Jaffe, K.E.**, Minier, D., Henderson, C.Δ, Volkov, W.Δ, & Mrsny, A. "Increasing captive chimpanzee (*Pan troglodytes*) engagement with multi-step cognitive enrichment." Presented at the 40th Meeting of the American Society of Primatologists in Washington, D.C., August 25-28, 2017. (Poster)

Wilson, P.J.♯, **Jaffe, K.E.**, & Minier, D. "The use of smart feeders to understand reward predictability and activity levels in captive lemurs and zoo visitor interest." Presented at the 2016 Association of Zoos and Aquariums Annual Conference in San Diego, CA, September 7-11, 2016. (Poster)

Williams, D.R.Δ & **Jaffe, K.E.** "Female-female competition in zoo living mandrills (*Mandrillus sphinx*): effects of dominance rank and reproductive state." Presented at the 38th Meeting of the American Society of Primatologists in Bend, OR, June 17-20, 2015. (Oral)

Jaffe, K.E. & Isbell, L.A. "Observations on a group of wild vervet monkeys (*Cercopithecus aethiops*) after a predator-induced group fusion event in Laikipia, Kenya." Presented at the 32nd Annual Meeting of the American Society of Primatologists in San Diego, CA, September 18-21, 2009. (Oral)

Brown, M.K.Δ & **Jaffe, K.E.** "Reversal of fortune: A study of dominance hierarchy in a captive troop of mandrills (*Mandrillus sphinx*)." Presented at the 32nd Annual Meeting of the American Society of Primatologists in San Diego, CA, September 18-21, 2009. (Oral)

Enstam, K.L. "Predation and anti-predator behavior in Old World Monkeys (Superfamily: Cercopithecoidea): The effects of habitat structure on perceived risk of predation as exemplified by vervet (*Cercopithecus aethiops*) and patas (*Erythrocebus patas*) monkeys." Presented at the 21st Congress of the International Primatological Society in Entebbe, Uganda, June 25-30, 2006. (Oral)

Enstam, K.L. & Isbell, L.A. "Predation risk and habitat structure affect habitat preference and vertical use of space by wild patas monkeys (*Erythrocebus patas*)." Presented at the 72nd Annual meeting of the American Association of Physical Anthropologists in Phoenix, Arizona, April 23-26, 2003. (Oral)

Enstam, K.L. & Isbell, L.A. "Changes in visibility affect ranging behavior and vigilance in vervet monkeys (*Cercopithecus aethiops*)." Presented at the 71st Annual Meeting of the American Association of Physical Anthropologists in Buffalo, New York, April 10-13, 2002. (Oral)

Enstam, K.L. & Isbell, L.A. "Correlations between habitat structure and diurnal anti-predator behavior of sympatric vervet (*Cercopithecus aethiops*) and patas (*Erythrocebus patas*) monkeys in Laikipia, Kenya." Presented at the 18th Congress of the International Primatological Society in Adelaide, South Australia, January 7-12, 2001. (Oral)

Select External Grants

2019 Experiment.com Crowdfunding Campaign ($5,000): "Does increasing enrichment complexity for bears encourage them to work harder for their food?" *Winner of the AZA Grant Challenge ($1,000 award to the campaign) (co-PIs: D. Minier and Y. Ghavamian♯)

2015 Experiment.com Crowdfunding Campaign ($2,584): "Using smart feeders to increase lemur activity and stimulate human interest" (co-PIs: D. Minier and P. Wilson♯)

2015 International Primatological Society Captive Care Grant ($1,500): "An applied ethological study of the potential for former laboratory squirrel monkeys to be successfully retired to the San Francisco Zoo"

1999 National Science Foundation Dissertation Improvement Grant ($12,000): "Influences of micro-ecology on behavioral responses to perceived risk of predation in sympatric vervet and patas monkeys" (co-PI: L.A. Isbell)

APPENDIX XVII- 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

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

2020 - present Professor of Biology, Sonoma State University
2015 - 2020 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 Univ. 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 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. My lab utilizes both purified recombinant proteins as well as cultured immune cells to investigate this poorly understood regulatory mechanism.

2004 to 2009 Washington Univ. in St. Louis, School of Medicine
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: Activation of the Protein Tyrosine Kinase, Itk.

APPENDIX XVII- Joseph Lin

1995 to 1996 The Scripps Institution of Oceanography
Advisor: Paul Dayton Ph.D.
Research project: Larval Settlement and Growth Studies of *S. purpuratu*s and *S. franciscanus*

Publications

1. Álvarez L, Suarez Vega V, McGinity C, Khodade VS, Toscano JP, Nagy P, **Lin J**, Works C, and Fukuto JM. (2020). The Reactions of Hydropersulfides (RSSH) with Myoglobin. *Arch Biochem Biophys.* Jul 15, 687:108391.

2. Fukuto JM, **Lin J,** Khodade VS, Toscano JP. (2020) Predicting the Possible Physiological/Biological Utility of the Hydropersulfide Functional Group Based on Its Chemistry: Similarities Between Hydropersulfides and Selenols. *Antioxid Redox Signal.* 33(18):1295-1307.

3. Henderson CF, Bica I, Long F, Irwin D, Stull CH, Baker BW, Suarez Vega V, Taugher ZM, Fletes ED, Bartleson JM, Humphrey ML, Álvarez L, Akiyama M, Kumagai Y, Fukuto JM, and **Lin J.** (2020) Cysteine Trisulfide Protects *E. coli* from Electrophile-Induced Death Through the Generation of Cysteine Hydropersulfide. *Chem Res Toxicol.* 33(2):678-686.

4. Kamennaya N, Gray J, Ito S, Kainuma M, Nguyen MV, Khilyas IV, Birarda G, Bernie F, Hunt M, Vasadia D, **Lin J**, Holman HY, Torok T, Cohen MF. (2020) Deconstruction of plant biomass by a Cellulomonas strain isolated from an ultra-basic (lignin-stripping) spring. *Archives of Microbiology*. In press.

5. Fukuto JM, Vega VS, Works C, and **Lin J.** (2020) The chemical biology of hydrogen sulfide and related hydropersulfides: interactions with biologically relevant metals and metalloproteins. *Curr Opin Chem Biol.* 55:52-58.

6. **Lin J**, Akiyama M, Bica I, Long FT, Henderson CF, Goddu RN, Suarez V, Baker B, Ida T, Shinkai Y, Nagy P, Akaike T, Fukuto JM, and Kumagai Y. (2019) The Uptake and Release of Polysulfur Cysteine Species by Cells: Physiological and Toxicological Implications. *Chem Res Toxicol.* 32(3):447-455.

7. Goddu RN, Henderson CF, Young AK, Muradian BE, Calderon L, Bleeg LH, Fukuto JM, and **Lin J**. (2018) Chronic Exposure of the RAW246.7 Macrophage Cell Line to H2O2 Leads to Increased Catalase Expression. *Free Radic Biol Med.* 126:67-72.

8. Bianco CL, Akaike T, Ida T, Nagy P, Bogdandi V, Toscano JP, Kumagai Y, Henderson CF, Goddu RN, **Lin J**, Fukuto JM. (2018) The Reaction of Hydrogen Sulfide with Disulfides: Formation of a Stable Trisulfide and Implications to Biological Systems. *Br J Pharmacol*. May 29.

9. Fukuto JM, Ignarro LJ, Nagy P, Wink DA, Kevil CG, Feelisch M, Cortese-Krott MM, Bianco CL, Kumagai Y, Hobbs AJ, **Lin J**, Ida T, Akaike T. (2018) Biological hydropersulfides and related polysulfides - a new concept and perspective in redox biology. *FEBS Lett.* 592(12):2140-2152.

10. Alvarez L, Bianco CL, Toscano JP, **Lin J,** Akaike T, Fukuto J. (2017) The Chemical Biology of Hydropersulfides and Related Species: Possible Roles in Cellular Protection and Redox Signaling. *Antioxid Redox Signal.* 27(10):622-633.

11. Millikin R, Bianco CL, White C, Saund SS, Henriquez S, Sosa V, Akaike T, Kumagai Y, Soeda S, Toscano JP, **Lin J**, Fukuto JM. (2016) The chemical biology of protein hydropersulfides: Studies of a possible protective function of biological hydropersulfide generation. *Free Radic Biol Med.* 97:136-147.

12. 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.

13. 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.

14. 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 H_2S, Hydropersulfides and Derived Species: Implications to Their Possible Biological Activity and Utility. *Free Radic Biol Med.* 77C: 82-94.

15. 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 H_2O_2 metabolism and possible mechanism of HNO signaling. *Arch. Biochem. Biophys.* 538: 120-129.

16. 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.

17. 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.

18. 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.

19. **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.

20. **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.

21. **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.

22. 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.

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24. 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.

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26. **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.

27. **Lin, J.**, and Shaw, A. S. (2005). Getting downstream without a raft. *Cell*. 121:815-816.

28. **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.

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32. 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.

33. 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.

34. **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.

35. 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.

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37. **Lin, J.**, and Weiss, A. (2001). T cell receptor signalling. *J Cell Sci.* 114:243-244.

38. Tomlinson, M. G., **Lin, J.**, and Weiss, A. (2000). Lymphocytes with a complex: adapter proteins in antigen receptor signaling. *Immunol Today.* 21:584-591.

39. Kane, L. P., **Lin, J.**, and Weiss, A. (2000). Signal transduction by the TCR for antigen. *Curr Opin Immunol.* 12:242-249.

40. **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.

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

Murali C. Pillai, PhD

[Currently Participating in Faculty Early Retirement Program]

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:

2017-present: Professor in FERP, Department of Biology, Sonoma State University
2014-2017 Chair, Department of Biology, Sonoma State University
1994-present Assistant, Associate and Professor of Biology, Sonoma State University
2010-2016 Member, Faculty Consensus Group, California State University Program for Education and Research in Biotechnology (CSUPERB)
2013-2015 CSU Council on Ocean Affairs, Science and Technology (COAST)
2001-2014 Director, Health Professions Advisory Program, Sonoma State University
1992-2017 Faculty 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
2009 Keynote Speaker, International Conference on Environmental Biotechnology, Vellore Institute of Technology, Vellore, India
2003 Visiting Professor, University of Tokyo, Japan
2003 Instructor, International Course in Developmental Biology, Univ of Tokyo
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 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 pallasi*. 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, *Crassostra 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 Publicatio*n. pp. 8-9.
- 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. Yanagimaci and Cherr, G.N. 1994. *In Vivo* and *in vitro* initiation of sperm motility using fresh and cryopreserved gametes from the Pacific herring, *Clupea pallasi*. *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.
- 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.
- Pillai, M.C. and Clark, W.H., Jr. 1990. Development of cortical vesicles in *Sicyonia ingentis* ova: Their heterogeneity and role in elaboration of the hatching envelope. *Molecular Reproduction and Development,* 26: 78-89.
- Pillai, M.C. and Clark, W.H., Jr. 1990. Hatching envelope formation in shrimp (*Sicyonia ingentis*) ova: origin and sequential exocytosis of cortical vesicles. *Tissue & Cell* 20: 941-952.
- Pillai, M.C., Griffin, F.J. and Clark, W.H., Jr. 1988. Induced spawning in the marine shrimp, *Sicyonia ingentis*. *Biological Bulletin*, 174:181-185.
- Pillai, M.C. and Clark, W.H., Jr. 1987. Oocyte activation in the marine shrimp, *Sicyonia ingentis*. *Journal of Experimental Zoology*, 244: 325-330.

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 324/349, Animal Physiology
BIOL 344, Cell Biology
BIOL 390, Biology Colloquium
BIOL 372/472, Developmental Biology
BIOL 500S, Graduate Seminars
BIOL 544, Advanced Cell Biology
BIOL 595, Graduate Independent Studies
BIOL 599, M.A. Thesis

APPENDIX XVII- Sean Place

SEAN P. PLACE
Associate Professor, Department of Biology, Sonoma State University
1801 E. Cotati Ave.
Rohnert Park, CA 94928
places@sonoma.edu

Expertise
Dr. Place is a functional genomicist that focuses on the molecular, cellular and biochemical pathways utilized by organisms to cope with both acute and chronic perturbations by measuring the gene level response. Currently, my interests are centered around the genome-wide response of marine organisms to multiple stressors such as seasonal changes in habitat temperature, oxygen levels and environmental pH. By analysis of these pathways, I aim to better understand how stress-response pathways, cellular energy demands, and cell-cycle control integrate to determine the limits of physiological plasticity.

Professional Preparation

University of New Mexico, Albuquerque, NM	Biology	B.S.,	1998
University of California, Santa Barbara, CA	Comparative Physiology	Ph.D.,	2005
Mayo Clinic, Scottsdale, AZ	Biochemistry & Molecular Biology	Postdoctoral Fellow	2005 – 2006
University of California, Santa Barbara, CA,	Molecular, Cell & Developmental Biology	NRSA Fellow	2007 – 2008

Appointments
Associate Professor, Sonoma State University, August 2017 - present
Research Development Associate, Sonoma State University, 2017-2019
Assistant Professor, Sonoma State University, August 2014- 2016
Assistant Professor, University of South Carolina, January 2009 – August 2014
Adjunct Assistant Professor, University of South Carolina July 2008 – December 2008
NIH Postdoctoral Research Fellow, UC Santa Barbara, 2007 – 2008
Postdoctoral Research Fellow, Mayo Clinic, Scottsdale, 2005 – 2006

Recent Products **(‡graduate student):**

‡Tercero, AD and **Place, SP** (2020). Characterizing Gene Copy Number of Heat Shock Protein Gene Families in the Emerald Rockcod, *Trematomus bernacchii*. *Genes*, *11*, 867. https://doi.org/10.3390/genes11080867

‡Bogan, SN and **Place, SP** (2019). Accelerated evolution at chaperone promoters among Antarctic notothenioid fishes. BMC Evol. Biol. https://doi.org/10.1186/s12862-019-1524-y

Tolomeo, AM, Carraro, A, Bakiu, R, Toppo, S, Garofalo, F, Pellegrino, D, Gerdol, M, Ferro, D, **Place, SP,** Santovito, G (2019). Molecular characterization of novel mitochondrial peroxiredoxins from the Antarctic emerald rockcod and their gene expression in response to environmental warming. Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology. 225: https://doi.org/10.1016/j.cbpc.2019.108580.

‡Vasadia, DJ, Zippay, ML, **Place, SP** (2019). Characterization of thermally sensitive miRNAs reveals a central role of the FoxO signaling pathway in regulating the cellular stress response of an extreme stenotherm, Trematomus bernacchii. Marine Genomics. DOI: 10.1016/j.margen.2019.100698.

‡Enzor, LA, EM Hunter, **Place, SP** (2017). The effects of elevated temperature and ocean acidification on the metabolic pathways of notothenioid fish. Conserv Physiol. 5 (1): cox019. DOI: 10.1093/conphys/cox019.

‡Huth, TJ and **Place, SP** (2016) RNA-seq reveals a diminished acclimation response to the combined effects of ocean acidification and elevated seawater temperature in Pagothenia borchgrevinki. Marine Genomics. DOI: 10.1016/j.margen.2016.02.004

Grants & Awards in Support of Research

Active/ Awarded

National Science Foundation – Polar Programs: 1443289 $618,260 (PI) 8/1/16-7/31/21 "RUI: Characterizing the regulatory mechanisms controlling molecular chaperone expression and the impact ocean warming will have on protein homeostasis in *Trematomus bernacchii*".

CSU Council on Ocean Affairs, Science and Technology – Grant Development Program $19,992 (PI). 07/1/18 – 12/30/20. "Profiling the methylation landscape of Mytilus californianus genomes"

Completed

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".

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?"

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".

Professional Activities & Service

National Service

Associate Editor –	BMC Genomics
Review Panel Member –	NSF, Integrative Organismal Systems
	NSF, Office of Polar Programs
NOAA Panel Member –	Ocean Acidification Data Management Integration Workshop
External Reviewer –	National Science Foundation
External Reviewer –	Netherlands Organization for Scientific Research – Division of Earth and Life Sciences

Reviewer for professional journals: Antarctic Science, Comparative Biochemistry and Physiology, Journal of Experimental Biology, Physiological and Biochemical Zoology, Journal of Experimental Marine Biology and Ecology, Journal of Environmental Science and Technology, Molecular Ecology

APPENDIX XVII- Nathan Rank

Nathan Egan Rank
Curriculum Vitae

Expertise — Population and evolutionary genetics and genomics; evolutionary ecology; plant-herbivore enemy and plant-pathogen interactions; co-evolution

Appointments

2005-	Professor, Department of Biology, Sonoma State University
2011-2014	Professor and Chair, Department of Biology, Sonoma State University
2000-2008	Director of Fairfield Osborn Preserve, Sonoma State University
1999-2004	Associate Professor, Department of Biology, Sonoma State University
1995-1999	Assistant Professor, Department of Biology, Sonoma State University
l992-1995	Assistant Professor, Group of Experimental Ecology, Swiss Federal Institute of Technology-Zurich
l990-1992	Post-doctoral Fellow, Laboratory of Animal Biology, Free University of Brussels, Belgium and Zoological Institute of the University of Basle, Switzerland

Education

PhD. 1993	University of California-Davis (Zoology)
B.A. l983	Kalamazoo College, Kalamazoo, Michigan (Biology)

Awards and Fellowships

2011	Goldstein Award for Excellence in Scholarship, Sonoma State University.
1991-1992	NSF-NATO Postdoctoral Fellow, Free University of Brussels, Belgium.
1990-1991	NSF-Postdoctoral Fellow, Long and Medium-term Research at Foreign Centers of Excellence (University of Basle, Switzerland; Free University of Brussels, Belgium.
1990	Merton Love Award, best dissertation research, UC-Davis Ecology and Evolution
1988-1990	Regent's and Storer Fellowship, University of California-Davis
1986	Steinhouse Teaching Award, University of California-Irvine
l983-1984	Regent's Fellowship, University of California-Irvine
1979-1983	Heyl Scholarship for undergraduate study, Kalamazoo College

Refereed publications[*]

1) **Rank, N. E.,** P. Mardulyn, S. J. Heidl, K. T. Roberts, N. A. Zavala and E. P. Dahlhoff. 2020. Mitonuclear interactions influence performance and reproductive characters in a montane leaf beetle. *Evolution* 74(8): 1724-1740. **https://doi.org/10.1111/evo.13962 1**
2) Yuzon, J.D., Travadon, R., Malar C, M., Tripathy, S., **Rank, N**., Mehl, H.K., Rizzo, D.M., Cobb, R., Small, C., Tang, T., McCown, H.E., Garbelotto, M., Kasuga, T. 2020. Asexual evolution and forest conditions drive genetic parallelism in *Phytophthora ramorum*. *Microorganisms* 8: 940. **0**
3) Dahlhoff E. P., V. C. Dahlhoff, C. A. Grainger, N. A. Zavala, D. Otepola-Bello, K. T. Roberts, S. J. Heidl, B. A. Sargent, J. T. Smiley and **N. E. Rank**. 2019. Getting chased up the mountain-high elevation may limit performance and fitness characters in a montane insect. *Functional Ecology* 33(5): 809-818. **https://doi.org/10.1111/1365-2435.13286 8**
4) Wininger, K. and **N. E. Rank.** 2017. Evolutionary dynamics of interactions between plants and their enemies: comparison of herbivorous insects and pathogens. *Annals of the New York Academy of Sciences* 1408(1): 46-60.

5) Haas, S., J. H. Cushman, W. W. Dillon, **N. E. Rank**, D. M. Rizzo and R. K. Meentemeyer. 2016. Effects of individual, community and landscape drivers on the dynamics of a wildland forest epidemic. *Ecology* 97(3): 649-660. **20**

*Times cited (in bold) from Google Scholar 9/13/20.

6) Zvereva, E. L., M. V. Kozlov and **N. E. Rank**. 2016. Does ant predation favor leaf beetle specialization on toxic host plants? *Biological Journal of the Linnean Society* 119(1): 201-212. **4**
7) 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* 106(1): 47-55. **6**
8) Boychuk, E. C., J. T. Smiley, E. P. Dahlhoff, M. A. Bernards, **N. E. Rank** and B. J. Sinclair. 2015. Cold tolerance of the montane Sierra leaf beetle, *Chrysomela aeneicollis*. *Journal of Insect Physiology* 81: 157-166. **13**
9) Dellicour, S., S. L. Fearnley, A. Lombal, S. J. Heidl, E. P. Dahlhoff, **N. E 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. **19**
10) Dick, C. A., **N. E. Rank,** M. McCarthy, S. McWeeney, D. Hollis and E. P. Dahlhoff. 2013. Effects of temperature variation on male behavior and mating success in a montane beetle. *Physiological and Biochemical Zoology* 86(4): 432-440. **14**
11) Meentemeyer, R. K., **N. E. Rank**, D. Shoemaker, C. Oneal, D.M. Rizzo. 2008. Impacts of sudden oak death on tree mortality in the Big Sur ecoregion of California. *Biological Invasions* 10(8): 1243-1255. **112**
12) Dahlhoff, E. P., S. L. Fearnley, D. A. Bruce, A. G. Gibbs, R. Stoneking, D. M. McMillan, K. Deiner, J. T. Smiley and **N. E. 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* Special issue: "Predicting Extinction: Investigating the Interface of Physiology, Ecology, and Climate Change." 81(6): 718-732. **53**
13) Meentemeyer, R. K., **N. E. Rank**, B. L. Anacker, D. M. Rizzo and J. H. Cushman. 2008. Influence of land-cover change on the spread of an invasive forest pathogen. *Ecological Applications* 18(1): 159-171. **91**
14) Otto, S. B., E. L. Berlow, **N. E. Rank**, J. T. Smiley and U. Brose. 2008. The diversity and identity of predators drive interaction strengths and trophic cascades in a montane food web. *Ecology* 89(1): 134-144. **101**
15) Anacker, B. L., **Rank, N. E.**, D. Huberli, M. Garbelotto, S. Gordon, R. Whitkus, T. Harnik, M. Meshriy and R. K. Meentemeyer. 2008. Susceptibility to *Phytophthora ramorum* in a key inoculum-producing host: influences of landscape variation in host genotype, phenotype, and environmental factors. *New Phytologist* 177(3): 756-766. **52**
16) Dahlhoff, E. P. and **N. E. Rank**. 2007. The role of stress proteins in responses of a montane willow leaf beetle to environmental temperature variation. *Journal of Biosciences* 32(3): 477-488. **82**
17) **Rank, N. E**., D. A. Bruce, D. M. McMillan, C. Barclay and E. P. 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(5): 750-764. **59**

18) **Rank, N. E.**, K. Yturralde and E. P. Dahlhoff. 2006. Role of contests in the scramble competition mating system of a leaf beetle. *Journal of Insect Behavior* 19(6): 699-716. **16**
19) McMillan, D. M., S. L. Fearnley, **N. E. Rank** and E. P. Dahlhoff. 2005. Natural temperature variation affects larval survival, development, and Hsp70 expression in a leaf beetle. *Functional Ecology* 19(5): 844-852. **73**
20) Zvereva, E. L. and **N. E. Rank**. 2004. Fly parasitoid *Megaselia opacicornis* uses defensive secretions of a leaf beetle *Chrysomela lapponica* for host location. *Oecologia* 140(3): 516-522. **33**
21) Garcia-Rossi, D., **N. E. Rank**, and D. R. Strong. 2003. Potential for self-defeating biological control? Variation in herbivore vulnerability among invasive *Spartina* genotypes. *Ecological Applications* 13(6): 1640-1649. **61**
22) Neargarder, G. G., E. P. Dahlhoff and **N. E. Rank**. 2003. Variation in thermal tolerance and HSP70 expression is linked to phosphoglucose isomerase genotype in a montane leaf beetle. *Functional Ecology* 17(2): 213-221. **65**
23) Zvereva, E.L. and **N. E. Rank**. 2003. Host plant effects on parasitoid attack on the leaf beetle *Chrysomela lapponica*. *Oecologia* 135(2): 258-267. **54**
24) **Rank, N. E.** and E. P. Dahlhoff. 2002. Allele frequency shifts in response to climate change and physiological consequences of allozyme variation in a montane insect. *Evolution* 56(11): 2278-2289. **108**
25) Sears, A. L. W., J. T. Smiley, M. Hilker, F. Muller and **N. E. Rank**. 2001. Nesting behavior and prey use in two geographically separated populations of the specialist wasp *Symmorphus cristatus* (Vespidae: Eumeninae). *American Midland Naturalist* 145(2): 233-246. **37**
26) Dahlhoff, E. P. and **N.E. Rank**. 2000. Functional and physiological consequences of genetic variation at phosphoglucose isomerase: Heat shock protein expression is related to enzyme genotype in a montane beetle. *Proceedings of National Academy of Sciences* 97(18): 10056-10061. **151**
27) Anttila, C. K., C. C. Dahler, **N. E. Rank**, and D. R. Strong. 1998. Greater male fitness of a rare invader (*Spartina alterniflora*, Poaceae) threatens a common native (*Spartina foliosa*) with hybridization. *American Journal of Botany* 85(11): 1597-1601. **174**)
28) Köpf, A., **N. E. Rank**, H. Roininen, R. Julkunen-Tiitto, J. M. Pasteels and J. Tahvanainen. 1998. The evolution of host plant use and sequestration in the leaf beetle genus *Phratora* (Coleoptera: Chrysomelidae). *Evolution* 52(2): 517-528. **69**
29) **Rank, N. E**., A. Köpf, R. Julkunen-Tiitto and J. Tahvanainen. 1998. Host preference and larval performance of the salicylate-using leaf beetle *Phratora vitellinae. Ecology* 79(2): 618-631. **102**
30) Köpf, A., **N. E. Rank**, H. Roininen and J. Tahvanainen. 1997. Defensive larval secretions of leaf beetles attract a specialist predator *Parasyrphus nigritarsis*. *Ecological Entomology* 22(2): 176-183. **46**
31) Köpf, A., **N. E. Rank**, and H. Roininen. 1996. Geographic variation in feeding and mating preferences in the *Phratora tibialis* complex**.** *Entomologia Experimentalis et Applicata* 80: 311-314. **7**
32) **Rank, N. E**. 1994. Host plant effects on larval survival in a salicin-using leaf beetle *Chrysomela aeneicollis* Schaeffer (Coleoptera: Chrysomelidae). *Oecologia* 97(3): 342-353. **40**
33) **Rank, N. E**. and J. T. Smiley. 1994. Host-plant effects on *Parasyrphus melanderi* (Diptera: Syrphidae) feeding on a willow leaf beetle *Chrysomela aeneicollis* (Coleoptera: Chrysomelidae). *Ecological Entomology* 19(1): 31-38. **35**
34) Rank, N. E. 1992. A hierarchical analysis of genetic differentiation in a montane leaf beetle (*Chrysomela aeneicollis*). *Evolution* 46: 1097-1111. **86**

35) **Rank, N. E**. 1992. Host plant preference based on salicylate chemistry in a willow leaf beetle (*Chrysomela aeneicollis*). *Oecologia* 90: 95-101. **91**
36) Smiley, J. T. and **N. E. Rank** 1986. Predator protection versus rapid growth in a montane leaf beetle. *Oecologia* 70: 106-112. **34**
37) Smiley, J. T., J. M. Horn and **N. E. Rank** 1985. Ecological effects of salicin at three trophic levels: new problems from old adaptations. *Science* 229: 649-651. **119**

Review articles and book chapters

38) **Rank, N. E.** and E. P. Dahlhoff. 2017. Exploring evolution by studying beetles living on the edge. *Scientia* 109: 95-98. http://www.scientiapublications.com/professor-nathan-e-rank-professor-elizabeth-p-dahlhoff-science-diffusion.
39) Dahlhoff, E. P. and **N. E. Rank.** 2015. Sierra Nevada willow-leaf beetles help to unlock secrets of climate change. *White Mountain Research Center Newsletter.*
40) Baur, R. and **N. E. Rank**. 1996. Influence of host quality and natural enemies on the life history of the alder leaf beetles *Agelastica alni* and *Linaeidea aenea*. *Chrysomelidae Biology,* P.H.A. Jolivet and M. Cox, editors. 2: 173-194. **25**
41) **Rank, N. E**., J. T. Smiley and A. Köpf. 1996. Natural enemies and host plant relationships for leaf beetles (Chrysomelinae) feeding on Salicaceae and Betulaceae. *Chrysomelidae Biology*, P.H.A. Jolivet and M. Cox, editors. 2: 147-172. **35**
42) Smiley, J. T. and **N. E. Rank** 1991. Bitterness of *Salix* along the north fork of Big Pine Creek, Eastern California: species and community elevational trends. In *The Natural History of Eastern California and High Altitude Research, UC WMRS.* 3: 132-147. **5**
43) **Rank, N. E.** 1991. Effects of plant chemical variation on a specialist herbivore: willow leaf beetles in the Eastern Sierra Nevada. In *The Natural History of Eastern California and High Altitude Research, UC WMRS.* 3: 161-181. **6**

*Times cited (in bold) from Google Scholar 9/13/20.

Manuscripts in preparation

- **Rank, N. E.,** B. Zhang, A. Dupluoy, J. S. Deyarmin, N. L. P. Keehnen, K. T. Roberts, S. Weisselberg, E. P. Dahlhoff and C. W. Wheat.. The endosymbiont *Wolbachia* alters effects of thermal stress on mitonuclear interactions in a montane insect herbivore.
- Dahlhoff, E. P., S. J. Heidl, W. A. Reynier, J. T. Smiley and **N. E. Rank**. Predator-prey interactions are modulated environmental stress in montane insect populations.
- Rocereto, S. K., J. B. Whittall, C. W. Wheat, **N. E. Rank** and E. P. Dahlhoff. Non-synonymous variation at a metabolic enzyme locus under purifying selection.

Invited symposia and seminars (past 5 years)

- **Rank, N.E.** Is the insect apocalypse real? Pacific Coast Entomological Society (12/19). Also given at Sonoma State University Department of Biology (2/20) and to community groups.
- **Rank N. E.** and E. P. Dahlhoff. Mito-nuclear interactions influence performance and fitness characters along elevation gradients in a montane insect. In- *Mitochondria, Metabolism, and Homeostasis: from molecular mechanisms to societies.* Entomological Society of America Annual Meeting, Denver, CO USA (11/17)
- Dahlhoff E. P. and **N.E. Rank**. Getting chased up the mountain: Physiological consequences of a life at high elevation. *Watt Festschrift- A celebration of the science and mentorship of Professor Ward Watt.* Rocky Mountain Biological Laboratories, Crested Butte, CO USA (8/17).

- **Rank, N. E.** and E. P. Dahlhoff. Mitonuclear interactions influence cold and heat tolerance along elevation gradients in a montane insect. In- *Hot and cool bugs: Energetics and thermal tolerances of insects in an ecological context.* American Association for the Advancement of Science (Pacific Division) Annual Meeting, San Francisco, CA USA (11/15)
- Other invited seminars- National Science Foundation (2017); Dept. of Biology, Santa Clara University (2017). Dept. of Organismal & Evolutionary Biology, University of Helsinki (2016); Dept. of Zoology, Stockholm University (2016)

Presentations at scientific meetings (past 5 years; presenting author(s) listed)

- *Society of Integrative and Comparative Biology:* 2020 (Austin, TX)- 2 posters; 2019 (Tampa, FL USA)- 1 talk (N. E. Rank); 2018 (San Francisco, CA USA)- 2 talks (K. T. Roberts, B. Zhang), 2 posters (H. M. Boyden, B. A. Sargent); 2017 (New Orleans, LA USA)- 1 talk (K. T. Roberts); 2016 (Portland, OR USA)- 1 talk (K. T. Roberts) 2 posters (J. S. Deyarmin; V. C. Dahlhoff and C. A. Grainger); 2015 (Austin, TX USA)- 1 talk (K. T. Roberts), 1 poster (J. M. Sayre).
- *American Physiological Society, Comparative Physiology*: 2018 (New Orleans, LA USA)- 1 talk (K. T. Roberts); 2014 (San Diego, CA USA)- 1 talk (N. E. Rank)
- *International Symposium on the Environmental Physiology of Ectotherms and Plants:* 2019 (Buenos Ares, Argentina)- 1 talk (K. T. Roberts); 2015 (Aarhus, Denmark)- 1 talk (N. E. Rank).
- *California State University Program for Research in Biotechnology* (Santa Clara, CA USA): 2018- 1 poster (N. Michel); 2015- 2 posters (B. Zhang, J. S. Deyarmin); 2014- 2 posters (R. A. Regello, J. M. Sayre).

Broader research impacts

- My research has been disseminated through segments in local and national television media and newspaper including the Emmy-award winning documentary *In the Shadow of White Mountain* (https://www.youtube.com/watch?v=3afcsVegPOs&feature=youtu.be).
- Work is featured in UC Berkeley's 'Understanding Evolution' program, used by K-12 educators nationwide (https://evolution.berkeley.edu/evolibrary/teach/lessons/beetle-project-overview.php).
- Evolutionary philosophers consider the research that I have conduced on Sierra leaf beetles to provide a "classic" example of an ecological explanation of adaptation and natural selection. (Millstein, R. L. 2006. Natural selection as a population-level causal process. *British Journal for the Philosophy of Science.* 57(4): 627-653. **142** (2.1).

Grants (past 10 years)

- California Conservation Genomics Program. *Genomic diversity among California populations of a leaf beetle*. PI Caroline Williams. Co-PIs: Doris Bachtrog, N.E. Rank, and E.P. Dahlhoff. **$49,860** plus c.a. $**10,000** for construction of high quality reference genome (5/20-5/21).
- National Science Foundation (NSF). Integrative Organismal Systems, Ecological and Evolutionary Physiology. *Physiological and genetic responses to winter in a willow leaf beetle.* C. M. Williams (co-PIs: J. T. Stillman, **N. E. Rank** and E. P. Dahlhoff) **$750,102** (5/16-4/21).
- NSF. Integrative Organismal Systems, Ecological and Evolutionary Physiology. *Adaptive significance of genomic variation in a montane insect*. E. P. Dahlhoff and **N. E. Rank** (Sr. Scientist C. W. Wheat). **$843,224** (5/15-4/21).

- California State Univ. Program in Education and Research in Biotechnology. *Evolutionary significance of variation at metabolic enzyme proteins.* **N. E. Rank**. **$25,000** (1/13-6/15)
- NSF. Environmental Biology, Population Dynamics. *Ecological and evolutionary responses to environmental change in Sierra Nevada populations of a montane willow beetle.* E. P. Dahlhoff and **N. E. Rank** (Sr. Scientist J. T. Smiley). **$762,437** (2/09-7/15).
- Wenner-Gren Foundation, Sweden. Genes associated with thermal adaptation in a montane leaf beetle. **N. E. Rank**. **$80,000 SKr** (8/16-12/16).
- NSF. Undergraduate Education. S^3: STEPping up STEM at SSU. L. Stauffer, L. Cominsky, C. Luke, J. Qualls and **N. E. Rank**. **$994,826** (8/11-7/16).

Teaching and curriculum development

Courses taught (Undergraduate courses once per year for past five years)

Title	Student target population	Enrollment
Science 120: A Watershed Year	First year seminar, non-STEM major	50
Ecology and Evolution, an Integrated approach	BA/BS Biology and related majors	120
Entomology	BA/BS Biology and related majors	40
Graduate seminar: Adaptation	MS Biology	7
Graduate seminar: Grand Challenges in Biology	MS Biology	17

I have also taught biometry, genetics, introductory biology, evolution, and graduate seminars.

Curriculum development and outreach

- I was a PI on a grant from NSF designed to innovate STEM curriculum for students not interested in pursuing STEM careers. I am a founding member of the teaching team and continue to teach the course we developed, *Science 120*, using best practices in undergraduate science education (e.g. active and hands-on learning, group work, regular feedback). For information, see https://contentbuilder.merlot.org/toolkit/html/snapshot.php?id=72153204932952
- Biological Diversity Outreach- I developed and still coordinate this program. Thousands of members of the public and elementary school students have participated in events and observed displays presented by SSU students as part of this program.
- Director of Fairfield Osborn Preserve (2000-09). I promoted the Preserve as center for education and research and identified funding sources to enhance educational programs.

Major Academic Service

- *Department of Biology.* Department Chair- facilitated major curriculum revision and improved department review procedures for admission (8/11-7/14). Department Committees- I have served on and chaired departmental committees including Reappointment, Tenure and Promotion, Curriculum, Budget and Space, Graduate Student, Collections, and Education and Outreach. Graduate committees- I have served on 18 MS thesis committees and 26 examinations for advancement to candidacy.
- *School of Science and Technology.* School Curriculum committee (8/11-7/15; Chair 2014-15); School Reappointment, Tenure and Promotion, which evaluates sabbatical requests, reappointment, tenure and promotion files from across disciplines in school (8/05- 7/08).
- *University.* University Reappointment, Tenure and Promotion (1/19-12/19; 8/09-7/12; Chair 2011-12); University Studies (8/15-7/17; Chair 2016-17); committee oversees development and review of first year seminars and interdisciplinary programs; Educational Policies Committee. (8/13-7/16); committee oversees curriculum development and review across the University. General Education Committee (8/04-7/09; Chair 2006-09). I led the first program review of the

- General Education curriculum and participated in statewide and national meetings concerning undergraduate education. Faculty Housing Committee (8/99-7/09); Academic Senate (8/97-7/99).
- *External reviewer for Department of Biology, San Jose State University*- Involved a two-day site visit and writing final report covering all aspects of department administration (13 pages; 2014).
- *Grant Reviews*- I regularly serve on grant review panels at the National Science Foundation. I served on an IUSE panel (2016), S-STEM panel (2019) and 4 panels for Population and Community Ecology, Division of Environmental Biology (2013, 2014, 2015, 2010). I also regularly *ad hoc* review for NSF, CSUPERB, and other agencies.

Manuscript reviews- I review 4-6 manuscripts per year from major peer-reviewed journals, including: *American Naturalist, Ecology, Evolution, Journal of Experimental Biology, Molecular Ecology and Proceedings of the National Academy of Sciences.*

APPENDIX XVII- 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

Assoc. Dean, School of Science and Technology, Fall 2020
Chair, Dep. of Biology, 2017-2020
Biology Undergraduate Program Review Coordinator, 2016-17
Interim Associate Vice President for Academic Programs 2015 to 2016
Director of Academic Planning and Resources, School of Science and Technology, 2012 to 2015
Chair, Dept. of Biology, 2008 to 2011
Professor, Dept. of Biology, 2003 to present
Biology Graduate Program Coordinator, 2000 to 2006
Associate Professor, Dept. of Biology, 1999 to 2003

AMERICAN ASSOCIATION FOR THE ADVACEMENT OF SCIENCE

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

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Assistant Professor of Botany and Assistant Botanist, Dept. of Botany and Plant Sciences, 1991 to1998

UNIVERSITY OF MINNESOTA

Postdoctoral Associate, Dept. of Plant Biology, 1989 to1990

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

RECENT 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.

Roalson, E. H., A. G. McCubbin, and R. Whitkus. 2007. Chromosome evolution in the Cyperales. *Aliso* 23: 62-71.

Lowrey, T. K., R. Whitkus, and W. R. Sykes. 2005. A new species of *Tetramolopium* (Asteraceae) from Mitiaro, Cook Islands: Biogeography, phylogenetic relationships, and dispersal. *Systematic Botany* 30:448-455.

COURSES OFFERED (at SSU)

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

DEPARTMENT SERVICE (SSU)

2017 – 2020	Department Chair
2008 – 2011,	Department Chair
2007 – 2008	Undergraduate Program Review Coordinator
2002 – 2004	Department Undergraduate Advisor
2002	Organizing contributor, 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. Thibault) 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

PROFESSIONAL SOCIETY SERVICE

Journal of Plant Research – Editorial Board, 2015-2020
California Botanical Society, Copy Editor, MADROÑO – A West American Journal of Botany, 2008 to 2013
Botanical Society of America, Genetics Section; Chair, Graduate Student Research Award Committee, 2000 to 2009

PROFESSIONAL ASSOCIATIONS

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

Mackenzie L. Zippay
Curriculum Vitae

EDUCATION

2004-2009 Ph.D., Dept. Ecology, Evolution and Marine Biology, University of California, Santa Barbara; Advisor: Gretchen E. Hofmann, Ph.D.

2002 Bachelors of Science in Biology, Arizona State University (*cum laude*)

ACADEMIC POSITIONS

2020- present *Associate Professor*, Sonoma State University, Department of Biology
2015-2020 *Assistant Professor*, Sonoma State University, Department of Biology
2014-2015 *Lecturer*, Sonoma State University, Department of Biology
2013-2015 *Associate Research Scientist*, Northeastern University, Department of Marine & Environmental Sciences
2011-2014 *Postdoctoral Fellow*, University of South Carolina, Environmental and Sustainability Program; Supervisor: Brian Helmuth, Ph.D.
2009-2001 *Postdoctoral Scholar*, Oceans and Human Health, Medical University of South Carolina and NOAA; Supervisor: Fran Van Dolah, Ph.D. and Eric Lacy, Ph.D.

GRANTS & AWARDS IN SUPPORT OF RESEARCH

Active/Awarded

2020 Associate Professor, CA Sea Grant, "*A multi-pronged approach to kelp recovery along California's North coast*" (total award: $500,000; SSU PIs: $171,921).

2020 Associate Professor, Anthroprocene, "*Adding resilience to kelp forest through the development of heat tolerant varieties for restoration*" ($60,000).

Completed and Pending

2019 Assistant Professor, SSU's - Mini-Grant under the Research, Scholarship and Creative Activity Program (RSCAP), "*Understanding hsp90 in developing purple sea urchins: maternal-to-zygotic transition*" ($5,000)

2019 Assistant Professor, SSU's- Professional Development, Travel Award for conference

2018 Assistant Professor, SSU's – Koret Scholars Award, *"Molecular analysis of physiological responses"* ($10,000)

2018 Assistant Professor, SSU's – Summer Fellowship under the Research, Scholarship and Creative Activity Program (RSCAP), *"Physiological Performances: Survival of an invasive mussel in a warming climate"* ($5,000)

2018 Assistant Professor, SSU's – Office of Undergraduate Research and Creative Experiences (SOURCE), *"Gradients in metabolic performance across the intertidal zone: A comparative analysis of mussels and barnacles"* ($2,000)

2017 Assistant Professor, SSU's - Mini-Grant under the Research, Scholarship and Creative Activity Program (RSCAP), *"Using an energetics framework to forecast*

the interactive effects of abiotic and biotic stressors on intertidal mussels" ($4,500)

2017 CSU's Council on Ocean Affairs, Science, and Technology (COAST)- seminar speaker award.

2016 National Science Foundation- Integrative Organismal Systems #1557901, *"Collaborative: Using an energetics framework to forecast the interactive effects of abiotic and biotic stressors on intertidal mussels"* (total award: $575,704: SSU PI-ZIPPAY $176,196).

2016 CSU's Council on Ocean Affairs, Science, and Technology (COAST)- Grant Development Program- #COAST-GDP-2016-006, "*Gradients in metabolic performance across the intertidal zone: A comparative analysis of mussels and barnacles"* (total award: $20,000; SSU PI-ZIPPAY $10,000).

2015 Assistant Professor, SSU's – Office of Undergraduate Research and Creative Experiences (SOURCE), Faculty award with undergraduate.

2015 Assistant Professor, SSU's January Fellowship under the Research, Scholarship and Creative Activity Program (RSCAP), *"Linking physiological and biophysical approaches to understand environmental regulation of stress in intertidal mussels"*

PUBLICATIONS

Peer-Reviewed Publications (*indicates student co-authors)

17. *Torossian, J.L., *Hosek, K.E., Donelan, S.C., Trussell, G.C., Helmuth, B.S., and **Zippay, M.L.** (2020) Physiological and biochemical responses to environmental stress and predation risk in the blue mussel, *Mytilus edulis. J. of Sea Research,*159.

16. *Collins, C.L., Burnett, N.P., *Ramsey, M.J., *Wagner, K.A., and Zippay, M.L. (2019). Physiological responses to heat stress in an invasive mussel *Mytilus galloprovincialis* depend on tidal habitat. *Marine Environmental Research.*

15. *Vasadia, D.J., **Zippay, M.L**., and Place, S.P. (2019) Characterization of thermally sensitive miRNAs reveals a central role of the FoxO signaling pathway in regulating the cellular stress response of an extreme stenotherm, *Trematomus bernacchii. Marine Genomics*. doi: 10.1016/j.margen.2019.100698.

14. Helmuth, B., Choi, F., Matzelle, A., Torossian, J. L., Morello, S. L., Mislan, K. A. S., Yamane, L., Strickland, D., Szathmary, P. L., Gilman, S. E., Tockstein, A., Hilbish, T. J., Burrows, M. T., Power, A. M., Gosling, E., Mieszkowska, N., Harley, C. D. G., Nishizaki, M., Carrington, E., Menge, B., Petes, L., Foley, M. M., Johnson, A., Poole, M., Noble, M. M., Richmond, E. L., Robart, M., Robinson, J., Sapp, J., Sones, J., Broitman, B. R., Denny, M. W., Mach, K. J., Miller, L. P., O'Donnell, M., Ross, P., Hofmann, G. E., **Zippay, M.**, Blanchette, C., Macfarlan, J. A., Carpizo-Ituarte, E., Ruttenberg, B., Peña Mejía, C. E., McQuaid, C. D., Lathlean, J., Monaco, C. J., Nicastro, K. R. & Zardi, G. (2016) Long-term, high frequency in situ measurements of intertidal mussel bed temperatures using biomimetic sensors. *Scientific Data* 3:160087.

13. *Matzelle A., Sarà G., Montalto V., **Zippay M.**, Trussell G., Helmuth B. (2015) A framework for integrating multiple stressors through metabolic theory: opening a 'black box' in climate change research. *Amer. Malacological Bulletin* 33: 1-11.

12. *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.

11. Van Dolah F.M.**, Zippay, M.L.**, Pezzolesi L., Rein K.S., Wang Z., and Pistocchi, R. (2013) Subcellular localization of dinoflagellate polyketide synthases and fatty acid synthase activity. *J. of Phycology* 49: 1118-1127.

10. Burnett, N.P., Seabra, R., de Pirro, M., Wethey, D.S., Woodin, S., Helmuth, B., **Zippay, M.L.,** Sarà, G., Monaco, C., and Lima, F.P. (2013) An improved noninvasive method for measuring heartbeat of intertidal animals. *Limnology and Oceanography: Methods* 11: 91-100.

9. Enzor, L.A., **Zippay, M.L.** and Place, S.P. (2013) High latitude fish in a high CO_2 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.

8. **Zippay, M.L.** and Helmuth, B. (2012) Effects of Temperature Change on mussels, *Mytilus* (Linnaeus 1798). *Integrative Zoology* 7: 312-327.

7. **Zippay M.L.** and Hofmann G.E. (2010) Effect of pH on gene expression and thermal tolerance of early life history stages of red abalone (*Haliotis rufescens*). *J. Shellfish Research* 29: 429-439.

6. **Zippay M.L.** and Hofmann G.E. (2010) Physiological tolerances across latitudes: Thermal sensitivity on larval marine snails (*Nucella* spp.). *Marine Biology* 157(4): 707-714.

5. O'Donnell M.J., Todgham A.E., Sewell M.A., Hammond L.M., Ruggiero K., Fangue N.A., **Zippay M.L.** and Hofmann G.E. (2010) Ocean acidification alters skeletogenesis and gene expression in larval sea urchins. *Marine Ecology Progress Series* 398:157-171.

4. Alberto F., Whitmer A., Coelho N., **Zippay M.**, Varela-Alvarez, Raimondi P.T., Reed D.C & Serrão E.A. (2009) Microsatellite markers for the giant kelp *Macrocystis pyrifera*. *Conservation Genetics* 10:1915-1917.

3. **Zippay M.L.**, Place S.P., and Hofmann G.E. (2004) The molecular chaperone Hsc70 from a eurythermal marine goby exhibits temperature sensitivity during luciferase refolding assays. *Journal of Comparative Biochemistry and Physiology,* Part A 138: 1-7.

2. Place S.P., **Zippay M.L.,** and Hofmann G.E. (2004) Constitutive roles for inducible genes: evidence for the alteration in expression of the inducible *hsp70* gene in Antarctic notothenioid fishes. *American Journal of Physiology* 287: 429-436.

1. Hofmann G.E., Buckley B.B., Place S.P., and **Zippay M.L.** (2002) Molecular chaperones in ectothermic marine animals: Biochemical function and gene expression. *Integrative and Comparative Biology* 42: 808-814.

Manuscripts Submitted or in Review

1. *Horn, K.M., Fournet, M.E., Liautaud, K.A., Morton, L.N., Zippay, M.L., and Hardy, K.M. (revisions). Effects of intertidal position on metabolism and behavior in the common acorn barnacle, *Barnacle gladula.* PLOSOne.

STUDENT RESEARCH SUPERVISION (start date noted)

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