

College of Science and Health

SABBATICAL LEAVE APPLICATION

University of Wisconsin-La Crosse

Name: Meredith Thomsen

Telephone Number: 785-8245

Rank: Associate Professor

Department: Biology

Title of Project: *Testing a trophic cascade: does mountain lion predation promote oak regeneration in coastal California?*

Dates of Project: *September 1, 2012 – May 31, 2013*

Location(s) of Project: *Santa Cruz, California*

Date of Last Leave: *Fall 2009 (75% maternity leave)*

Date of Last Sabbatical: *None*

Requesting: (check one)

Two (2) semesters

One (1) semester

Fall Spring

Please Check here that the following are included or are not applicable:

Current, brief CV

Letter of support from Department Chair

Table of sabbatical costs and possible funding sources

Letters of support from collaborators

Should funds (in addition to salary) be required to support this sabbatical proposal, I have also appended a Faculty Development Grant Proposal.

Applicant's Signature _____ Date _____

I have sent a letter to the Dean of the College of Science and Health indicating how courses would be covered during the sabbatical and what the associated department costs would be.

Chair's Signature _____ Date _____

I. Abstract of Project

I propose to carry out a field experiment evaluating how environmental conditions, deer herbivory and mountain lion predation risk affect oak seedling growth and survival in the Santa Cruz Mountains of California. Using radio-collared animals, Christopher Wilmer's lab group at the University of California, Santa Cruz, has collected detailed spatial information about mountain lion movements in the area, including the locations of sites where lions have killed black-tailed deer. Preliminary data suggests that differences in mountain lion predation risk across the study region may be altering the distribution and behavior of black-tailed deer and, ultimately, increasing oak seedling establishment in areas where lions are active. Oak regeneration is of particular concern to conservation biologists in California, since acorns are an important wildlife food and oaks are threatened by the combined effects of habitat loss, cattle grazing, and the Sudden Oak Death pathogen. Relatively little information is available on how top predators affect plant community dynamics (particularly in Mediterranean climates), so my proposed work has the potential to provide a unique insights. I further propose to conduct field sampling to characterize vegetation within the study area, which will provide more detailed information than the vegetation maps currently available for the Wilmer's lab modeling efforts. As part of my involvement with the Wilmer's lab group, I will assist with mountain lion capture and processing, sit in on Dr. Wilmer's Winter 2013 Behavioral Ecology class, participate in weekly lab meetings focused on new literature in wildlife ecology, and attend a weekly guest lecture on the same topic. My proposed sabbatical activities will directly benefit both my teaching and ongoing research activities at UW-L.

II. Introduction

Large mammalian carnivores can exert a controlling influence on prey species distribution and abundance in terrestrial ecosystems. Recent work, particularly in the Greater Yellowstone Ecosystem, has shown that top predators (e.g. timber wolves) have effects that cascade down through prey species (elk) to primary producers, driving patterns in woody plant distribution and abundance. For example, in parts of Yellowstone National Park, wolf reintroduction has been credited with increases in riparian quaking aspen densities, as elk numbers have declined and/or as elk avoid particular areas due to the high risk of predation they face there (Ripple et al. 2001). Such findings are intriguing, given the widespread loss of top carnivores in terrestrial systems: they raise numerous questions about the degree to which modern plant community dynamics are artifacts of carnivore extirpation. It is possible, for instance, that the difficulty we face in regenerating floodplain forest along the Upper Mississippi River is due in part to the absence of timber wolves, and the resulting high white-tailed deer densities. As wolves continue to expand their range into southern and western Wisconsin, it is possible that they will facilitate forest restoration by decreasing white-tailed deer browsing on tree seedlings.

Carnivore-mediated terrestrial trophic cascades are also controversial, and subject to intense debate with regard to the mechanism by which they arise (Kauffman et al. 2010), their robustness at broader spatial scales (Kimble et al. 2011), the effects of other organisms (e.g. beavers, which profoundly alter riparian hydrology; Bilyeu et al. 2008) and their contingency upon ecosystem type (Maron and Peterson 2011). Most importantly, researchers have begun to address the degree to which terrestrial trophic cascades depend on environmental conditions, particularly plant stressors such as low resource availability (Marshall et al. 2011). Plants are unlikely to respond to decreased herbivory if they are strongly limited by resource availability. Thus, differences in slope, aspect, and soil texture, which drive variation in soil resources, may determine the degree to which predator activities are "felt" by the plant community.

An integrated approach, combining the methods of plant and wildlife ecology, is needed to more adequately address these questions. Such an approach will simultaneously evaluate the effects of environmental conditions, herbivory, and predation risk on plant growth. A broader range of study systems is also needed, to rule out the possibility that the dynamics observed in the Greater Yellowstone Ecosystem are a special case of limited applicability. The primary difficulty in implementing such an approach is to find contrasting ecosystems from which top carnivores have not been lost.

Dr. Christopher Wilmers at the University of California, Santa Cruz, conducts research on the spatial and behavioral ecology of mountain lions in and around the Santa Cruz Mountains in northern California (<http://santacruzpumas.org/>). His lab is modeling the effect of variation in predation intensity and the resulting changes in black-tailed deer density and behavior on oak seedling recruitment, a novel terrestrial trophic cascade. The area's Mediterranean climate makes it a particularly compelling comparison with the better-studied Greater Yellowstone Ecosystem. The growing season in northern California is limited to the wet winter and early spring. Germination occurs in November or December, the end of the summer-fall drought. Many plants complete their entire life cycle and set seed by May; even long-lived evergreen plants experience reduced growth and carefully regulate their water use in the face of severe summertime water deficits. Given the strong gradients in environmental conditions in the Santa Cruz Mountains, the study system is an ideal one for an evaluation of how resource availability interacts with predator behavior in driving plant responses to herbivory.

III. Project Description

For my sabbatical, I propose a manipulative field experiment that will help parameterize the Wilmers lab model of the lion-deer-oak trophic cascade, by evaluating the interactive effects of environmental conditions and deer herbivory on oak seedling germination and early growth. The project combines my expertise in plant ecology with that of an animal ecology lab group. I will work closely with one of Dr. Wilmers's Ph.D. students; the experiment will be deployed in January 2013, so I will have a semester to work with the student prior to its initiation, and I will be present for the first season of field sampling. My ongoing research in CA involves yearly trips to the area in late May, which will allow me to supervise some of the follow-up sampling as well (see Timeline below).

The Wilmers lab has already analyzed its spatial data on black tail deer kill sites, along with available vegetation cover data sets, and determined that the habitat types that are the "highest risk" for deer are forest edge habitats and grassland areas close to woody cover. In the fall of 2012, I propose to use the lab's existing geographic databases to identify field sites with this type of habitat, categorized as either high vs. low mountain lion activity levels (based on the available data from collared animals) and high vs. low environmental stress (from the plant perspective; drier and hotter south- to west-facing slopes vs. cooler and wetter north- to east-facing areas with minimal slope). I will identify five sites matching each of the four possible combinations (low predation, low stress; high predation, low stress; low predation, high stress; and high predation, high stress).

In December 2012, near the start of the growing season, I will set up three 50m transects crossing the forest-to-grassland transition at each of the 20 field sites. I will measure percent tree canopy cover, slope, aspect, light availability and gravimetric water content at study plots every five meters along the transects (N=30 plots per site). Pending available funds, I will also collect soil samples to have analyzed for soil texture and for N and P availability. I will also collect acorns of Coast live oak at every site, discarding any that show of seed predation or other damage. I have chosen to focus on Coast live oak

because they are abundant in the Santa Cruz Mountains and therefore should be found reliably in the study sites I identify. They also have high rates of acorn viability. Although California oaks are mast seeders (show highly variable annual acorn production), Coast live oak acorns are commercially available in the event of a low acorn production year.

In January 2013, when natural acorn germination occurs, I will place 10 acorns in fenced vs. unfenced study arenas at each study plot. Fences will be constructed so as to allow access to small mammals (e.g. rodents) but not deer, using techniques I am familiar with from my work with white-tailed deer in Wisconsin. Contingent upon the availability of funds and my ability to identify a suitable student, a UW-L undergraduate will travel to CA to assist me with experimental setup during J-term 2013. Oak germination and early growth will be monitored within each study arena during spring 2013, including browse surveys of young seedlings. This design will allow me to evaluate the effects of environmental conditions (south- vs. north-facing slopes and environmental measurements), deer consumption of acorns and browsing of young seedlings (cage treatment), and mountain lion activity patterns (high- vs. low-lion activity sites). As time and available seedlings allow, I also intend to conduct browse surveys of existing trees across the 20 sites, to determine if natural browsing shows any pattern that correlates with environmental conditions or lion activity levels.

I further propose to carry out vegetation surveys at specific research sites of interest to the Wilmers lab group, to supplement the existing coarse-scale vegetation maps that are available for the Santa Cruz Mountains. Although this sampling will not directly contribute to my proposed research, the information will be integrated into other modeling efforts in the lab, particularly with regard to lion movement patterns and ecophysiology. Dr. Wilmers's research is supported in part by an Instrument Development for Biological Research grant from the National Science Foundation for the field-testing of a new type of wildlife collar. Since the vegetation data I will collect will be used to evaluate some of the collar's capabilities, Dr. Wilmers and I are preparing a Research Opportunity Award supplement to his current NSF grant to fund that portion of my sabbatical activities.

Finally, as part of my yearlong membership in the Wilmers Lab, I intend to make use of every opportunity to improve my knowledge of wildlife ecology, since that area is outside of my current area of expertise. I will be able to audit Dr. Wilmers's upper-division undergraduate course on Wildlife Ecology during the 2013 winter quarter, and to participate in two weekly lab meetings: a seminar focused on reading and discussing the recent primary literature related to lab research projects, and a broader guest lecture series focused on wildlife ecology and conservation biology. I will also be able to accompany the researchers as they track, capture and outfit mountain lions with radio collars. Overall, my sabbatical year experiences will supplement my ecological "skill set," adding methods, approaches and theoretical frameworks commonly used in animal ecology to my background in plant community ecology.

Timeline

- Fall 2012: Arrive in Santa Cruz, identify field sites, collect acorns, finalize methods, mark transects and make environmental measurements. Attend lab meetings; help out with lab fieldwork.
- Winter 2013: Establish germination and early growth experiment, conduct browse surveys, and start data collection on vegetation cover and composition. UW-L student travels to CA for J-term if possible. Audit Wildlife Ecology. Attend lab meetings; help out with lab fieldwork.
- Spring 2013: Monitor germination and early growth experiment; continue browse survey and vegetation survey. Attend lab meetings; help out with lab fieldwork.
- May 2013: Travel to UC Angelo Reserve with Biology Department colleague Tim Gerber and UW-L students for annual sampling of long-term climate change experiment.
- 2013-14: Check in with Santa Cruz Ph.D. student periodically to guide continued sampling of experiment.
- May 2014: Return to CA for annual sampling, conduct final (?) sampling on germination and early growth experiment, begin preparing manuscript for publication.

References Cited

- Bilyeu, D.M., D.J. Cooper, and N.T. Hobbs. 2008. Water tables constrain height recovery of willow on Yellowstone's northern range. *Ecological Applications* 18:80-92.
- Kauffman, M.J., J.F. Brodie, and E.S. Jules. 2010. Are wolves saving Yellowstone's aspen? A landscape-level test of a behaviorally mediated trophic cascade. *Ecology* 91:2742-2755.
- Kimble, D.S., D.B. Tyers, J. Robison-Cox, and B.F. Sowell. 2011. Aspen recovery since wolf reintroduction on the Northern Yellowstone Winter Range. *Rangeland Ecology & Management* 64:119-130.
- Maron, J.L., and D.E. Pearson. 2011. Vertebrate predators have minimal cascading effects on plant production or seed predation in an intact grassland ecosystem. *Ecology Letters* 14:661-669.
- Marshall, K.N, D.J. Cooper and N.T. Hobbs. 2011. Wolves, elk and willows: Spatial variation in landscape configuration on Yellowstone's Northern Range. Annual Meeting of the Ecological Society of America, Austin, TX.
- Ripple, W.J., E.J. Larsen, R.A. Renkin, and D.W. Smith. 2001. Trophic cascades among wolves, elk and aspen on Yellowstone National Park's northern range. *Biological Conservation* 102:227-234.

IV. How the project meets UW System Sabbatical Guidelines

Sabbatical should support the mission of the institution

My proposed sabbatical activities will improve my teaching in a core class in the Biology department, and could potentially result in my offering a new course for the department (see below). I will thereby increase the degree to which I help UW-L provide "a challenging, dynamic, and diverse learning environment." Furthermore, by participating in cutting-edge research in wildlife biology, I will increase my ability to help prepare "students to take their place in a constantly changing world community."

Sabbatical proposals are encouraged to take up any of the UW System Shared Learning Goals

My sabbatical proposal addresses issues within the learning goals of "Knowledge of human cultures and the natural world" and "Individual, social and environmental responsibility."

V. How the project meets CSAH Sabbatical Guidelines

Sabbatical project should enhance teaching, course and curriculum development and/or research ... within the field of expertise of the faculty member taking such leave.

My proposed sabbatical activities will directly benefit my teaching and research at UW-L. First and foremost, they will allow me to increase and personalize my coverage of the topics of predation and conservation biology in Biology 307 (Ecology). Students seem to be particularly interested in these topics, but they are outside my current research area. **The goal of broadening my ecological training in an area of student interest was a major motivation for my choice of sabbatical year activities.** I can also use the vegetation surveys I conduct as a lecture topic in Plant Biology, as an illustration of why and how plant growth form matters from a wildlife perspective. Secondly, pending departmental interest, my sabbatical year experiences could allow me to develop a new lecture course or seminar in Wildlife Ecology. I have known several Biology majors in the Environmental Science Concentration who were interested in wildlife biology, but we currently offer relatively few classes that directly address that topic. Such a class might also appeal to Biology majors who are hunters or whose families hunt.

On the research side, **my proposed project dovetails with my research on how white-tailed deer browsing influences forest regeneration in the Upper Mississippi River floodplain.** The questions I will address during my sabbatical are very similar, augmented by the presence of a top predator. There are researchers studying radio-collared wolves in our region, so in the longer term I anticipate a research project on oak regeneration across areas of greater and lesser timber wolf activity here in Wisconsin. Furthermore, being in California for a year would allow me to devote some time to the long-term climate change experiment I continue to collaborate on in Mendocino County, reinvigorating that aspect of my research. This will also benefit UW-L students, since I intend to continue my annual sampling trips with students for the foreseeable future. Tim Gerber and I are working on a way to stabilize the funding for that trip (which includes both pre-service teachers and undergraduate biology researchers) in a way that does not rely on external support.

Sabbatical project should lead to results that are publishable in a reputable journal. . . .

I expect the experiment described above to result in a peer-reviewed publication, to be co-authored with the Ph.D. student who will assist me and with Dr. Wilmers. I also expect that the vegetation data cover data I propose to collect will contribute meaningfully to ongoing modeling projects in the Wilmers lab, and thus to result in at least one other manuscript co-authorship.

Sabbatical project should demonstrate originality.

As described above, the proposed lion-deer-oak trophic cascade would be a novel one in a number of respects. Furthermore, I am aware of no published work that simultaneously addresses underlying environmental variation, herbivory, and spatial patterns in carnivore activity in the context of a trophic cascade. Finally, I feel that my proposed activities provide a unique opportunity to broaden both my research and teaching in a way that will be of interest to students.

VI. Estimated Budget

ITEM	DESCRIPTION	ANTICIPATED COST
Travel in CA	To and from field sites	\$1500
Field supplies	Fencing materials , etc.	\$3000
	TOTAL	\$62,500

List Possible Sources of Additional Funding: (College funds are used only for salary.)

Travel in CA and field supplies: Research Opportunity Award from National Science Foundation to my collaborator Christopher Wilmers at the University of CA, Santa Cruz.

VII. References

Letter of support from Christopher Wilmers enclosed.

VIII. Letter of support from Chair

Enclosed.

IX. CV

Enclosed.

UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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SANTA BARBARA • SANTA CRUZ

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September 12, 2011

To Whom It May Concern:

It is my pleasure to write a letter of support for Dr. Meredith Thomsen's sabbatical plans to join my lab here at UC Santa Cruz for the academic year beginning in September 2012. I have known Meredith professionally since we were graduate students together at UC Berkeley and have been very impressed by her work on California grassland ecological dynamics. My lab here at UC Santa Cruz is focused on understanding the ecological effects of top terrestrial predators such as mountain lions and grey wolves. One area in which we have struggled to advance understanding is on the indirect effects of large predators on plant communities through their impacts on herbivore density and behavior. This deficiency is largely to do the lack of a plant expert in our group. While Meredith is here at UC Santa Cruz she will help us design and implement a plant component to our four-year-old study on mountain lions.

While here at UC Santa Cruz, I can offer Meredith space in my lab (office and lab space if needed) as well as full library privileges. Meredith will also have the opportunity to integrate as much as she like in our lab's activities. This includes everything from fieldwork related to our mountain lion project (e.g. capture of animals, tracking, telemetry etc.) to participation in our two weekly lab meetings; one where we read and discuss recent papers related to wildlife biology, and the second we where we team up with two other labs and present and discuss our various research projects. Finally, as a member of the UC Santa Cruz community, Meredith will have access to a diverse set of academics as well as a number of weekly seminars in various related disciplines.

Should you need any more information, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris Wilmers", written over a horizontal line.

Christopher Wilmers
Assistant Professor

Meredith A. Thomsen

University of Wisconsin-La Crosse
Biology Department and River Studies Center
(608)-785-8245
Email: mthomsen@uwlax.edu

Education

Ph D, University of California, Berkeley, 2005. Department of Integrative Biology
Dissertation Title: Interactions between propagule supply and ecological resistance to the
invasion of *Holcus lanatus* in California coastal prairie

BA, Carleton College, 1997.
Major: Biology
Concentration: Environmental Sciences

Professional Memberships

Ecological Society of America
Mississippi Valley Conservancy
The Prairie Enthusiasts

Awards and Honors

Chancellor's Inaugural Scholar, University of Wisconsin-La Crosse. 2007.
Wisconsin Teaching Fellow, University of Wisconsin System. 2010.

TEACHING

Courses taught at UW-L

General Biology Lecture
Plant Biology Lecture and Lab
Ecology Lecture
Plant-Microbe Interactions Lecture and Lab
Plant Ecology Lecture and Lab
Senior Capstone in Biology
UWL 100 First-Year Experience

Teaching Grants

Thomsen, M.A., "Supplies & equipment proposal: Improved living collection for plant biology
courses." UW-L College of Science and Health, \$957. 2008

Thomsen, M.A., "National Great Rivers Research & Education Center Graduate Student Summer
Fellowship." Sponsored by National Great Rivers Research & Education Center, \$4850. 2010.

Baines, A., Thomsen, M.A. (Co-Principal), Gerber, D.T. (Co-Principal), "Redesign of Bio 204 Plant
Biology Laboratory: Student-Inquiry and Active Learning." \$23302. 2010.

RESEARCH

Journal Articles

- Thomsen, M. A., Brownell, K., Groshek, M.*, Kirsch, E. *In review*. Control of reed canarygrass promotes wetland herb and tree seedling establishment in an Upper Mississippi River floodplain forest. *Wetlands*.
- De Jager, N., Thomsen, M.A., Yin, Y. *In review*. Threshold effects of flood duration on the vegetation and soils of the Upper Mississippi River Floodplain, USA. *Forest Ecology and Management*.
- Salesman, J.*, Thomsen, M.A. Smooth brome (*Bromus inermis*) in tallgrass prairies: a review of control methods and future research directions. *To appear in Restoration Ecology*.
- Bennett, A., Thomsen, M. A., Strauss, S. (2011). Multiple mechanisms enable invasive species to eliminate native species. *American Journal of Botany*, *98*, 1086-1094.
- Hawkes, C. V., Kivlin, S., Huguet, V., Thomsen, M. A., Suttle, K. B. (2011). Fungal community responses to precipitation. *Global Change Biology*, *17*, 1637-1645.
- Suttle, K. B., Thomsen, M. A. (2007). Climate change and grassland restoration: lessons from a rainfall manipulation in California. *Madrono*, *54*, 225-233.
- Suttle, K. B., Thomsen, M. A., Power, M. E. (2007). Species interactions reverse grassland responses to changing climate. *Science*, *315*, 640-642.
- Thomsen, M. A., D'Antonio, C. M. (2007). Mechanisms of resistance to invasion in a California grassland: the roles of competitor identity, resource availability, and environmental gradients. *Oikos*, *116*, 17-30.
- Thomsen, M. A., Corbin, J. D., D'Antonio, C. M. (2006). The effect of soil nitrogen on competition between native and exotic perennial grasses from northern coastal California. *Plant Ecology*, *186*, 23-35.
- Thomsen, M. A., D'Antonio, C. M., Suttle, K. B., Sousa, W. P. (2006). Ecological resistance, seed density and their interactions determine patterns of invasion in a California coastal grassland. *Ecology Letters*, *9*, 160-170.

Peer-Reviewed Lesson Plans

- Balistrieri, D.*, Gerber, D. T., Thomsen, M. A. 2010. *Simulating Climate Change Research in Grasslands* in Science NetLinks K-12 Science Education Resources. Washington DC: Science NetLinks/American Association for the Advancement of Science.
- Hill, E.*, Gerber, D.T., Thomsen, M.A. 2011. *Grassland Plants: Plant Identification* in Science NetLinks K-12 Science Education Resources. Washington DC: Science NetLinks/American Association for the Advancement of Science.

Hill, E.* , Gerber, D.T., Thomsen, M.A. 2011. *Grassland Plants: Plant Classification* in Science NetLinks K-12 Science Education Resources. Washington DC: Science NetLinks/American Association for the Advancement of Science.

Some Recent Presentations

Cogger, B.* , Thomsen, M. A., and De Jager, N. Annual Meeting of the Ecological Society of America, "Interactive effects of flooding and white-tailed deer herbivory on tree seedling recruitment in floodplain forests of the Upper Mississippi River." Austin, TX. (August 2011).

Gerber, D. T., Thomsen, M. A., Thurston, S. International Botanical Congress, "Botanical Education of the Next Generation to Face National and Global Grand Science Challenges: Simulating Climate Change Research in the Secondary Classroom." Melbourne, Australia (July 2011).

Thomsen, M. A., UW System President's Summit on Excellence in Teaching and Learning, "Can a science writing assignment improve biology students' scientific self-efficacy?" Madison, WI. (April 2011).

Power, M., Suttle, K. B., Thomsen, M. A. Annual Meeting of the Ecological Society of America, "Species interactions mediate climate change impacts in rivers and meadows: time scales of effects." Pittsburgh, PA. (August 2010).

Bolwahn, J.* , Thomsen, M. A. Annual Meeting of the Ecological Society of America, "Effect of fire, herbicide, and mowing on invasive smooth brome grass and re-establishment of a sand prairie." Pittsburgh, PA. (August 2010).

Thomsen, M. A., Brownell, K., Kirsch, E. Ecological Society of America Annual Meeting, "Control of reed canary grass (*Phalaris arundinaceae*) improves tree regeneration in an Upper Mississippi River floodplain forest." Pittsburgh, PA. (August 2010).

Ballistreri, D.* , Gerber, D. T., Thomsen, M. A. American Association for the Advancement of Science Annual Meeting 2010, "Connecting Scientific Research and the Secondary Classroom through Online Lesson Plans." San Diego, CA. (February 18, 2010).

* Indicates graduate or undergraduate student.

Contracts, Grants and Sponsored Research

External Grants

Thomsen, M.A., De Jager, N. (Co-Principal), "Comparison of deer exclosure methods for protection of bottomland forest restoration sites." Sponsored by United States Army Corps of Engineers, \$6000. (November 2009 - September 2011).

Thomsen, M.A., Suttle, K. B. (Co-Principal), Gerber, D.T. (Co-Principal), "2008 LTREB: RUI: Grassland Community Responses to Sustained Rainfall Manipulation." Sponsored by National Science Foundation, \$135000. (July 2008 - July 2010).

UW-L Grants

Thomsen, M.A. "Development of a proposal for the National Science Foundation." \$3000. (Fall 2011).

Thomsen, M.A. "Faculty Research Grant: How can protection from deer herbivory improve forest restoration in the Upper Mississippi River floodplain?" \$11193. (July 2010 - June 2011).

Thomsen, M.A. "Faculty Research Grant: The regeneration of floodplain forest tree species in gaps invaded by reed canary grass." \$12680. (July 2007 - June 2008).

SERVICE

Editorial and Review Activities

Grant Review Panelist, National Science Foundation. 21 proposals reviewed. 2011.

Invited Manuscript Reviewer, various journals. 8 articles reviewed. 2006-2011.

External Grant Reviewer, National Science Foundation. 1 proposal reviewed. 2009.

Invited Chapter Reviewer, "California Grasslands," University of California Press. 3 chapters reviewed. 2006.

Department Service

Writing Across the Curriculum in the Department Committee, Chair. (2010 - Present).

Greenhouse committee, Chair. (2008 - Present).

Organismal Biologist Search Committee, Member. (2010).

Plant Biologist Search Committee, Member. (2009).

Limnologist Search Committee, Member. (2007).

Comparative Animal Physiologist Search Committee, Member. (2006).

Merit Evaluation Committee, Chair. (September 2010, September 2008).

Biology Club Advisor, Faculty Advisor. (2006 - 2009).

Budget Committee, Member. (2008 - 2009).

College Service

College Committee, Secretary. (2009 - Present).

Dean's Distinguished Fellowship Summer Seminar Series, Co-Organizer. (Summer 2008).

Dean's Distinguished Scholarship Committee, Member. (2006 - 2008).

University Service - Committee Involvement

Joint Committee on Environmental Sustainability, Member. (2009 - present).

Faculty and Staff Awareness Through Performance, Member. (2008-present).

Ad hoc committee for the review of Faculty Grant Development applications, Member. (2010).

Ad hoc Online SEI Committee, Member. (2009).

Environmental Studies Pool Search, Member. (2009).

Cultural Affairs for Multicultural Student Services, Member. (2007 - 2008).

Faculty Development, Member. (2007 - 2008).

Student Organizations, Member. (2007 - 2008).

Contracts, Grants and Sponsored Research

UW System Grants

Downey, N., Thomsen, M.A. (Co-Principal), Sanderfoot, A.A. (Supporting), "UW-L Summer Research Program for Increasing Student Retention and Graduation." Wisconsin Alliance for Minority Participation, \$24940.00. (Summer 2010).

Downey, N. (Principal), Thomsen, M.A. (Co-Principal), "UW-L Summer Research Program for Increasing Student Retention and Graduation." Wisconsin Alliance for Minority Participation, \$19700. (Summer 2009).