

# UW – Green Bay Research Council

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## Research Scholar Cover Page

Name: Amy T. Wolf

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Department: Biology / Natural and Applied Sciences

Unit: Natural and Applied Sciences

Project Title: *Development of a National Science Foundation REU proposal for an internationally networked study of temperate forest dynamics*

### Proposals should include:

**Proposal Narrative**

- A 5-6 page, double-spaced description of the proposed project with four sections:
  - a) A thorough narrative about the project itself
  - b) An explanation of the relationship of the project to existing scholarship (including relevant citations, as applicable)
  - c) An indication of how the project would contribute to the faculty member's professional development and overall program of research
  - d) A detailed description of the final product that would result from the Research Scholar's work

**Proposed Timeline**

- A 1-page proposed timeline for completion of the project (with markers of progress and some product to be completed within the semester and, if appropriate or necessary, a final product to be completed by the end of the following semester).

**Curriculum Vitae**

- A 2-page abbreviated vita limited to relevant research experience

**Approval from Department Chair**

Institute for Research  
Mail: WH 303  
Phone: 2784/2565  
Fax: 2043

**Proposal Narrative:**

During 2007 biologists from the Smithsonian Institution's Center for Tropical Forest Studies, the U.S. Forest Service, and University of Wisconsin-Green Bay formed a partnership to establish a 25 ha *forest dynamics plot* near Lake Wabikon in northern Wisconsin as part of the newly-formed Smithsonian Institution Global Earth Observatory Network (SIGEO). Forest dynamics plots (FDP's) are intensively studied sites where all trees and shrubs with a diameter 1cm or greater are measured, tagged, and re-sampled at five year intervals. The goal is to monitor spatially explicit changes in tree growth, reproduction, and mortality within a sampling area of unprecedented size (typically 15-50 ha). As of 2007, 20 forest dynamics plots are being monitored in tropical regions across the world (<http://www.ctfs.si.edu/doc/index.php>), the oldest established in 1980 at the Smithsonian Institution's Barro Colorado Island Research Station in Panama. The Wisconsin forest dynamics plot represents one of 12 newly established plots in the temperate zone, extending the research to address global dimensions of forest dynamics. Among many applications, results from the temperate zone forest dynamics plots will help us understand how climate change affects today's forest ecosystems.

Along with Dr. Robert Howe, Director of UWGB's Cofrin Center for Biodiversity, and Gary Fewless, Curator of the UWGB Herbarium, I have led the planning and development of the UW-Green Bay forest dynamics plot project since it was conceived. During 2007 we established a 1 ha pilot plot in the Cofrin Arboretum at the UW-Green Bay campus and we obtained funds (> \$150,000 for equipment and field work) for the first summer's field work in northern Wisconsin during 2008. Sources of financial support include the Smithsonian Institution Tropical Research Institute, the Department of Natural and Applied Sciences, and a private gift to the Cofrin Center for Biodiversity. We are ready to begin field

## UW-GREEN BAY RESEARCH SCHOLARS PROPOSAL 2008 - AMY T. WOLF

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work in May, 2008, with a crew of 8 UW-Green Bay students or former students in addition to Howe, Fewless, and myself.

I have been invited to attend a workshop on temperate zone forest dynamics plots (the first ever meeting of this kind) at Harvard University in May 2008. The invitations were purposely restricted to a small group including leaders of new or proposed forest dynamics plot projects in China, Taiwan, Hong Kong, United Kingdom, Brazil, Canada, Washington, Oregon, and Massachusetts. Our goal will be to establish scientific directions of the temperate forest plot network and to build foundations for future collaborations. A major strength of the forest dynamics plot initiative is replication in forests around the world. Methods outlined by Condit (1998) are being followed by both the 20 tropical plots as well as the 12 new plots in the temperate zone. Numerous research collaborations are inevitable as this network grows. Already, research from the tropical plots has resulted in over 300 scientific research articles and at least 10 books. Given that we will be among the first plots in the temperate zone, we expect to be part of global analyses of carbon sequestration in forests, worldwide comparisons of forest productivity, and fundamental research on the dynamics of forest ecology.

I am applying for a spring 2009 3 credit academic reassignment through the UW-Green Bay Research Scholars Program so that I can prepare a research proposal to the National Science Foundation's Research Experiences for Undergraduates (REU) program. This proposal will seek funding of approximately \$200,000 to provide research opportunities for undergraduates (from UW-Green Bay and elsewhere) to participate in research at Wisconsin's forest dynamics plot in summer 2010. By the end of 2008 we will have completed the initial census (and marking) of trees and shrubs at the Lake Wabikon site, providing the foundation for a highly competitive research proposal to investigate other

aspects of forest ecology at the site. Specifically, I am interested in studying the understory vegetation (wildflowers and tree seedlings), the richest element of forest ecosystems in the North Temperate Zone. In tropical forests, by contrast, the highest diversity of species is found in the forest canopy. We hope to work with Dr. Liza Comita, a postdoctoral researcher at Columbia University who has studied understory plants at the Panama forest dynamics plots (e.g., Comita et al. 2007). Dr. Comita visited UW-Green Bay during fall 2007 to view the Lake Wabikon site and to discuss future collaborations. I will develop the proposal in such a way that our data will be comparable with Dr. Comita's work in the tropics, providing an outstanding opportunity to compare the ecology of understory plants in temperate and tropical forests. This work will address 3 questions about the ecology of understory plants in temperate forests:

- 1) How do spatial variations in topography, soil, and canopy composition affect the distribution of understory plants? This analysis will consist of a GIS analysis of plant distributions within the detailed map established by previous work.
- 2) Does the spatial distribution of plants (in selected species) affect pollination success and seed predation?
- 3) What is the relationship between seedling production and the distribution of canopy tree species in the Lake Wabikon site?

I also plan to pursue comparisons of understory plant diversity and demographics between our site and other tropical and temperate forest dynamics plots.

The National Science Foundation's REU program provides approximately \$57,000,000 annually to support ongoing or new research projects that involve undergraduate students in meaningful ways. About 150 new sites are funded each year, along with supplemental support for 1,600 continuing projects. According to Program Solicitation NSF 07-569, "proposals with an international dimension are

welcome..." I intend to explore the possibility of linking the proposed student research in Wisconsin with similar research at forest dynamics plots in Canada, the U.K. and China.

During Spring Semester 2009 I will be in an excellent position to prepare a competitive REU proposal. I have a strong record of research in northern Wisconsin, including a recent study (funded by the U.S. Forest Service) on the effects of logging on understory plants, published this year in the international journal *Forest Ecology and Management*. I also am author or co-author of comprehensive checklists of birds and butterflies in the Chequamegon-Nicolet National Forest, and have worked with Forest Service biologists on various research projects for nearly 20 years. The Lake Wabikon forest dynamics project will provide an outstanding field opportunity for undergraduates, particularly if it can be linked with research at other plots in the global SIGEO network. In addition to field work during 2008, I will be exploring potential collaborations with scientists at other temperate (or possibly tropical) forest dynamics plots, beginning with the May 2008 meeting at Harvard Forest. I will seek funding from the U.S. Forest Service and other sources to conduct smaller scale field research at the Lake Wabikon site during summer 2009. This work, along with the already-established international connections and the standardized sampling of trees and shrubs during summer 2008, should provide the foundation for a very competitive REU proposal during 2009.

### **Literature Cited**

Comita, L.S., S. Aguilar, R. Perez, S. Lao, and S.P. Hubbell. 2007. Patterns of woody plant abundance and diversity in the seedling layer of a tropical forest. *Journal of Vegetation Science* 18:163-174.

Condit, R. 1998. *Tropical Forest Census Plots: Methods and Results from Barro Colorado Island, Panama and a Comparison with Other Plots*. Springer-Verlag, New York. 211 pages.

**Proposed Timetable:**

1. **May 2008**                      **Attend workshop at Harvard Forest to develop network of researchers working on temperate zone *forest dynamics plots*. The workshop, organized by Dr. Stuart Davies of Harvard University, will be attended by 25 invited scientists from the U.S., Canada, U.K., China, Taiwan, and Brazil.**
2. **Summer 2008**                **Complete first year of research at Lake Wabikon Forest Dynamics Plot in northern Wisconsin. Funding for this work has already been secured.**
3. **Fall 2008**                      **Prepare funding proposals for preliminary research during summer 2009 on understory plants at the Lake Wabikon Forest Dynamics Plot. Analyze data and prepare manuscripts on summer 2008 field work.**
4. **Spring 2009**                    **Prepare major research proposal for National Science Foundation's REU (Research Experiences for Undergraduates) program. Continue to work on manuscripts from summer 2008 field work.**
5. **Summer 2009**                **Conduct preliminary research on understory plants at Wabikon Lake Forest Dynamics Plot. Use results to refine methods for NSF proposal.**
6. **August 2009**                 **Submit NSF/REU proposal before the annual August/September deadline.**
7. **Spring 2010**                 **If successful, begin planning for implementation of REU project during summer 2010.**

**UNIVERSITY of WISCONSIN**  
**GREEN BAY**

MEMO

DATE: 31 March 2008

TO: UW-Green Bay Research Council

FROM: Gregory Davis, Chair of NAS 

SUBJECT: Dr. Amy Wolf – Research Scholar Proposal

With this memo, I am expressing my support for Dr. Amy Wolf's Research Scholar proposal so that she may continue the development and implementation of the Wisconsin forest dynamics plot project in conjunction with the Smithsonian Institution's Center for Tropical Forest Studies and the U.S. Forest Service.

As such, if this proposal is supported by the UW-Green Bay Research Council, then I am prepared to see that Dr. Wolf is extended a 3 credit course reassignment during the Spring 2009 semester.

## *Curriculum Vitae*

Amy T. Wolf

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### EDUCATION

- Ph.D.** Ecology, University of California, Davis. December 1998.  
Dissertation: Population structure and reproductive ecology of serpentine endemic plant species in California's North Coast Range.
- M.S.** Environmental Science and Policy, University of Wisconsin, Green Bay. August 1993.  
Thesis: The ecology and conservation of the northern blue butterfly *Lycaeides idas nabokovi* and its larval host plant (*Vaccinium caespitosum*) in northeastern Wisconsin.
- B.S.** Biology, University of Wisconsin-Green Bay (*cum laude*). May 1989.

### RECENT PUBLICATIONS

- Wolf, A., L. Parker, G. Fewless, K. Corio, J. Sundance, R. Howe, and H. Gentry. 2008. Impacts of summer vs. winter logging on understory vegetation in the Chequamegon-Nicolet National Forest **Forest Ecology and Management** 254: 35-45.
- Nedland, T.S., A.T. Wolf, and T. Reed. 2007. A re-examination of restored wetlands in Manitowoc County, Wisconsin. **Wetlands** 27: 999-1015.
- Herrick, B.M., M.D. Morgan, and A.T. Wolf. 2007. Seed banks in diked and undiked Great Lakes coastal wetlands. **American Midland Naturalist** 158:191-205.
- Peterson, R.K.D., S.J. Meyer, A.T. Wolf, J.D. Wolt, and P.M. Davis. 2006. Genetically engineered plants, endangered species, and risk: A probabilistic exposure assessment for Karner Blue Butterfly larvae and Bt maize pollen. **Risk Analysis** 26: 845-858
- Wolf, A.T. and R.W. Howe. 2006. Winter Wren (species account). pages 334-335 in Cutright, N. J., B. R. Harriman, and R.W. Howe (eds.). **Atlas of the Breeding Birds of Wisconsin**. Wisconsin Society for Ornithology.
- Herrick, B.M. and A.T. Wolf. 2005. Invasive plant species in dikes vs. undiked Great Lakes wetlands. **Journal of Great Lakes Research** 31:277-287. [Winner of Chandler-Meissner Award for outstanding paper, 2005, International Association for Great Lakes Research]
- Wolf, A.T., R. Howe, and R. Dana. 2004. Conservation of the Northern Blue Butterfly *Plebejus (Lycaeides) idas nabokovi* in the western Great Lakes Region. **Natural Areas Journal** 25(1): 77-85.



- Wolf, A.T. 2003. Protocol for monitoring rare butterflies in managed forests. Chequamegon-Nicolet National Forest, U.S. Forest Service, Park Falls, WI.
- Jurjavcic, N., S. Harrison, and A. Wolf. 2002. Abiotic stress, competition, and the distribution of the native annual grass *Vulpia microstachys* in a mosaic environment. *Oecologia* 130:555-562.
- Wolf, A.T. and M. Brzeskiewicz. 2002. A conservation assessment of the Northern Blue Butterfly (*Lycaeides idas nabokovi*) and Dwarf Bilberry (*Vaccinium caespitosum*) in Michigan, Minnesota, and Wisconsin. U.S. Forest Service, Chequamegon-Nicolet National Forest, Park Falls, WI. 42 pp. [http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/insect\\_Plebejus\\_\(Lycaeides\)\\_idas\\_nabokovi- NoBlueButterfly.pdf](http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/insect_Plebejus_(Lycaeides)_idas_nabokovi- NoBlueButterfly.pdf)
- Wolf, A.T. 2001. Conservation of endemic plants in serpentine landscapes. *Biological Conservation* 100: 35-44.
- Wolf, A.T., and S.P. Harrison. 2001. Natural habitat patchiness and the reproductive success of serpentine morning glory, *Calystegia collina* (Convolvulaceae). *Conservation Biology* 15: 111-121.
- Wolf, A.T., J.L. Hamrick, and S.P. Harrison. 2000. Influence of habitat patchiness on genetic diversity and spatial structure of a serpentine endemic plant. *Conservation Biology* 14:454-463.
- Wolf, A.T., Howe, R.W., and J.L. Hamrick. 2000. Genetic Diversity and Population Structure of the Serpentine Endemic *Calystegia collina* (Convolvulaceae) in northern California. *American Journal of Botany* 87:1138-1146.
- Wolf, A.T., P.A. Brodmann, and S.P. Harrison. 1999. Distribution of the rare serpentine sunflower (*Helianthus exilis*, Asteraceae): the roles of habitat availability, dispersal limitation, and species interactions. *Oikos* 84: 69-76.

## RECENT GRANTS

- Wolf, A.T. 2007. Analysis of *Phragmites australis* control measures in Green Bay wetlands Wisconsin Department of Agriculture, Trade, and Consumer Protection (funded by Wisconsin Coastal Management Program and Lake Michigan Lakeshore Management Program). \$15,500.
- Wolf, A.T. 2007. Establishment of a pilot forest dynamics plot in the UW-Green Bay Cofrin Arboretum. UWGB Department of Natural and Applied Sciences. \$9,000.
- Wolf, A.T. 2006. Survey of Native Bees in Prairie Remnants of Southwestern Wisconsin. Prairie Biotic Research, Inc. \$1000.
- Wolf, A.T. 2006. A Comprehensive Data Base of Wisconsin's Bee Fauna. UWGreen Bay Research Council. \$300.
- Wolf, A.T. 2006. Follow-up: A comparison of impacts of summer vs. winter logging on understory vegetation in the Chequamegon-Nicolet National Forest. U.S.D.A. Forest Service, Chequamegon Nicolet National Forest. Park Falls, WI. \$5,000.
- Wolf, A.T. 2005. A comparison of impacts of summer vs. winter logging on understory vegetation in the Chequamegon-Nicolet National Forest. U.S.D.A. Forest Service, Chequamegon Nicolet National Forest. Park Falls, WI. \$5,000.