JENNIFER H. OLKER

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Natural Resources Research Institute
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Education

UNIVERSITY OF MINNESOTA DULUTH, MN
Integrated Biosciences PhD candidate
September 2008 to present

UNIVERSITY OF MINNESOTA DULUTH, MN
MS in biology, minor in applied and computational mathematics
February 2004
Thesis: *Ultraviolet radiation and northern vernal pools: are amphibians at risk?*

NORTHLAND COLLEGE ASHLAND, WI
BS in biology and mathematics, minor in chemistry
graduated summa cum laude, May 2000

Research Interests

Research interests include wetland ecology and associated communities, especially amphibian ecology; wetland ecosystem and organism responses to local and landscape stressors; impacts of climate change on aquatic habitat and communities

Professional Experience

Sept 2008-present — PHD STUDENT, INTEGRATED BIOSCIENCES GRADUATE PROGRAM
University of Minnesota

My dissertation research integrates the impacts of watershed level activities (agriculture, urban development, etc.) on habitat quality with organismal and physiological responses to stressors. Specifically, I am incorporating amphibian health and development into the predictions of ecological and community responses to land use and climate change. This research includes identifying the land uses and physical wetland attributes that influence pesticide levels in wetlands across the Upper Midwest, a controlled experiment in artificial ponds to determine the effects of atrazine on amphibian growth, development, and gonadal formation, and evaluating relative influences of local and landscape factors in predicting development, growth, and abnormal gonadal development. Through this research I have acquired skills in captive husbandry of amphibians for experimental exposure and manipulation of habitat and gross and histological analysis of amphibian gonadal morphology (including dissection, imaging, microtomy and microscopy). In addition, I am working on spatial analyses to link the broad landscape scale issues (e.g., land use) to the physiological responses of individuals, which will allow further predictions to be made regarding the impacts of climate change and

land management actions on amphibians and other wetland biota.

Aug 2009 - June 2010, Aug 2011 - present

FELLOW, NATIONAL SCIENCE FOUNDATION GK-12 PROJECT
University of Minnesota Duluth

As an NSF fellow, I work with a tenth grade biology teacher and his/her students to improve science and mathematical teaching in the public school system through developing and implementing inquiry-based lesson plans and action research, under the guidance and training of a team of project investigators and fellows.

Sept 2000-Present

RESEARCH FELLOW, NATURAL RESOURCES RESEARCH INSTITUTE
University of Minnesota Duluth
(PREVIOUSLY JUNIOR SCIENTIST AND GRADUATE RESEARCH ASSISTANT)

As an aquatic ecologist, I specialize in amphibian ecology and contribute to multiple research projects in aquatic ecology and climate change through data management, statistical analysis, experimental design, GIS, data processing, and preparation of reports and manuscripts. I also support undergraduate education through mentoring interns in scientific research, guest lecturing, and co-instructing a field ecology course during May term.

2009-present: GIS and data analyst, Salt marsh indicator and landscape metrics for coastal wetland integrity indices projects (USGS)
GIS support for coastal wetland monitoring in 13 National Wildlife Refuges including site selection based on existing locations as well as randomized points and transects, field maps, and summary of landscape attributes and metrics. Analysis of landscape indicators between reference, disturbed, and managed sites.

April-Sept 2011: data analyst, St. Louis River watershed streams and lakes: water quality biological monitoring (MN Pollution Control Agency)
Analyzed water quality, fish community, and aquatic invertebrate community data to evaluate: 1) relationship to cumulative landscape based stressor score; 2) site selection method (MPCA targeted v. NRRI stressor score) on interpretation of habitat quality; and 3) field sampling techniques on interpretation of habitat quality.

2007-2010: Sub-project of Non-linear response of prairie pothole landscapes to climate change and land management (SDSU, prime EPA)
Evaluated the potential impact of climate change on amphibians through statistical and spatial analysis of output from Wetlandscape model which predicts hydrologic responses of three wetland permanence types (temporary, seasonal, semipermanent) under climate change scenarios in the Prairie Pothole Region. Summarized viability of amphibian breeding habitat over 95 year time period for multiple locations using Access and SAS. Summarized land use/land cover and evaluated functional connectivity using ArcGIS, in addition to other programs such as Circuitscape.

2007-2010: data manager, Minnesota's Water Resources: impacts of climate

change-phase I and II (2 projects, Legislative and Citizen's Commission on Minnesota's Resources)
Coordinated research across multiple universities and state agencies to assess the consequences of past climate trends on aquatic resources. Acquired, summarized, and analyzed historical water quality, fish community, and ice cover data for lakes across Minnesota. Responsible for Access database linking all sets of data, GIS summaries land use/land cover, project meetings, and reports.

2006-2008: GIS and data analyst, Acadia National Park risk assessment and Northeast Temperate Network freshwater wetland monitoring protocol development (2 projects, USGS)
Analyzed wetland monitoring data from Acadia National Park to indentify local indicators of anthropogenic stressors. Assisted in development of mechanism to identify wetlands in Acadia NP most vulnerable to anthropogenic threats using landscape-scale indicators in a GIS. Assisted in the development of a sampling design that incorporates these watershed landscape indicators of susceptibility to stress. Acquired appropriate GIS layers for other parks in the Northeast Temperate Network to apply indicator and stressor gradient concept developed at Acadia NP and create field maps to aid in the development of the freshwater wetland monitoring protocol.

July 2003-July 2007: project manager, Multiple stressors in Prairie Pothole Region (EPA STAR)
Involved with most aspects of this project that quantified the effects of multiple stressors, including climate change, land use, local habitat, and wetland attributes, on amphibian organismal and community responses. Developed site selection method, selected sites, created field maps, and summarized land use and other landscape attributes for survey locations using a GIS (ArcView, ArcMap). Responsible for all aspects of field work, including hiring, training, and leading field crews to survey amphibians and sample water chemistry at over 100 wetlands across the Prairie Pothole Region. Conducted standard amphibian surveys (day and night), malformation surveys, water quality sampling, and habitat summaries. Developed and managed an Access database and analyzed amphibian community, malformation, and landscape data using multiple techniques. Presented results from this project at scientific meetings, and assisted in writing reports and manuscripts.

2006: data analyst, Great Lake Environmental Indicators (EPA STAR)
Summarized and analyzed data for potential fish indicators using water quality, habitat, and landscape data with multiple programs and statistical analyses (Access, SAS, Canoco, PCOrd, PCA, Variance Partitioning, Indicator Analysis, C2) for one of the subprojects of GLEI (*Testing indicators of coastal ecosystem integrity using fish and macroinvertebrates*).

May-July 2003: research field assistant, Forest birds (long-term project in 3 national forests)
Participated in a long-term forest bird survey in northern Minnesota and

Wisconsin, surveying bird populations with point counts.

Sept 2000-May 2003: graduate research assistant, Vernal pools (EPA STAR)
Held a graduate research assistantship on a three-year study on the effects of forest fragmentation on vernal pools in northern Minnesota. Surveyed amphibian populations and quantified their habitat (including water quality, ultraviolet radiation, vegetation, and land use), as well as hired, trained, and supervised field crews and contributed to reports and manuscripts.

May-Aug 2000 — FIELD BIOLOGY TECHNICIAN, UNIVERSITY OF MONTANA
Saguaro National Park, Arizona

As a field technician, I participated in a study to investigate the impacts of prescribed burns on bird populations, including monitoring breeding success, conducting point count surveys, and habitat data.

May-Aug 1997-1999 — FIELD BIOLGY TECHINICIAN, MONTANA COOPERATIVE WILDLIFE RESEARCH UNIT,
Mogollon Rim, Arizona

For three summers, I participated in a long-term study of bird populations in the Coconino National Forest, including bird banding, nest-searching, and monitoring of breeding success, and collecting vegetation data. In the third year, I received a NSF-REU to analyze mark-recapture data to compare capture techniques.

Aug 1997-May 2000 — TUTOR AND STUDENT ADVISOR, NORTHLAND COLLEGE
ACADEMIC SUPPORT CENTER, Ashland, Wisconsin

As a student advisor and tutor, I worked with undergraduate students in small groups covering statistics and algebra, as well as guided new students in the registration, course selection, orientation process, and solving curricular problems.

Grants

Gonadal deformities in smallmouth bass as indicators of endocrine disruption in the St. Louis River estuary. Minnesota Sea Grant. Co-Investigator. $49,929 (pending)
National Science Foundation – GK-12 Fellowship 2011-2012. $30,000 + $10,500 for tuition
National Science Foundation – GK-12 Fellowship 2009-2010. $30,000 + $10,500 for tuition
Thesis Research Grant – University of Minnesota 2009. $2,400
Alexander and Lydia Anderson Fellowship – University of Minnesota 2009. $3,700
National Science Foundation – Research Experience for Undergraduates 1999

Honors and Awards

- Best student poster – Chicago SRA and Midwest SETAC 2011
- Honorary mention for best student poster – Midwest SETAC 2010
- Research Award – University of Minnesota Duluth 2007
- Major Merit Award in Mathematics – Northland College 2000
- Science Faculty Award – Northland College 2000
- Dean's List – Northland College Fall 1996-Winter 2000
- Honorary Academic Scholarship – Northland College 1996-2000

Research and Analytical Skills

Research experience:

- Captive husbandry of amphibians for experimental exposure and manipulation of habitat.
- Amphibian survey techniques including identification of egg masses, larvae, metamorphs and adults of Midwest species; nighttime calling surveys; mark-recapture with toe-clips and elastomer; physiological measurements and examination for malformations
- Gross and histological analysis of amphibian gonadal morphology, including dissection, imaging, microtomy and microscopy
- Water quality sampling and processing including turbidity, total suspended solids, chlorophyll-a, true color, dissolved organic carbon, and UV scans
- Ultraviolet radiation (and PAR) measurements with instantaneous, datalogging, and exposure methods
- Bird population surveying including point counts, nest-searching/monitoring, and banding
- Aquatic invertebrate sampling with sweep nets and funnel traps
- Navigation with map, compass, and GPS to specific locations on and off roads
- Independent travel including extensive off-trail hiking
- Prepare data and results for reports and manuscripts

Analytical experience:

- Manage and summarize data for projects including organismal, community, water quality, land use, and stressor data
- Conduct statistical analyses to answer questions about wildlife and water/habitat quality responses to land use, anthropogenic stressors, and climate change
- Complex statistical analyses, including multivariate, non-linear, ordination, and community analyses
- Design sampling methodology for field and experiment based research
- Multiple computer applications for statistical analysis and data management including SAS, R, Jmp, Statistica, MiniTab, Canoco, PC-ORD, C2, Access, Excel,
- Process data into figures, tables, and preparation of reports and manuscripts

GIS experience:

- Design and implement study site selection methods with GIS and statistical tools
- ArcView and ArcGIS to create maps, identify study sites, summarize land use and stressors
- Evaluate landscape connectivity with ArcView, ArcGIS, and freeware tools (e.g. Circuitscape)
- GPS units (Trimble, Garmin) in conjunction with GIS to locate and store site location data

Teaching Skills

- Develop and implement inquiry-based lessons and activities for undergraduate and high school science courses
- Develop interactive lectures and new activities/methods for instructing undergraduate students and training field/lab technicians

- Develop tools to improve communication and teaching of scientific research, to non-technical audiences
- One-on-one instruction and guided group study for undergraduate and high school students
- Evaluate teaching effectiveness through reflection, discussion, action research, and interdisciplinary collaboration

Professional and Community Service

Co-instructor in University of Minnesota Duluth May term course: Biol 4803 Methods in Field Ecology (May-June 2011)

Student representative on the Integrated Biosciences Program curriculum committee, University of Minnesota Duluth (December 2010-present)

Research mentor for high school science fair project, as part of NSF GK12 Fellowship. (October 2011-present)

Research mentor for undergraduate student from Lake Superior College in the Bridges to the Baccalaureate Degree Program funded by NIH/NIGMS (August 2010-present)

Research mentor for undergraduate student from University of Minnesota Duluth in the McNair Scholars Program (January-August 2011)

Ad hoc journal reviewer:

Landscape Ecology
Urban Ecosystems

Publications

Johnson, LB., GE Host, C Richards, **JH Olker**. 2006. Landscape and local scale predictors of wood abundance in low gradient streams. Pages 151-174, In: Hughes, RM, L Wang, PW Seelbach, eds. *Landscape influences on stream habitats and biological assemblages*. American Fisheries Society Symposium 48, Bethesda, MD

Olker, JH 2004. Ultraviolet Radiation and Northern Vernal Pools: Are Amphibians at Risk? MS thesis, University of Minnesota, Duluth, MN. 120 p.

Reports

Axler, R, **J Olker**, V Brady, D Breneman, L Johnson, G Host, T Brown, J Henneck, E Ruzycki. 2011. St. Louis River watershed streams and lakes: biological monitoring addendum- stressor gradient and macroinvertebrate sampling protocol assessment. NRRI/TR-2011/38

Johnson, LB, RP Axler, RM Newman, HG Stefan, RH Skaggs, T Hollenhorst. **JH Olker**. Minnesota's water resources: impacts of climate change - Phase II. 2010. Final report to the Legislative and Citizen Commission on Minnesota Resources. NRRI/TR-2010/30

Neckles, HA, AT Gilbert, GR Guntenspergen, NP Danz, T Hollenhorst, A Little, **J Olker**. 2007. Draft protocol for monitoring freshwater wetlands in national parks of the Northeast Temperate Network. Prepared for the National Park Service. 262 p.

Schoff, PK, L. Johnson, GR Guntenspergen, C Johnson, **J Olker**. 2007. Effects of multiple

stressors on aquatic communities. Final report to the U.S. EPA STAR Program. NRRI/TR-2007/13.

Johnson, L, C Johnson, R Boone, D Breneman, J Gross, **J Olker**. Effects of forest fragmentation on community structure and metapopulation dynamics of amphibians. Final report to the US EPA STAR Program. NRRI/TR-2004/25.

In revision or review

Olker, JH, LB Johnson, CM Johnson, RP Axler. Ultraviolet radiation dose to *Rana sylvatica* (wood frog) in vernal pools in northern Minnesota: a case study. For Conservation Biology.

Olker, JH, LB Johnson, PK Schoff. Effects of atrazine and climate change on amphibian larval development and growth of two native frog species. For Environmental Science and Technology.

Olker, JH, R Johnson, PK Schoff, LB Johnson. Effects of atrazine and climate change on gonadal anomalies and presence of testicular oocytes in two native frog species. For Environmental Science and Technology.

Rohweder, AK, **JH Olker**, LB Johnson, GR Guntenspergen, TP Hollenhorst, PK Schoff. Wetland atrazine concentrations and occurrence of testicular oocytes in *Rana pipiens* from randomly-selected sites in the prairie pothole region. For Environmental Health Perspectives.

Guntenspergen, G, **J Olker,** L Johnson. Predicting the persistence of amphibians in the Prairie Pothole Region under a changing climate. For Global Change Biology.

Baghat, Y, JJH Ciborowski, LB Johnson, **J Olker**. A multivariate approach to determining fish assemblages associated with reference condition and anthropogenically disturbed areas at great lakes coastal margins. For Ecological Applications.

In preparation

Olker, JH, PK Schoff, LB Johnson, GR Guntenspergen, AK Rohweder. Spatial and temporal atrazine distribution with respect to land use and hydrology.

Olker, JH, R Johnson, PK Schoff, LB Johnson, GR Guntenspergen. Predictors of altered development, size, and gonadal endpoints in *Rana pipiens* in Prairie Pothole wetlands.

Olker, JH, R Johnson, PK Schoff. Distribution of testicular oocytes with male *Rana pipiens.*

Schoff, PK, **JH Olker**, T Hollenhorst, LB Johnson. Distribution and types of amphibian malformations detected at randomly selected Midwestern wetlands.

Johnson, CA, LB Johnson, **JH Olker**. Recruitment, dispersal and movement patterns of wood frogs (*Rana pipiens*) in a fragmented landscape.

Selected abstracts and presentations

Olker, JH, LB Johnson, PK Schoff, RD Johnson. Development, size, and gonadal endpoints differ in two native frog species exposed to atrazine and accelerated pond-drying. Oral presentation at the Joint Meeting of Ichthyologists and Herpetologists. Minneapolis, MN, July 2011.

Olker, JH, PK Schoff, RD Johnson. Distribution of testicular oocytes within male *Rana pipiens*. Poster at the International Association of Great Lakes Research, Duluth, MN, June 2011.

Olker, JH, LB Johnson, PK Schoff. Development, size, and gonadal endpoints differ in two native frog species exposed to atrazine and accelerated pond-drying. Poster at the joint meeting of Chicago Society of Risk Analysis and Midwest Society of Environmental Toxicology and Chemistry meeting, Lake Geneva, WI, March 2011. Received best poster award from Chicago SRA.

Olker, JH, LB Johnson, GR Guntenspergen. Evaluating wetland connectivity in the Prairie Pothole Region under climate change scenarios with graph theory and spatial pattern analysis. Oral presentation at the Minnesota LIS/GIS conference. Duluth, MN. October 2010.

Olker, JH, LB Johnson, PK Schoff. Atrazine and accelerated pond-drying affect developmental rate and metamorphic size in wood frogs (*Rana sylvatica*). Poster at the Midwest Society of Environmental Toxicology and Chemistry meeting, St. Paul, MN, March 2010. Received honorary mention for best student poster.

Olker, JH, LB Johnson, V Brady, JJH Ciborowski, D Breneman. Quantifying Great Lakes wetland habitat structure for environmental assessment. Poster at the Making a Great Lake Superior Conference, Duluth, MN, October 2007.

Olker, JH, T Hollenhorst, LB Johnson, PK Schoff, CM Johnson, G Guntenspergen. Broadscale land use impacts on northern leopard frog (*Rana pipiens*) in the upper Midwest. Poster at the workshop: Understanding agriculture's effects on amphibians and reptiles in a changing world, St. Louis, MO, February 2007.

Olker, JH, T Hollenhorst, LB Johnson, PK Schoff, AK Rohweder, G Gunternspergen, WC Johnson. Effects of hydrology and land use on amphibian breeding potential and community structure in the Prairie Pothole Region. Presentation at the joint annual meeting of the Minnesota Chapters of The Wildlife Society, American Fisheries Society, Society of American Foresters, and the Society of Conservation Biology, Brainerd, MN. March 2006.

Olker, JH, LB Johnson, RP Axler, CM Johnson. Ultraviolet-B radiation dose to wood frogs (*Rana sylvatica*) in northern Minnesota vernal pools. Presentation at North American Benthological Society annual meeting, Vancouver, B.C. June 2004.

Olker, JH, LB Johnson, RP Axler, CM Johnson. Ultraviolet-B radiation dose to *Rana sylvatica* in vernal pools in northern Minnesota. Presentation at the Society of Conservation Biology annual meeting, Duluth, MN. June-July 2003.