

***2008-2009 Annual Report and Progress Towards Goals for the University of Toledo's
Lake Erie Center
July 1, 2008 – June 30, 2009***

By Carol A. Stepien, Ph.D., Director

Drafted August 6, 2009, revised with additions from LEC faculty Aug. 26, 2009
(With Dr. Christine Mayer, Dr. Jonathan Bossenbroek, Dr. Daryl Dwyer, and Dr. Thomas
Bridgeman and LEC staff Patricia Uzmann, Meredith Gray, and Rachel Lohner)

Progress on Ongoing Goals for the Lake Erie Center

1. Fine-Tune Plans for Defining the Direction and Increase the Visibility of the LEC.

2009-2010 goal: Further develop 5 and 10 year plans for NSF report (fall 2009), then increase implementation. Hold joint internal board meeting fall 2009. Attract more adjunct faculty from USGS and NOAA agencies.

Goal for 2006-9 was: Formulate and hold workshops for developing and implementing 5 and 10 year plans for the LEC, with internal and external Scientific Advisory Boards and the Education & Outreach Advisory Board members. We worked to develop our architectural expansion needs. (Progress: completed preliminary plans in spring 2008, submitted grant for funding \$350,000 to the National Science Foundation (NSF); next internal joint board meeting is planned for fall 2009, following IAGLR in May 2009). Primary 2008-9 goal was: Hold successful 2009 International Association for Great Lakes Research (IAGLR) Conference, May 18-22, on the main UT campus. Theme: “Bridging Ecosystems and Environmental Health Across Our Great Lakes” (600 scientists and students attended).

Progress for 2008-9:

- 1) Held successful 2009 IAGLR conference and developed our team networking and interfacing with other universities and agencies.*
- 2) Submitted Environmental Sensor grant to NSF Field Station and Marine Laboratory (FSML) program March 2009, as a result of our NSF planning grant.*
- 3) Further developed collaboration with University of Wisconsin Milwaukee WATER institute through joint VHS session held at IAGLR09, and Washington D.C. meeting in June 2009. Also co-authored paper with UWM 's Dr. Goetz (Transactions of American Fisheries Society) and wrote and will receive grant funding with them for VHS Fish virus work. This VHS work and College led to new research collaborations with the Ohio Department of Agriculture and with Michigan State University's College of Veterinary Medicine Diagnostic Center for Population & Animal Health.*
- 4) Organized special sessions at IAGLR 2009 on Great Lakes Field Stations, the Bioeconomics of Invasive Species in the Great Lakes Region, and the VHS fish virus.*
- 5) We increased collaborations with adjunct faculty from USGS, specifically Dr. Ed Roseman (Ann Arbor) and Dr. Patrick Kocovsky (Sandusky), who have been very active on graduate student committees and in grant writing and project collaborations.*

2. Continue to build research and education grant funding and output; and grow collaborations and positive visibility for the LEC. Particularly develop collaborative work and networking with our Health Sciences campus, other colleges, and other departments.

Progress to date:

- 1) *Most significant outcome was the funding of our new \$2.4 million NSF Gk-12 program, "Graduate fellows in high school STEM education: An environmental science learning community at the land-lake ecosystem interface", which supports 8 graduate fellows and 8 high school teachers per year, 5 years, from Civil Engineering, Environmental Sciences, and Geography & Planning. PI: Stepien, co-PIs: Moorhead, Bridgeman, Fisher, Gruden. This project had a very successful year 1 and has entered year 2. The team presented this progress to the director of the NSF Dr. Arden Bement in November 2008, and again in Washington D.C. in March 2009. The team also presented at Purdue University in November 2008 and at the IAGLR conference in May 2009.*
- 2) *The LEC was awarded a Research Experiences for Teachers award for high school teacher Tim Bollin to conduct research on fish genetics in Stepien's lab and work with her graduate student Amanda Haponski. This team provided a successful transition to the Gk-12 program. The RET built off the LEC planning grant. Mr. Bollin published with Stepien & Haponski and the team has been conducting an independent research course for TECHS students.*
- 3) *A large NSF URM (Undergraduate Research and Mentoring) proposal was resubmitted in March 2008 and was funded for \$600,000 in 2009. PI: Sigler, co-PI: Stepien (note: Stepien was asked by NSF to reverse the order, as she has the Gk-12 program to run). This program funds 6 undergraduate researchers per year for 2 years each. The first cohort began in May 2009 and helped at the IAGLR09 conference.*
- 4) *We developed a new fish viral grant proposal plan with faculty from the Health Sciences Campus, for which we applied for and received USDA earmark funding. We held several meetings and collaborative activities with researchers from the Health Sciences campus. PI: Stepien, co-PIs: Wiley, Bossenbroek. We expanded this program in collaboration with the UWM WATER Institute and are receiving additional funding. Our group coordinated a special VHS session at the IAGLR09 conference and Dr. Stepien plans to edit a special issue of the Journal of Great Lakes Research on the results in the future. We presented on the project at the USDA in Washington D.C. in June 2009. Ph.D. student Lindsey Pierce won a best paper award and a best poster award on the early project results at the Sigma Xi and Ohio Fish and Wildlife Management conferences.*
- 5) *The LEC, especially through the Gk-12 program has continued to sponsor Dr. Wanda Penamon from the UT3 Teacher Education program, through Drs. Bridgeman and Stepien. Dr. Bridgeman and Ms. Penamon have a manuscript in review based on their research in the summer of 2008.*
- 6) *Our LEC Public Lecture Series has been well attended. Regular attendees include high school teachers, graduate students, undergraduate students, local citizens, and faculty from the colleges of engineering, law, and arts and sciences as well as members of the environmental community. This program is being utilized as part of the Gk-12 Environmental Science Learning Community and the URM program.*
- 7) *We published an LEC FOLEC newsletter (Friends of the Lake Erie Center) and plan to now publish it 2 times per year.*

- 8) *A new collaborative joint project was developed for the Maumee Bay Power plant ecosystem effects, which is being led by Dr. Christine Mayer, with NOAA Sea Grant funding. Co-PIs include Dr. Stepien, Dr. Tom Bridgeman, Dr. Patrick Kocovsky (USGS), Jeffrey Tyson (Ohio DNR), and Dr. Craig Stow (USGS). The project title is: "Effects of Bay Shore power plant on ecosystem function in Maumee Bay, western Lake Erie". The NOAA Sea Grant program is funding this project for 2009-2012.*

Goals for 2009-2010:

- a) *Operate year 2 of the Gk-12 program and help with year 1 of the URM program. Interface the two programs.*
- b) *Publish the LEC FOLEC newsletter 2 times yearly and improve the LEC website.*
- c) *Aid and target graduate and undergraduate recruitment and retention.*
- d) *Work with A&S College towards developing the LEC summer course program.*
- e) *Implement a new graduate scholarship program, which is generously being funded by the new Dr. Brundage-Western Lake Erie Waterkeeper Association Scholarship for resident graduate students at the LEC.*
- e) *Revisit and grow our LEC internal and external boards, and engage its members in our development.*

3. Continue to build research productivity, especially output of top scientific publications and conference presentations. Increase visibility of the LEC, its researchers, graduate students, and programs in the Great Lakes Community, as well as throughout the University of Toledo.

Progress (through 6-09):

- 1) *Research productivity, including output of scientific publications and conference presentations, has continued to climb by LEC researchers and students. We have significantly increased positive visibility of the LEC, its researchers, graduate students, and programs in the Great Lakes Community, as well as throughout UT and our neighboring institutions.*
- 2) *Our website has grown to feature our many efforts and highlight our output.*
- 3) *We had a strong presence at the May 2009 IAGLR (International Association for Great Lakes Research) annual meeting held at our university. Students from multiple LEC and university labs presented their research at the conference. Special sessions included the high school poster show, including the Gk-12 program. Ph.D. student Kristen DeVanna won the IAGLR scholarship award. Our LEC students have now won 6 of these prestigious awards since 2005.*
- 4) *We established a publication numbering system for the LEC, which was implemented in 2007, and was fruitful in 2008-9.*
- 5) *Through the NSF Gk-12 program, we are developing our Environmental Science Learning Community.*
- 6) *Publication of "Bioeconomics of Invasive Species: Integrating Ecology, Economics, Policy, and Management". J. Bossenbroek is lead or co-author on four of the chapters.*

Goals for 2008-9:

- a) *We will continue to feature our publications and programs on our website, and will continue to upgrade and enhance the website.*
- b) *Our new NSF Gk-12 program is building an Environmental Science Learning Community, and is working with the TMACOG Student Watershed Watch program. This spring 2010 we plan to present at the Lake Erie biannual Millennium Conference to be held at the University of Windsor.*
- c) *Integrate the URM program with the Gk-12 program.*

4. Continue to build graduate and undergraduate and postdoctoral-level research and education at the LEC, along with sponsoring high school science projects. Help to increase Ph.D. student enrollment and participation in the LEC.

Progress 2008-9:

- 1) *We continued to build graduate and undergraduate and postdoctoral-level research and education at the LEC, which was evidenced by our record number of 20 graduate students working at the LEC and our new Gk-12 funded program. We had two MS students defend their theses this year at the LEC (Justin Chaffin, Colleen Wellington).*
- 2) *The LEC was funded for a new \$2.4 million 5 year Gk-12 program for graduate fellows and \$600,000 for the new NSF URM program for undergraduate researchers.*
- 3) *The LEC hosted the first annual high school science research poster show on April 30, 2009, which was a feature of the Gk-12 program.*
- 4) *Ms. Amanda Haponski received a Sigma Xi grant and an NSF Deepfin travel award and a Smithsonian Institution travel award to work at the US Museum of Natural History in summer 2009. Joshua Brown was awarded a 2009-10 Sea Grant Knauss Fellowship to work at NOAA in Washington D.C. Ms. Audra Crosky, an M.S. student in Dr. Bossenbroek's Invasive Species Modeling Laboratory was awarded a Sigma Xi Grant In Aid from her Emerald Ashborer project. High school student programs included the Maumee Watershed Watch program, and three high school interns from St. John's and Notre Dame Academies. UT3 teacher in training Dr. Wanda Penamon was sponsored by the LEC by Drs. Bridgeman and Stepien, and worked with the Gk-12 program.*
- 5) *We taught a summer training course for the Gk-12 program for 16 teachers and students in summer 2009, and courses for the graduate fellows in the fall and spring semesters.*
- 6) *A week-long summer day camp for grades 4-5 was taught at the LEC to local elementary school children (taught by Rachel Lohner and Meredith Gray)*
- 7) *Undergraduate student Phillip Mathias was awarded USR&CAP funding to study the distribution of unionid mussels in the Ottawa River. This research was presented at UT Chapter of Sigma Xi, Posters at the Capital and IAGLR 2009. Mr. Mathias graduated with Departmental Honors.*
- 8) *Undergraduate student Lance Olsen was awarded an URM fellowship and will be working with Dr. Bossenbroek for two years on darters of Ohio.*

Goals for 2009-10:

- a) *Develop increased Graduate recruitment plans, in conjunction with the Departments of Environmental Sciences, Geography and Planning, Public Health, and Civil Engineering. Increase recruitment appeal and efforts on the web and at scientific*

conferences. (ongoing, website and displays have been developed, director has assigned Technology & Communications Specialist to this task)

- b) Obtain UT funding and support for the LEC summer courses. These will be necessary to facilitate and develop the NSF Gk-12 program, the URM program, and others; and is required by our NSF FSML grant. We anticipate that the new provost likely will be amendable to helping to secure funding for the instructors, as she has run such programs for the NSF. (progress: stymied by UT administration to date, director is working on with Provost and dean)*
- c) Increase LEC library acquisitions to feature LEC dissertations and theses. Include these in our website. (progress: Director has assigned Technology & Communications Specialist to this task)*
- d) Host the Student Watershed Watch Summit attended by over 200 local high school students in the College of Engineering at UT through collaboration with the NSF Gk-12 program.*
- e) Further develop the Gk-12 high school poster show to an annual event and couple with the URM program.*
- f) Implement a new graduate scholarship program, which is generously being funded by the new Dr. Brundage-Western Lake Erie Waterkeeper Association Scholarship for resident graduate students at the LEC.*

5. Further develop website and LEC foyer display area (posters, displays, lake aquarium) as well as utilize existing space wisely and efficiently at the LEC. Make the LEC user-friendlier to its researchers, students, collaborators, and visitors. Increase our public participation.

Progress to date:

- 1) The LEC website was further developed and visual displays in both of the classrooms have been beautifully upgraded, to include satellite images, aerial photographs, and maps.*
- 2) We developed attractive framed posters around the LEC atrium aquarium.*
- 3) The pole barn was built using the changes implemented by the new UT administration.*
- 4) We upgraded the wetlab for several graduate student experiments, and the running lake water system.*
- 5) We developed an online facility manager request site through the university and have been having monthly Facility Committee meetings with all LEC PIs, technicians, and representative graduate students.*
- 6) Completed remodel/renovation of LEC kitchen area, using existing funds. (completed 8-08)*
- 7) Created memorial garden in front of LEC with bench, flagpole, native plants, and sundial (completed 8-08)*
- 8) Are completing rain garden and displays (begun by junior high school Lego robotics team in fall 08; Sponsored Eagle Scout project to replant natives and eradicate invasives in summer-fall 2008) (completing fall 2009)*
- 9) Began the LEC annual art contest and continued to year 2 of the annual LEC photo contest, whose winners are featured in our lobby displays and on our website.*

Goals for 2009-10:

- a) Continue to upgrade and update the LEC website (ongoing, facilitated by hire of new Technology & Communications Specialist in February 2009)*
- b) Increase plantings and displays of native plants. Help Technology & Communications Specialist to develop a LEC volunteer docent program to help lead tours, help out, and aid P.R.*
- c) Increase publicity for tour and field trip programs.*
- d) Increase publicity and impact of the LEC now annual art and photo contests.*
- e) Develop an LEC docent volunteer program (to help with LEC native garden display, tours, K-12 classroom field trips and activities, aquarium displays)*
- f) Reinvigorate FOLEC (Friends of Lake Erie Center) donation group.*
- g) Celebrate the 10th year of the LEC's opening in fall 2009.*

REPORT OF LAKE ERIE CENTER ACTIVITIES
JULY 1, 2008 – JUNE 30, 2009

PUBLIC EDUCATION

- 3/24/2009 50 biology students from Start High School for field trip for GK-12 program
- 4/27-5/18/09 Three Student Interns, St. Johns Jesuit (1 month), Notre Dame Academy (1 week), St. Ursula Academy (1 week)– Stepien Lab
- 4/30/09 NSF – Gk-12 Poster Gala featured 24 posters by 36 local high school students
- 6/22-6/26/08 Summer Science Camp, 15 Students from local elementary schools, 4th & 5th Grades – R. Lohner and M. Gray

UT CLASSES, SEMINARS AND WORKSHOPS

- Fall 2008 PSO Class – Geology (Tuesdays & Thursdays)
- Fall 2008 PSO Class – English (Mondays & Wednesdays)
- Fall 2008 Applied Spatial Ecology (Mondays; 2 units) – J. Bossenbroek
- Fall 2008 Gk-12 training course for 8 graduate fellows (8980,6980; 2 units)
Environmental Education Methods (Thursdays) – C. Stepien
- 9/8/08 Aquatic Ecology Course Field Trip
- 11/21/08 Fisheries Genetics Workshop for Lake Erie Managers – C. Stepien
- Spring 2009 Gk-12 training course for 8 graduate fellows
Environmental Science Learning Community (Thursdays) – C. Stepien
- Spring 2009 Molecular Fisheries Genetics Techniques (8960,6960; 2 units) – C. Stepien
- Summer 2009 Gk-12 Training Course for 16 graduate fellows and high school teachers
Environmental Education Field Methods II (8980, 6980; 2 units) – T Fisher, C. Gruden

PUBLIC OUTREACH AND LECTURES

- 8/28/08 Winners of LEC Art Contest awards dinner
Movie Screening: “Inland Seas: Understanding and Protecting the Waters of the Great Lakes”, by Matthew Radcliff and Rebecca Klaper followed by a discussion of the Great Lakes Compact led by Kenneth Kilbert, UT College of Law
- Fall 2008 Pond Restoration Project for Eagle Scout Requirements of Ken Gibbons
- 9/18/08 “Hypoxia in Lake Erie”, Dr. Gerald Matisoff, Department of Geological Sciences, Case Western Reserve University
- 10/16/08 “Food, fertilizer, fish, and fouled beaches: Water quality in the Maumee River and the western basin of Lake Erie”, Dr. Peter Richards, Heidelberg College
- 11/4/08 Rain Garden Installation by Ottawa Hills Middle School First Lego League Team
- 11/6/08 “Lake Erie’s Dead Zone: Who killed it?” Dr. Robert Heath, Kent State University
- 1/22/09 “Viral Hemorrhagic Septicemia in Ohio’s Fish”, Eugene Braig, Assistant Director, Ohio Sea Grant College Program, The Ohio State University
- 2/19/09 “What’s in Your Water”, Dr. Isabel Escobar, Chemical & Environmental Engineering Department, University of Toledo
- 3/5/09 “Lake Erie Yellow Perch: Numbers, Catchability, and Management”, Dr. Patrick Kocovsky, USGS Great Lakes Science Center, Lake Erie Biological Station, Sandusky, Ohio
- 4/16/09 “Criminal Enforcement of Federal Environmental Laws (Or the Lack of It)”, Dr. Frank Merritt, College of Law, University of Toledo
- 4/22/08 Earth Day at the LEC, special tour and tree planting
- 4/29/09 “Neolithic vs. modern Baltic Sea fisheries: evidence of a shifting baseline?”
Dr. Karin Limburg, Assoc. Prof. Env. & Forest Biology, SUNY (Joint with Dept. of Environmental Sciences Seminar)
- 6/30/09 Deadline of “Nature on Maumee Bay” LEC art contest
- 6/18/09 Documentary Screening: “Waterlife,” directed by Kevin McMahon

UT MEETINGS AND CONFERENCES (INCLUDING LEC DIRECTOR'S MEETINGS)

- 7/12-7/30/08 Research trip to Poland and Russia (NSF-sponsored, invasive goby project work) – C. Stepien
- 7/31/08 Great Lakes Aquatic Ecosystem Research Consortium conference at Stone Laboratory – C. Stepien, D. Moorhead, C. Gruden with Gk-12 fellows and teachers
- 8/4/09 Ecological Society of America – J. Bossenbroek and 1 grad student
- 8/17-8/21/08 American Fisheries Society Annual Conference – C. Stepien & 2 grad students
- 9/2/08 IAGLR09 strategy meeting
- 10/3/08 Cleveland State Univ. Biology Dept. Seminar – J. Bossenbroek
- 10/7/08 IAGLR09 planning committee meeting
- 10/16/08 Student Watershed Watch High School sampling Gk-12 program day
Water quality monitoring and macroinvertebrate sampling of schoolyard streams
8 high schools with 8 Gk-12 graduate students and teachers
- 11/3/09 NSF Research symposium Poster presentation for Director Dr. Arden Bement
-C. Stepien & NSF GK-12 graduate students & teachers, and other LEC grad students (4 poster presentations)
- 11/5/09 Sigma XI – UT Chapter Annual Symposium – D. Dwyer and J. Bossenbroek were on the organizing committee. Several graduate and undergraduate students presented.
- 11/7-8/08 Gk-12 presentations at Purdue University Regional conference-led by coPI Daryl Moorhead (with graduate students)
- 11/14/08 Great Lakes Water Conference, UT College of Law – C. Stepien
- 11/16-11/21 Presentations at AIChE Annual Meeting, Philadelphia, PA – led by Dr. I Escobar and C. Gruden by students A. Zaky, C. Gorey
- 11/19/08 Student Watershed Watch Summit program at the Toledo Zoo for the Gk-12 program high school students, teachers, and graduate fellows; Presentations by the high school students
- 11/19/08 IAGLR09 strategy meeting

12/8/08 Dr. Stepien collaboration meeting with Dr. Charles Krause (USDA)

12/14/09 Midwest Fish and Wildlife Conference, Columbus, OH – J. Bossenbroek & 1 student

1/13/09 IAGLR09 planning committee meeting

1/30/09 Commission on the Ottawa River meeting – C. Stepien

2/05/09 IAGLR09 planning committee meeting
Presentation by NSF Gk-12 team to Bowling Green State Univ. NSF SETGO team – C. Stepien, with graduate students M. Campbell and C. Gorey

2/11/09 HEC steering committee meeting with USEPA, Grosse Isle, MI – C. Stepien

2/12-2/13/09 IAGLR Annual Board Meeting, Ann Arbor – C. Stepien and K. DeVanna

2/23-2/24/09 Great Lakes Days in Washington, D.C. – C. Stepien

2/27/09 Commission on the Ottawa River meeting – C. Stepien

3/3/09 IAGLR09 planning committee meeting

3/18/09 VHS Fish Virus Grant Discussion in Columbus, OH with Ohio Dept. Agriculture – C. Stepien (with J. Willey and 2 grad students)

3/22-3/26 ACS National Meeting in Salt Lake City, UT. Research presentation – C. Gruden, C. Gorey and O. Milejeva-Biebesheimer)

3/23/09 Great Lakes Fishery Commission Lake Committee Meeting in Ypsilanti, MI – C. Stepien & grad students

3/27-3/29/09 Presentations by the NSF Gk-12 team in Washington, D.C. at annual conference (led by Dr. C. Stepien, Dr. C. Gruden, with T. Crail, B. Bodamer, J. Blosser, C. Kolinski, Dr. W. Penamon, Dr. Gale Mentzer)

3/28/09 NW Ohio District II Science Fair at the University of Toledo
High school students in the Gk-12 program presented 23 projects

4/1/09 Women in Science Lecture at UT – C. Stepien

4/07/09 IAGLR09 planning committee meeting

4/12/09 U.S. International Association of Landscape Ecology – 1 student

4/15/09 Chemistry Department Seminar at UT – given by C. Stepien

- 4/20-4/23/09 International Conference on Aquatic Invasive Species, research meetings and presentations attended by C. Stepien, J. Bossenbroek, and graduate student K. DeVanna, all of whom presented
- 4/29/09 BGSU/UT/LEC Joint Lecture – Dr. Karin Limburg, SUNY
- 4/30/09 NSF – Gk-12 Poster Gala featured 24 posters by 36 local high school students
- 5/2/09 Provost and College of Arts and Sciences strategy meeting
- 5/5/09 IAGLR09 planning committee meeting
- 5/5/09-5/8/09 Tenth International In Situ and On-site Bioremediation Symposium, Baltimore, MD – Dr. Dwyer and K. Barnswell
- 5/9/09 State Science Fair, Columbus Ohio
High school students in the Gk-12 program presented 5 projects
- 5/18-5/22/09 International Association for Great Lakes Research Annual Conference held at the University of Toledo main campus, coordinated by the LEC
- 5/29/09 Commission on the River meeting – C. Stepien
- 6/19/09 Research presentations by Dr. Stepien to the USDA in Washington D.C. and Congresswoman M. Kaptur’s office and Senator Voinovich’s office (led by Dr. F. Calzonetti)

OUTSIDE MEETINGS, CONFERENCES, WORKSHOPS AND SEMINARS at the LEC

- 8/04/08 Duck & Otter Creeks Partnership Meeting
- 8/27/08 Elder Hostel Tour
- 10/02/08 UT Center for Creative Instruction Retreat
- 11/12/08 Ohio EPA Public Meeting
- 11/19/08 International Joint Commission Meeting
- 12/4/08 Ohio EPA Public Meeting
- 1/14/09 Advisory Committee for Wind Research in NW Ohio Meeting

1/29/09 Advisory Committee for Wind Research in NW Ohio Meeting

2/10/09 Ohio Sea Grant Focus Group

2/27/09 ASPRS Meeting – K. Czajkowski

3/19/09 Waterkeepers Meeting

4/14-4/15/09 US Coast Guard Training

4/15/09 Waterkeepers Meeting

5/27/09 Ohio EPA Public Meeting

5/29/09 Tour for former Biology Chairs

RESEARCH ACTIVITIES

Effects of Bay Shore power plant on ecosystem function in Maumee Bay - NOAA, Sea Grant- C. Mayer, T. Bridgeman, C. Stepien

Role of Turbid River Plumes in the Development of *Microcystis* Blooms - Ohio Lake Erie Commission and Ohio Sea Grant - T. Bridgeman, C. Mayer, S. Heckathorn, V Sigler

Remote Sensing of Harmful Algal Blooms – U.S. Army – T. Bridgeman

Biofuels from Algae – Center for Innovative Food Technologies – T. Bridgeman, S. Heckathorn

Lake Erie Algal Source Tracking (LEAST) – USEPA – T. Bridgeman, C. Mayer, C. Gruden

Algal Bloom Studies in the Maumee River and western Lake Erie – USDA (Maumee Valley Resource Conservation and Development) - T. Bridgeman

Role of Sediments in Algal Bloom Formation – Ohio Lake Erie Commission – C. Gruden

Sludge Grant - USDA - K. Czajkowski

USDA- Phytoremediation Plant Research, Design of a Passive Biological Treatment System for Arsenic – D.F. Dwyer, D. Apul, J. Gottgens, J. Martin-Hayden

USDA- Phytoremediation Plant Research – D.F. Dwyer, J. Bossenbroek, K. Czajkowski

NRCS- Stream Gage Installation- Maumee River GIS Development – D.F. Dwyer

USDA- Phytoremediation and Plant Research, OH: Wetlands – D.F. Dwyer, W.V. Sigler, A.L. Spongberg, D. Apul

Maumee Bay State Park Wetland Restoration - ODNR - D.F. Dwyer

Turbidity Effects on Yellow Perch - Great Lakes Fishery Commission – C. Mayer, J. Bossenbroek, and T. Bridgeman

Dreissena effects on aquatic ecosystems - NY Sea Grant, Lake Erie Protection Fund – C. Mayer and graduate students P. Armenio and K. DeVanna

Neogobiin Fish Research - NSF - C. Stepien (final report completed April 2009)

Walleye/Perch Research - Ohio Sea Grant - C. Stepien

Fish Genetic Stock Research - US EPA - C. Stepien

Research Experiences for Teachers – NSF RET – C. Stepien (with T. Bollin)

Brazil Visiting Graduate student – NSF Deepfin project – C. Stepien (summer 08)

NSF Gk-12 Project: Graduate Fellows in High School STEM Education: An Environmental Science Learning Community at the Land-Lakes Ecosystem Interface – C. Stepien, T. Bridgeman, D. Moorhead, C. Gruden, and T. Fisher

NSF URM Program: Undergraduate Research and Mentoring in Environmental Sciences at the Land – Lake Ecosystem Interface – V. Sigler and C. Stepien

USDA VHS Fish Virus Project – C. Stepien, J. Willey, J. Bossenbroek

Emerald Ash Borer – USDA – J. Bossenbroek

Dreissenid Spread in Colorado – State of Colorado - J. Bossenbroek

Unionid Mussels in Ottawa River – U. Toledo USR&CAP – J. Bossenbroek

List of LEC 2008-9 publications

	Authors *=students, postdocs, techs Bold=LEC members or board or Gk-12	Journal, issue, pages (when available)	Title
2008-01	Barnswell* & Dwyer	<i>Ohio Journal of Science</i> 107:91-103	Vascular flora of the King Road Landfill in northwest Ohio
2008-02	Zhu, Mayer , Rudstam, Mills, & Ritchie	<i>Aquatic Botany</i> 88:358-362	Experimental examination of light and phosphorus effects on submerged macrophytes: implications for ecosystem changes in North American lakes.
2008-03	Morzillo et al. (Bossenbroek)	<i>ESA Bulletin</i> 89(2): 193–203	A young scientist's guide to gainful employment: recent graduates' experiences and successful strategies
2008-04	Brown, J.E.* & Stepien, C.A.	<i>Molecular Ecology</i> 7(12): 1757-1769	Ancient divisions, recent expansions: Phylogeography and population genetics of the round goby <i>Apollonia melanostoma</i>
2008-05	Bodamer* & Bossenbroek	<i>Freshwater Biology</i>	Wetlands as barriers effects of vegetated waterways on downstream dispersal of zebra mussels
2008-06	Cecala, R.K. Mayer, C. M. , Schulz, K.L. & Mills, E. L.	<i>Journal of Integrative Plant Biology</i> 50 (11):	Increased benthic algal primary production in response to the invasive zebra mussel (<i>Dreissena polymorpha</i>) in a productive ecosystem, Oneida Lake, NY.
2008-07	Haponski, A.E.* & Stepien, C.A. >	<i>Molecular Phylogenetics and Evolution</i> 49: 69-83. Doi:10.1016/j.ympev.2008.07.013	Molecular, morphological, and biogeographic resolution of cryptic taxa in the Greenside Darter <i>Etheostoma blennioides</i> complex.
2008-08	Neilson, M.E.* & Stepien, C.A.	<i>Biological Journal of the Linnean Society</i> 96(3): 664-684. Doi:10.1111/j.1095-8312.2008.01135.x	Evolution and phylogeography of the tubenose goby <i>Proterorhinus</i> (Gobiidae: Teleostei): evidence for new cryptic species
2008-09	Brown, J.E.* & Stepien, C.A.	<i>Molecular Ecology</i> 18:64-79. doi: 10.1111/j.1365-294X.2008.04014.x	Invasion genetics of the round goby: Tracing Eurasian source populations to the New World.
2008-10	Feldheim, Willick, Brown* , Neilson* , Murphy , & Stepien	<i>Molecular Ecology Resources</i> 9(2):639-644. doi:10.1111/j.1755.1098.2008.0495	Microsatellite loci for Ponto-Caspian gobies: markers for assessing exotic invasions

	Authors *=students, postdocs, techs Bold=LEC members or board or Gk-12	Journal, issue, pages (when available)	Title
2009-01	Muirhead, J. R., A. M. Bobeldyk, J. M. Bossenbroek , K. Egan & C. Jerde	<i>Bioeconomics of Invasive Species: Integrating Ecology, Economics, Policy, and Management</i> (eds. Keller, Lodge, Lewis, and Shogren). Oxford University Press.	Estimating dispersal and predicting spread of nonindigenous species. In <i>Bioeconomics of Invasive Species: Integrating Ecology, Economics and Management</i>
2009-02	Herborg, L.M., J. Drake, J. Rothlisberger & J. M. Bossenbroek .	(eds. Keller, Lodge, Lewis, and Shogren). Oxford University Press.	Forecasting suitable habitat for invasive species using ecological niche models and the policy implications of forecasts. In <i>Bioeconomics of Invasive Species: Integrating Ecology, Economics and Management</i>
2009-03	Jerde, C. & J.M. Bossenbroek	(eds. Keller, Lodge, Lewis, and Shogren). Oxford University Press.	Uncertain Invasions: A biological perspective. In <i>Bioeconomics of Invasive Species: Integrating Ecology, Economics and Management</i>
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