

ANNUAL REPORT: June 1, 2014 – May 31, 2015
(i.e., Summer 2014, AY 2014-2015)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

*****PLEASE DO NOT INSERT TABLES FOR ANY CATEGORIES*****

NAME: Karin Limburg

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>	<u>No. of Lab. Sections</u>
SUMMER:					
FALL:		- on sabbatical -			
SPRING:	EFB 500	The Hudson River Watershed	2	3	(seminar + field course) (+ 1 audit)

NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT. For examples of service-learning in courses, see: <http://www.esf.edu/students/service/courses.htm>. Service-learning is a form of structured experiential education in which students engage with the community to be active learners, to enrich their sense of civic responsibility, and to explore practical application for course content. Faculty oversight, reflective thinking, and reciprocity are key components of service-learning.

We will be reaching out to the general public in the field portion of EFB 500.

2. Non-Scheduled Course Offerings (e.g., 496, 899, 999)

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>
FALL:	EFB899	Master's thesis research	2	1
	EFB999	Doctoral thesis research	11	2
SPRING:	EFB 498	Research/EFB	2	2
	EFB 796	Ecological modeling	2	4
	EFB 899	Master's thesis research	6	1
	EFB999	Doctoral thesis research	10	2

3. Continuing Education and Extension (short courses, workshops, etc.)

4. Guest Lecture Activities

<u>Course No.</u>	<u>Title</u>	<u>No. of Lectures</u>
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- BEE/EAS4940 Seminar on climate solutions, Cornell University
- Fisheries Methods (course number unknown), East Carolina University
- LSA 496 – Design Lab for NY Waters
- (all of these were one lecture apiece)

II. **STUDENT ADVISING**

A. Number of undergraduates for whom you are the student's official advisor 13 and unofficial advisor _____

B. Graduate Students: (list name, degree sought, starting date, month & year; if a degree was completed, please give date and full citation for the thesis or dissertation).

MAJOR PROFESSOR

Mount, Sarah – M.Sc., began Sept. 2013

Nack, Christopher – Ph.D., began May 2013 – passed candidacy exam, Spring 2015

Evans, Thomas; Ph.D., began September 2012 – passed candidacy exam, Spring 2015

CO-MAJOR PROFESSOR

Hamberg, Jonas; M.Sc., began 9-2013 (GPES, with Stewart Diemont); defended thesis April 20. Thesis title: Factors of Loss and Restoration of *Vallisneria americana* in the Hudson River Estuary

Jackman, George; PhD, began 9-2008 (CUNY Queens College, with John Waldman); passed qualifier exams, June 2010. Defended dissertation May 7, 2015. Dissertation title: *The Ecology of Winter Flounder from an Otolith Perspective*

MEMBER, STEERING COMMITTEE (other than those listed above)

Amos, Benjamin, MPS

Gurdak, Daniel, PhD (passed qualifier exams October 2011)

Hazell, C.J.; PhD (passed qualifier exams 2006?)

Hermann, Ted, PhD (passed qualifier exams August 2014)

Matillano, Joie, PhD

Mohan, John; PhD, University of Texas (will defend Aug. 2015)

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

- External examiner ("opponent") on doctoral dissertation, **University of Tartu, Estonia**. Date of defense: 15 May, 2015
- **Name of defendant:** Mehis Rohtla.
- **Dissertation title:** Otolith sclerochronological studies on migrations, spawning habitat preferences and age of freshwater fishes inhabiting the Baltic Sea

III. **RESEARCH COMPLETED OR UNDERWAY**

A. Departmental Research (unsupported, boot-legged; title - % time spent)

After literally years of boot-legged research on Baltic Sea cod and other fishes, to build a case for a grant from the National Science Foundation (including publishing two articles!), I finally got the grant...

B. 1. Grant-supported Research (source, subject, amount - total award and current year, award period starting and ending dates; list graduate research assistants supported by each grant)

Title	Sponsor	Start	End	Budget	# Students
Mohawk River Basin Action Agenda (w/Ringler)	NYSDEC	9/1/14	3/31/17	\$314,322	1
Collaborative Research: Consequences of sub-lethal hypoxia exposure for fishes: a trans-oceanic comparison	NSF	9/1/14	8/31/17	\$191,682 (of total \$283,564 to ESF)	1
Determining if eye lenses can be used to understand the origin and life history of adult lamprey	GLFC	10/1/13	9/30/15	\$10,000	1
Natal origins of humpback chub aggregations determined by otolith chemistry	USGS	7/1/13	1/14/16	\$112,670	1
Assessing silver eels in Hudson River tributaries	HRF	6/1/13	2/29/16	\$134,838	1
Hudson River shad recovery plan	Riverkeeper	4/1/11	6/30/15	\$99,395	1
Temporal Changes in Spawning of the Signature Fishes of the Hudson River Estuary	WRI	5/01/15	4/30/16	\$10,000	1

- Research Proposals pending (include information as in B.1., above).

SUNY 4E: Ecosystem services in Jamaica Bay: a model ecosystem in an urban context	SUNY RF	6/1/15	5/31/16	ca. \$130,000
Losing track of time: causes and solutions for the problematic determination of Baltic cod age	Formas (Sweden)	1/1/16	12/31/18	ca. \$352,000
Reconnecting waters for eels and river herring: a mediated modeling approach to assess receptivity to dam removal in the Hudson-Mohawk watershed	NYSG	2/1/16	1/31/18	\$129,276

- Research Proposals submitted, but rejected (include information as in B.1., above)

Evaluating the Impacts of Climate Change on the Early Life Stages of American Shad and Spawning of Alosine Species in the Hudson River Estuary	HRF	6/1/15	6/30/16	\$41,637
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IV. PUBLICATIONS (Full bibliographic citation, i.e., do not use "with Jones," or "Jones, et al."; please list only publications published, in press, or actually submitted during this reporting period --- **do not list manuscripts in preparation**).

A. Refereed Publications

- Elfman, M., K.E. **Limburg**, H. Svedäng, H. Wickström, M. Borysiuk, L. Ros, N.S. Abdel, P. Kristiansson, E.J.C. Nilsson, and J. Pallon. 2015. A decade's worth of otolith PIXE analyses: early trials, current status, and future plans at the Lund Ion Beam Analysis Facility (LIBAF). *Nuclear Instrumentation Methods B* (in review).
- Evans*, T.M., and K.E. **Limburg**. 2015. The distribution of larval lampreys and their nutritional sources in the Hudson River Basin. *Northeastern Naturalist* 22: 69:83.
- Glavovic, B.C, **Limburg**, K., Liu, K.-K., Emeis, K.-C., Thomas, Kremer, H., B. Avril, J. Zhang, M.R. Mulholland, M. Glaser, and D.P. Swaney. 2015. Living on the Margin in the Anthropocene: Engagement area for global sustainability research and action. *Current Opinion in Environmental Sustainability* (in press).
- Levin, L., K.-K. Liu, K.-C. Emeis, D.L. Breitburg, J. Cloern, C. Deutsch, M. Giani, A. Goffart, E.E. Hofmann, Z. Lachkar, K. **Limburg**, S.-M. Liu, E. Montes, W. Naqvi, O. Ragueneau, C. Rabouille, S. Sarkar, D. Swaney, P.F. Wassman, and K. Wishner. 2015. Comparative biogeochemistry-ecosystem-human interactions on dynamic continental margins. *Journal of Marine Systems*. 141: 3-17. DOI: 10.1016/j.jmarsys.2014.0
- Limburg**, K.E., B.D. Walther*, Z. Lu, G. Jackman*, J. Mohan, Y. Walther, A. Nissling, P.K. Weber, and A.K. Schmitt. 2015. In search of the dead zone: use of otoliths for tracking fish exposure to hypoxia. *Journal of Marine Systems* 141: 167-178. DOI: 10.1016/j.jmarsys.2014.02.014
- Nack*, C.C., K.E. **Limburg**, and R.E. Schmidt. 2015. Diet composition and feeding behavior of larval *Alosa sapidissima* (Wilson 1811) after the introduction of an invasive bivalve, *Dreissena polymorpha* Pallas 1771, in the Hudson River Estuary, NY. *Northeastern Naturalist* (in press)
- Payne Wynne*, M., K.A. Wilson, and K.E. **Limburg**. 2015. Retrospective examination of habitat use by blueback herring (*Alosa aestivalis*) using otolith microchemical methods. *Canadian Journal of Fisheries and Aquatic Science* 10.1139/cjfas-2014-0206.
- Turner*, S., K. **Limburg**, and E. Palkovacs. 2015. Can different combinations of natural tags identify river herring natal origin at different levels of stock structure? *Canadian Journal of Fisheries and Aquatic Sciences* 72: 1–10.
- Turner*, S.M., and K.E. Limburg. 2015. Does daily growth affect the rate of manganese uptake in juvenile river herring otoliths? *Estuaries and Coasts* (accepted pending minor revision).

*Current or former (i.e., Walther) students

B. Non-refereed Publications

- Limburg**, K.E. 2014. The Secret Life of the Humpback Chub. *Boatman's Quarterly Review* Fall 2014:11-14.
- Waldman, J., K.E. **Limburg**, and A. Roe. 2014. Let the River Run Wild. *The New York Times*. Sept. 7, 2014. (Op-ed)

C. Papers Presented at Science Meetings (give title, date, occasion, and location)

- Limburg**, K.E. Fish tales through fish heads. Poster presented at the 5th International Otolith Symposium, October, Mallorca, Spain.
- Limburg**, K.E., T. Evans, and A. Locket. Shades of Sophie Dove? The potential of eye lens chemistry as a complementary archive of environmentally relevant information. Paper presented at the 5th International Otolith Symposium, October, Mallorca, Spain.
- Limburg**, K.E., Luzadis, V.A. Isn't it time to put human population growth and attendant consumption back on the radar screen? Paper presented at the International Society of Ecological Economics, August

2014, Reykjavik, Iceland.

Limburg, K.E., C.C. Nack, and J.R. Waldman. Climate Change and Urban Sprawl – Impacts to Anadromous (and other) Fish. Paper presented at Hudson River Environmental Society Annual Conference, May 2014, New Paltz, NY.

Limburg, K.E., Roe, A. To Think the Unthinkable: Why Large Mainstem Dams Shouldn't Always Stay Up. Paper presented at the American Fisheries Society Annual Meeting, August, 2014, Quebec City.

Limburg, K.E., and C. Olson. Paleo- and modern salinity and temperatures as recorded by Baltic Sea cod *Gadus morhua* over millennia. Poster presented at the 5th International Otolith Symposium, October, Mallorca, Spain.

Mount, S.J., K.E. **Limburg**, R.E. Schmidt, and C. Bowser. The development of a non-lethal maturity index for American eels. Paper presented at the American Fisheries Society Annual Meeting, Quebec City, August, 2014, Quebec City.

D. Public Service Presentations (lectures, seminars, etc. to and for the public; give group or occasion, date(s), and attendance)

Title: “The ‘other’ biogeochemistry: Otoliths and their use to reconstruct the lives of fishes.” 26 March 2015, East Carolina University; attendance ca. 30.

Also, two more presentations of essentially the same seminar, at

- School of Marine and Atmospheric Sciences, Stony Brook University, 8 May 2015. Attendance: ca. 60.
- University of Tartu, Estonia, 14 May 2015. Attendance: ca. 30

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):
2. Industrial and Commercial Groups, etc.

B. Unfunded Service to Governmental Agencies, Public Interest Groups, etc.

- Technical working group on River Herring (for NOAA and the Atlantic States Marine Fisheries Commission); includes serving on Habitat and Climate Change sub-committees
- Scientific advisor, Mohawk River Basin Program (NYSDEC)
- Scientific advisor, Hudson River Estuary Program (habitat restoration)
- Member, Conseil Scientifique (Science Advisory Board) for “LabEx COTE – Evolution, Adaptation and Governance of Continental-to-Coastal Ecosystems” – Bordeaux, France
- Member, Continental Margins Working Group (IMBER-LOICZ); assumed co-chairmanship, Jan. 2015 (3-year term)
- External reviewer for P&T decision, UMass Amherst (for Asst. → Assoc.)

- External reviewer for P&T decision, UMass Dartmouth (for Assoc. → Full Prof.)

VI. PROFESSIONAL DEVELOPMENT

A. Professional Honors and Awards (for teaching, research, outreach, etc.)

- Became a Visiting Professor, 10% time, Department of Aquatic Resources, Swedish University of Agricultural Sciences, 1 May 2014 (3-year appointment)
- Nominated for Lise Meitner Visiting Professorship, Department of Physics, Lund University (have not yet heard the outcome)

B. 1. Activities in Professional Organizations (offices held, service as chairman, member, participant or consultant)

- Hudson River Environmental Society – **Board Member**
- American Fisheries Society – **President-elect, Estuaries Section**

2. Professional Society Membership

- American Fisheries Society
- American Institute of Biological Sciences
- American Society of Limnology and Oceanography
- Coastal and Estuarine Research Federation
- Ecological Economics (both the International and U.S. chapters)
- Ecological Society of America
- Hudson River Environmental Society
- Sigma Xi

3. Other Professional Activities

a. Editorial activity

<u>Journal (s)</u>	<u>Responsibility</u>
• Ecology and Society Handled 3 manuscripts	Subject editor
• Estuaries and Coasts Handled 11 manuscripts	Subject Editor
• Frontiers in Ecology & the Environment Handled 3 manuscripts	Subject Editor

Other (books, symposia, etc.)

- Contributed to a book chapter for “The world’s water quality – a pre-study for a worldwide assessment” (Case study of Hudson River, led by D. Swaney)

b. Reviewer

<u>Journal(s)</u>	<u>No. of manuscripts</u>
Canadian Journal of Fisheries & Aquatic Sciences	3
Chemical Geology	1

Conservation Biology	1
Estuaries and Coasts	1
ICES Journal of Marine Science	2
Journal of Experimental Marine Biology & Ecology	1
Oceanography Magazine	1
Transactions of the American Fisheries Society	1

<u>Agency</u>	<u>No. of proposals</u>
Delaware Sea Grant	1

<u>Other</u>	
Cornell High Energy Synchrotron Source	5
Labex-COTE (French center of excellence)	9

c. Participation (workshops, symposia, etc.)

<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
Member, Steering Committee, 5 th International Otolith Symposium,	20-24 October, 2014,	Mallorca, Spain
SUNY 4E workshop, "Assessing Ecosystem Services of Jamaica Bay" (Served as PI; developed a proposal for further collaborative work)	29-31 January 2015,	Stony Brook University,

C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.

Participant, workshop on Maia detector, Cornell High Energy Synchrotron Source, 14-16 October, 2014, Cornell University

D. Foreign Travel (Where, When, Purpose)

- Sweden, June 2014 – work with colleagues at Stockholm University and Lund University; hosted by the Baltic Sea Centre
- Reykjavik, Iceland, 12-15 August 2014; attended International Society for Ecological Economics conference
- Quebec City, PQ, Canada, 17-22 August 2014; attended American Fisheries Society Annual Meeting
- Mallorca, Spain, 20-24 October 2014; 5th International Otolith Symposium
- Bordeaux, France, 2-8 December 2014; advisory board for Labex-COTE (University of Bordeaux, center of transdisciplinary excellence)

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

Member, EFB Graduate Program Advisory Committee

Member, EFB Promotion and Tenure Committee

Member, mentoring committees for Jonathan Cohen, Stewart Diemont, and Rebecca Rundell

B. College-level

Member, Adirondack Ecological Center faculty advisory committee

Member, ESF strategic planning discussion group (Question 3 Committee Report: How can we meet human needs while conserving the environment?)

(Not sure where this fits, so I will put it here) Participant in Presidential Inaugural Symposium, *Foundations for a New American Environmentalism*, 11 September 2014

C. University-wide, including Research Foundation

Member, 4E Faculty Steering Committee, SUNY Research Foundation

VIII. SUMMARY OF SIGNIFICANT ACTIVITIES AND ACCOMPLISHMENTS DURING THIS REPORTING PERIOD, ESPECIALLY THOSE MOST NOTEWORTHY AND RELATIVE TO THE COLLEGE'S AND DEPARTMENT'S MISSION.

One paragraph on each of the following (i.e., three paragraphs total) would be most helpful: this past year, what have you done for our students, department/college, and self professionally? NOTE: The information in this section (along with the supporting specific information elsewhere in this report) should be your strongest case for being considered for a discretionary raise (when available), which I'll continue to award based on your contributions to the department and college this reporting period.

For students, I mentored and taught in the spring semester as I was on sabbatical leave in the fall. I spent a great deal of time working with my graduate students, helping them to write manuscripts and work on their theses and dissertations. This has resulted in higher publication rates by these students, as evidenced by their dominance in this year's publication list. I also provided informal advisory guidance to several students from other universities, and trained students from the University of Southern Maine in the use of our laser ablation ICP-mass spectrometer. I will be training more students over the summer.

For the department, I continued service on the Graduate Program Advisory Committee, and have now turned over the reins to co-chairs Melissa Fierke and Jonathan. Under their leadership, new initiatives include a survey of the graduate students, a stock-taking of quantitative course offerings, and a revised grad student manual. I also continue to serve on the department's Promotion and Tenure Committee. One of the most fun things I did for the department was to participate in our Bio-blitz of Onondaga Lake and surroundings. Despite the poor weather, it was great to collaborate with faculty and students as we surveyed the biota of the region; we in the tributaries group witnessed the take-over of benthic habitat by the round goby, for example. **For the college**, I served this year on a sub-committee for developing directions in our strategic planning; this committee was charged with the question, "how can we meet human needs while conserving the environment?" Our suggestions were exciting, as they could potentially place ESF in a leadership role on several key topics including ecological economics. I also represent the college as a member of the Technical Steering Committee as well as the Faculty Leadership Team of the SUNY 4E Network of Excellence. Finally, I serve as ESF's liaison to the Environmental Consortium of Colleges and Universities (a consortium within the Hudson River watershed).

For myself, I still feel that my biggest accomplishment was finally to publish a coherent paper on the use of biogeochemical tracers of hypoxia (“dead zones”) recorded in fish otoliths. Online and open access, this paper rose to the top of the “Most Downloaded Articles” in the journal (*Journal of Marine Systems*, which although not read by many ESF faculty, is highly regarded in the marine science community). It has remained on the top-10 list for over a year (currently #3).

On sabbatical leave in the fall, I began work on a different kind of a book. Tentatively titled *Fish Tales Through Fish Heads*, it is intended for the general public, and describes fishes I have learned about through study of their ear-stones (otoliths), the small, calcified structures in their inner ears. I have spent the past 18 years learning to measure and interpret the chemical composition of these structures via making 2-dimensional “maps” of trace elements in these otoliths. In some cases, the maps are striking and artistic, which was the inspiration for undertaking this book. I was able to get a good start on it, and hope to flesh out enough chapters over the summer to be able to take it to an agent or a publisher. The book has become more of a synthesis of prose and art, and I hope it will reach a large audience of those interested in “hearing fishes tell their own story.”

I was interested in becoming an adjunct at a Swedish university, in order to compete for grants and students there. Because that is not easy to do in Sweden, instead I became a Visiting Professor (10% time, 3 years beginning May 1) in the Department of Aquatic Resources, Swedish University of Agricultural Sciences (Sveriges Lantbruksuniversitet, SLU). Note that this department is the research arm of the former Fisheries Board of Sweden; that agency was dismantled several years ago and re-organized.

In addition, I have been nominated for a Lise Meitner Visiting Professorship in the College of Engineering, Lund University. The decision is still pending. If approved, it would run concurrently with the other visiting professorship at SLU.

I continue to do national- and international-scale service. Nationally, I will be transitioning into President (from President-Elect) of the Estuaries Section of the American Fisheries Society. Internationally, I serve as advisor to a center of excellence in interdisciplinary environmental research at the University of Bordeaux, and also as co-chair of the IMBER-Future Earth Coasts Continental Margins Working Group; we are in the process of re-constituting its committee and thrust for our next three-year term, but it will undoubtedly involve a focus on the Arctic.

Finally, I continued to engage in the debate about mainstem dam removal, co-authoring an op-ed in the *New York Times* that drew many comments (mostly positive) and has opened a window on “out of the box” thinking about this thorny issue.

IX. A. FUTURE PLANS, AMBITIONS, AND POTENTIAL CONTRIBUTIONS FOR YOUR OWN PROFESSIONAL DEVELOPMENT AND THE ENHANCEMENT OF THE PROGRAM IN ENVIRONMENTAL AND FOREST BIOLOGY (brief summary)

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2015

a. Course(s) to be offered

EFB 500	The Hudson River Watershed	(field course)
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b. Proposed research activity

- Hudson River eels
- Mohawk River fisheries
- Hypoxia impacts on fish populations

- Review article on otoliths (invited)

c. University, professional society, and public service

- Become President of Estuarine Section, American Fisheries Soc. (2-year term)
- Co-chair, Continental Margins Working Group (3-year term)
- Co-organizer of full day of sessions at the 100th Meeting of the Ecological Society of America
- Co-organizer of symposium at American Fisheries Society Annual Meeting

2. Fall Semester 2015

a. Course(s) to be offered

- EFB 487/687 Fisheries Science and Management
- EFB 496/796 “Thinking the Unthinkable” (with LSA)

b. Proposed research activity

- Hudson River eels
- Mohawk River fisheries
- Hypoxia impacts on fish populations
- Continental margins
- Baltic Sea cod
- Jamaica Bay (?)

c. University, Professional society, and public service

- Co-chair, Continental Margins Working Group
- Co-convener, theme session on hypoxia, International Council for the Exploration of the Seas Annual Science Conference (Sept. 2015)

3. Spring Semester 2016

a. Course(s) to be offered

- Ecological Modeling
- (possibly an introduction to R)

b. Proposed research activity

- Hudson River eels
- Mohawk River fisheries
- Hypoxia impacts on fish populations
- Continental margins
- Baltic Sea cod
- Dam removal

c. University, professional society, and public service