

ANNUAL REPORT: June 1, 2015 – May 31, 2016
(i.e., Summer 2015, AY 2015-2016)
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:	EFB 500	The Hudson River Watershed	1	6	1 (field course)
FALL:	EFB 487	Fisheries Science & Management	3	28	0
	EFB 687	Fisheries Science & Management	3	2	0

SPRING: (only 497/797, 796, and independent studies, see below)

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.

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>
	EFB 796	Ecological Modeling in STELLA and R		2 4
	EFB 497/797	Melting in the Anthropocene	1	4 undergrad, 6 grad
	EFB/LSA 496/796	Sharing a River to Save It (*)	3	2 undergrad, 5 grad
	EFB 497/797	Migration Ecology of Marine Fishes	1	6 undergrad, 6 grad
	EFB 899	Master's thesis research	2	2
	EFB 999	Doctoral thesis research	8	6
	ENS 999	Doctoral thesis research	6	3

(*) Co-taught jointly with "Design Lab for Northeastern Waters," Cornell University Department of Landscape Architecture

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>
EFB 424/<grad #>	Limnology	1
EFB 423/<grad #>	Marine Ecology	1
FOR 442/642	Watershed Ecology & Management	1

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor _19_ and unofficial advisor _0_

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

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

Ewell Hodkin, Cara – Ph.D., began January 2016

Mount, Sarah – M.Sc., began Sept. 2013 – **defended thesis** February 2016, submitted April 2016: *Searching for Silver: An Examination of the Physical and Environmental Characteristics of Maturing American Eels*

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

Samson, Melvin – Ph.D., began May 2015

Smith, Kayla – Ph.D., began September 2015

CO-MAJOR PROFESSOR

MEMBER, STEERING COMMITTEE (other than those listed above)

Cernadas-Martin, Sara – Ph.D., Stony Brook Univ. – passed candidacy exam, October 2015

Gurdak, Daniel, PhD – passed candidacy exam, October 2011

Hermann, Ted, PhD – passed candidacy exam, August 2014

Matillano, Joie, PhD

McCartin, Kellie – Ph.D., Stony Brook Univ. – passed candidacy exam, January 2016

Mohan, John – Ph.D., University of Texas – *defended* August 2015

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

Burnham, Anne – M.Sc., defended November 2015 (served as reader)

Arens, Karen – Ph.D., defended April 2016 (served as chair)

III. RESEARCH COMPLETED OR UNDERWAY

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

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)

- Baltic Sea 2020: "Eastern Baltic Cod: Solving the ageing and stock assessment problems with combined state-of-the-art tagging methods." 27M SEK (approx. \$3.2 million), 1/01/2016 – 12/31/2019; will support 4 PhD students in 4 Baltic countries; KL is co-PI and leading the otolith chemistry work package.
- Cornell University, NY Water Resources Institute: "Temporal changes in spawning in signature fishes of the Hudson River estuary." 1/01/2015 – 3/31/2016, \$10,000; supports 1 student (Chris Nack, who wrote the proposal).
- Hudson River Foundation: "Assessing silver eels in Hudson River tributaries." 6/1/13 – 12/31/16, \$134,838; supports 2 students (Sarah Mount, Kayla Smith)
- Hudson River Foundation: Mark Bain Fellowship award to Thomas Evans, "Understanding ammocoete movement and ecology." 9/01/14 – 3/31/17; \$17,000, 1 student supported (Tom Evans)
- Hudson River Foundation: Mark Bain Fellowship award to Christopher Nack, "Evaluating the impacts of large storm events on the early life stages of American shad." \$17,000, 7/01/15 – 12/31/16; 1 student supported (Chris Nack)
- National Science Foundation: "Collaborative Research: Consequences of sub-lethal hypoxia exposure for fishes: a trans-oceanic comparison." 9/1/14 – 8/31/17, \$283,564; supports 1 student (Melvin Samson)
- NYSDEC, Mohawk River Basin Action Agenda (w/Neil Ringler). KL's part: "Determining the provenance and life histories of blueback herring in the Mohawk River." 9/1/14-3/31/17, \$115, 171; 3 students supported on my part of the award (Chris Nack, Kayla Smith, Cara Ewell Hodkin)
- NY Sea Grant: "Reconnecting waters for eels and river herring: a mediated modeling approach to assess receptivity to dam removal in the Hudson-Mohawk watershed." 2/01/16 – 1/31/18, \$132,780; supports 1 student (Kayla Smith)
- Swedish Research Council FORMAS: "Losing track of time: dubious age determination of Baltic cod, probable causes and promising solution." 3M SEK (approx.. \$353,000), 1/01/16 – 12/31/18; will support 1 PhD student at the Swedish University of Agricultural Sciences (SLU), where KL is a Visiting Professor and lead PI.
- USGS: "Natal origins of humpback chub aggregations determined by otolith chemistry." 7/1-13 – 9/30/16, \$112,670; supports 1 student (Tom Evans)

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

Virginia Sea Grant: "Impacts of large storm events on the early life stages of American Shad and the importance of non-mainstem habitat." 7/01/2016 – 6/30/17, \$30,000 requested. (written by Chris Nack)

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

SUNY RF: "SUNY 4E: Ecosystem services in Jamaica Bay: a model ecosystem in an urban context." \$130,000

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. *Nuclear Instrumentation Methods B* 24: 85-100.

- Glavovic, B.C., K. **Limburg**, K.-K. Liu, K.-C. Emeis, H. Thomas, H. Kremer, B. Avril, J. Zhang, M.R. Mulholland, M. Glaser, and D.P. Swaney. 2015. Living on the Margin in the Anthropocene: Engagement areas for global sustainability research and action. *Current Opinion in Environmental Sustainability* 14: 232-238.
- Hamberg, L.J., S.E.G. Findlay, K.E. **Limburg**, and S.A.W. Diemont. 2016. Post storm sediment burial and herbivory of *Vallisneria americana* in the Hudson River estuary: Mechanisms of loss and implications for restoration. *Restoration Ecology* (revision submitted).
- Hermann, T.W., D.J. Stewart, K.E. **Limburg**, and L. Castello. 2016. Unravelling the life-history of Amazonian fishes through otolith microchemistry. *Royal Society Open Science* (revision submitted).
- Jackman, G., K.E. **Limburg**, and J. Waldman. 2015. Life on the bottom: the chemical and morphological asymmetry of winter flounder (*Pseudopleuronectes americanus*) sagittae. *Environmental Biology of Fishes* DOI 10.1007/s10641-015-0451-z.
- Limburg**, K.E., and M. Elfman. 2016. Insights from two-dimensional mapping of otolith chemistry. *Journal of Fish Biology* (in press).
- Limburg**, K.E., and S.M. Turner. 2016 (Online First). How common is “non-textbook” migration in Hudson River blueback herring? *Estuaries and Coasts*. DOI: 10.1007/s12237-016-0068-2.
- 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* 22: 437-450.
- Turner, S.M., and K.E. **Limburg**. 2015. Does daily growth affect the rate of manganese uptake in juvenile river herring otoliths? *Transactions of the American Fisheries Society* 144:873-881.
- Turner, S.M., and K.E. **Limburg**. 2016. Juvenile river herring habitat use and marine emigration trends: comparing populations. *Oecologia* 180: 77-89.

B. Non-refereed Publications

- Limburg**, K., R. Brown, R. Johnson, W. Pine, R. Rulifson, D. Secor, K. Timchak, B. Walther, and K. Wilson. 2016. Round-the-Coast: Snapshots of Estuarine Climate Change Effects. *Fisheries Magazine* (due out in July)
- Waldman, J., and K. **Limburg**. “Sharing” a River to Save It. *Yale environment-360*. July 2015. (Op-ed)
- Various writings for the Estuaries Section of the American Fisheries Society (“President’s column,” etc.)

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

- **Limburg**, K.E., and R.M. Hughes. “Putting human population growth and attendant consumption back on the radar screen: A fisheries perspective.” August 6, 2015, Centennial meeting of the Ecological Society of America, Baltimore
- Elfman, M., and K.E. **Limburg** (presenter). “2-D Micro-Mapping of Otolith Chemistry: Insights and Discoveries with Pictures.” August 18, 2015, American Fisheries Society, Portland, OR.
- Johnson, R., R. Stewart, F. Feyrer, and K.E. **Limburg**. “Otolith tools in the ecotoxicology toolbox: Unraveling sources and pathways of Se exposure in wild Sacramento Splittail with spinal deformities.” Aug. 18, 2015, American Fisheries Society annual meeting, Portland, OR.
- **Limburg**, K.E., B. D. Walther, Z. Lu, Y. P. Weber, Y. Walther, J. Mohan, G. Jackman, A. Nissling, A. Schmitt. “Tracking the Dead Zone: Use of Otolith Chemistry to Identify Interactions of Fishes with Hypoxia.” August 20, 2015, American Fisheries Society, Portland, OR.

- **Limburg, K.E., B. Walther, Z. Lu, M. Samson, and M. Altenritter.** “A bioenergetics- and biogeochemistry-based model of Mn uptake in fish otoliths.” September 27, 2015, ICES Annual Science Conference, Copenhagen, Denmark.
- **Limburg, K.E., and K. Hüsey.** “Losing track of time: is hypoxia in part to blame for Baltic cod aging problems?” February 2016, Ocean Sciences Meeting, New Orleans.
- Ewell Hodkin, C., and K. E. **Limburg.** “Determining the Provenance and Life Histories of Blueback Herring in the Mohawk River.” Poster presented at the Mohawk Watershed Symposium, Schenectady, NY (March 18) and at the Hudson River Environmental Society annual symposium New Paltz, NY (May 4).
- Smith, K.M., K.E. **Limburg,** A. Feldpausch-Parker, and A.J. Smith. “Reconnecting Waters for Eels and River Herring: A mediated modeling approach to assess receptivity to dam removal in the Hudson-Mohawk Watershed.” Poster presented at the Mohawk Watershed Symposium, Schenectady, NY (March 18) and at the Hudson River Environmental Society annual symposium New Paltz, NY (May 4).

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

- Dale Travis Lecture, “The Future of Fisheries: Choices, Decisions, and the Role of the Arts,” Halloween, 2015 (attendance ca. 150?)
- Keynote speaker, Mohawk Watershed Symposium, March 18, 2016 (attendance ca. 100)

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.

- Member, technical working group on River Herring (for NOAA Fisheries and the Atlantic States Marine Fisheries Commission); includes serving on Habitat and Climate Change sub-committees
- NOAA Fisheries, North Atlantic Regional Team (NART): Linking freshwater and ocean dynamics towards integrative ecosystem modeling: opportunities and challenges
- Member, Native Fishes Committee, NY American Fisheries Society Chapter (helps the DEC)
- 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
- Co-chair, Continental Margins Working Group (IMBER-LOICZ);
- Global Ocean Oxygen Network (GO₂NE) member (a program of UNESCO’s International Oceanographic Commission)
- External reviewer for P&T (Assistant → Associate), University of Maryland
- External examiner, doctoral dissertation, SOLEIL Synchrotron, Paris, France

VI. PROFESSIONAL DEVELOPMENT

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

- Visiting Professor, Department of Aquatic Resources, Swedish University of Agricultural Sciences (SLU); 5/2015 – 4/2018.
- Lise Meitner Visiting Professor, Division of Nuclear Physics, Dept. of Physics, Lund University; 11/2015 – 10/2018.

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

- American Fisheries Society, Estuaries Section president (2015-2017)
 - Co-chaired session at AFS 2015 meeting on “Frontiers in Otolith Chemistry Research”
- American Fisheries Society, Governing Board member
- Board member, Hudson River Environmental Society
- Co-organized/co-chaired session on “Causes and Consequences of Marine Hypoxia” at the Annual Science Conference of the International Council for the Exploration of the Seas (ICES)
- Co-organized/co-chaired two linked sessions at the 100th anniversary meeting of the Ecological Society of America; one was on population stabilization and the other was on ecological economics (related to population stabilization)

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 2 manuscripts	Subject editor
• Estuaries and Coasts Handled 10 manuscripts	Subject Editor
• Frontiers in Ecology & the Environment Handled 5 manuscripts	Subject Editor

Other (books, symposia, etc.)

b. Reviewer

<u>Journal(s)</u>	<u>No. of manuscripts</u>
Canadian J. of Fisheries & Aquatic Sciences	1
BioGeosciences	1
Est. Coastal & Shelf Sci.	1
CABI invasive spp catalog review	1
Journal of Fish Biology	2
AFS <i>Fisheries</i> magazine	12 (*)
Nature Communications	1
Fisheries Research	1
Fishery Bulletin	1
Comparative Biochemistry and Physiology	1
USGS internal mss. review	1

(*) I review the Policy Column for every issue. I've done this for several years, but kept forgetting to list this service.

<u>Agency</u>	<u>No. of proposals</u>
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Other

c. Participation (workshops, symposia, etc.)

Name of workshop, etc.

Date

Place

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

D. Foreign Travel (Where, When, Purpose)

Copenhagen, Denmark, September 2015 to attend ICES Annual Science Conference (ICES = International Council for the Exploration of the Seas), where I chaired a session I co-organized

Paris, France, September 2015, to serve as external examiner on PhD defense

Copenhagen, Denmark, Lund, Sweden, and Lysekil, Sweden May 2016, to work with various colleagues as part of my being a visiting professor at Lund U. and SLU

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

Member, Graduate Program Advisory Committee

B. College-level

Member, College-wide P&T Review Committee
Provost search committee

C. University-wide, including Research Foundation

Participated in SUNY 4E network

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 the students: This past academic year, I let students enter my world a bit, by teaching two seminars and an experimental class, in addition to my usual offerings. A seminar I ran last fall, titled "Melting in the Anthropocene," surveyed the current situation in the Arctic (rapid climate change, sea ice melting opening new commerce routes, military security issues, oil/gas/mineral/fisheries exploitation, biodiversity losses, societal disruptions...). The spring seminar, "Migration Ecology of Marine Fishes" involved reading a difficult yet highly insightful book that casts a new paradigm for marine ecosystems and how we should view fish populations there. The students seem to appreciate the cutting edge nature of these seminars, and in particular, it's been interesting to see how undergrads deal with this difficult material as well as being in amongst grad students. But the most fascinating project was to teach an experimental class with two landscape architecture colleagues (Jamie Vanucchi, now back at Cornell, and Doug Johnston) to "think the unthinkable" and consider how to take down a mile-long, 100-foot high dam near the mouth of the Susquehanna River: the Conowingo Dam, which all the local scientists and stakeholders say is "off the table" for removal. John Waldman and I have published a couple of op-eds about this, saying that it's not impossible, but takes some creative thinking. Thus, getting a group ESF and Cornell students to put their minds on this "wicked problem" was an ideal way to excite them and to generate some novel ideas. Indeed, the ESF students were so into this course, that they created a website about it (<http://sharedrivers-esf-cornell.weebly.com/>). This website has had a fair number of visitors, and we have received some nice compliments about it.

Although I am not really allowed a second paragraph, I would like to mention that it seems that my efforts to get grad students to publish as they go, or shortly after they finish, is starting to bear fruit. Of the 10 publications I listed above, 6 are first-authored by students. I hope we can continue to get students to publish, as this has become such a hurdle as regards getting ahead in the job market.

For the department and college: I continued to serve on the department's Graduate Program Advisory Committee, and began a term on the College's P&T oversight review committee. I was also involved in the strategic planning exercise. One of the most fun activities was to help organize a Dale Travis lecture in the fall. I was allowed/encouraged to bring on colleagues versed in the arts of literature, painting, and photography, all focused on fisheries and conservation. It was an amazing experience.

For myself: It seems that my expertise in otolith chemistry is now very much in demand. Thanks to this admittedly obscure expertise, I became a Visiting Professor at two different universities in Sweden, obtained my own research grant there, and am part of a multi-million dollar project involving 5 different countries. In addition, I am increasingly engaged in international research coordination efforts; some involve the "collision course" of human activities on continental margins, and others involve the worsening problem of loss of oxygen in the world's oceans. Both of these are extremely complex topics that require a multitude of expertises; I consider myself very lucky to have become engaged at this level of international science.

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)

I will very likely get quite busy with my international science work this coming year. I need to put more time into the Continental Margins Working Group; we have obtained funding from the European Space Agency to hold a workshop on issues in the Arctic. In addition, there will be work involved with the GO₂NE (Global Oxygen Network) project, which has been convened by the International Oceanographic Commission of UNESCO to highlight an emerging issue – global oceanic deoxygenation – that has not been as prominent as ocean acidification and sea level rise. Yet deoxygenation is another effect of climate warming, and has already become widespread across all major seas. This has serious implications for oceanic productivity, food web impacts, and ultimately, marine fisheries and aquaculture.

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2016

- a. Course(s) to be offered
- b. Proposed research activity
- c. University, professional society, and public service

2. Fall Semester 2016

- a. Course(s) to be offered
- b. Proposed research activity
- c. University, Professional society, and public service

3. Spring Semester 2017

- a. Course(s) to be offered
- b. Proposed research activity
- c. University, professional society, and public service