

## Environmental Conservation Graduate Program

### *Environmental Policy and Human Dimensions Concentration*

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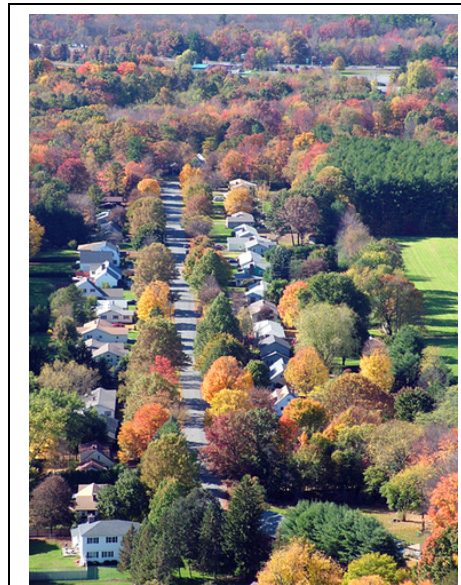
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### **A. Concentration Description**

This concentration leads to both Master of Science (MS) and Doctor of Philosophy (PhD) degrees in Environmental Conservation (ECo) and is designed for students who want scientific training on environmental policy and other human dimensions of environmental conservation. The focus of this concentration is on the socio-cultural, political (including policy and administration) and economic systems related to environmental conservation coupled with specialized training in aspects of forest, wildlife, or fisheries conservation, conservation biology, watershed science and management and/or building systems.

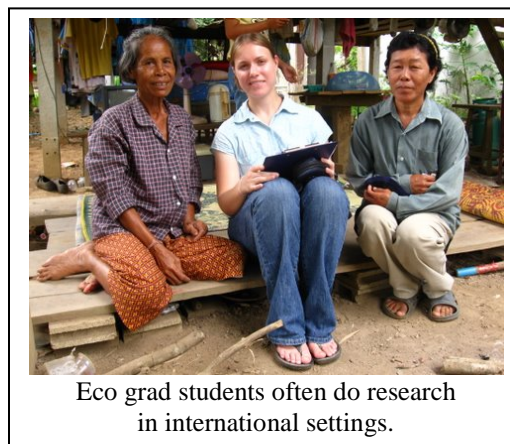
Faculty affiliated with this concentration (see below) have expertise in the influence of anthropogenic factors (e.g., urban-suburban development) on wildlife populations; human interactions with the natural environment; the impacts of human activities on wildlife populations, forests or water systems; ecosystem management; private landowner attitudes toward environmental conservation and their decision-making processes; water and watershed modeling and management; climate change; and environmental policy, administration and management at local, regional and international scales.

Moreover, this concentration takes advantage of expertise and offerings in social science-related departments on the UMass Amherst campus, such as Economics, Resource Economics, Geoscience, Sociology, Political Science and our strong relationship with the Center for Public Policy and Administration ([www.masspolicy.org](http://www.masspolicy.org)) which regularly offers graduate courses in public policy, and public and nonprofit administration/management.



ECo faculty and students study human-forest interactions. Photo credit: Inga Anger

A major strength of our program is the unique convergence of Universities, federal and state agencies in Amherst, unmatched in the Northeast. A series of cooperative agreements, memoranda of research understanding and sole-source vendor relationships with state and federal agencies provide a strong base of research funding. These agreements also provide important teaching and research relationships between our program and governmental natural resource agencies. Departmental research in the areas of wildlife conservation or forestry focuses on wetlands, biodiversity, animal habitat associations, landscape and systems ecology, remote sensing, human-wildlife conflicts, forest-wildlife relationships, forest management and policy, and international conservation. Fisheries research focuses on marine, estuarine, and inland resources and specifically on population dynamics, relationship of ecosystem structure and production, the effect of organic and inorganic contamination on aquatic ecosystem function, anadromous fish behavior, ecology and physiology and issues surrounding the management of fisheries and fish population. Through their research projects, graduate students often employ or provide volunteer opportunities for interested undergraduates. Graduate students are encouraged to participate in projects and activities of their colleagues to broaden their experience and to provide and receive ideas and suggestions for improvements.



Eco grad students often do research in international settings.



Through courses offered in ECo and in other affiliated departments at UMass, students get opportunities to contemplate environmental policies, human actions and outcomes on the environment.

At the MS level, students have the option of pursuing either a professional degree or thesis degree. The *thesis/dissertation degree* leads to the MS or PhD degree and centers around the completion of a major independent research project in addition to a modest coursework requirement. The *professional degree* leads to the MS degree and centers around a professional paper based on an internship/practicum in addition to a more substantial coursework requirement. Both degree options provide students a strong foundation in three core topic areas: *environmental science* (biology, ecology, conservation and environmental building design), 2) *quantitative science* (statistics, GIS and modeling), and 3) *human dimensions* (environmental policies, economics, politics, administration, management and values). The MS thesis degree is intended to prepare students for the option of pursuing a PhD and an eventual career in conservation science. The MS professional degree is meant to be a terminal degree for students seeking graduate-level training in a particular field of study and a career as a professional conservation scientist. Overall, the academic requirements of this concentration in combination with the

research/practicum experience provide students professional training for conservation science positions within academia, state and federal resource management agencies, non-governmental conservation organizations, and private industry (e.g., environmental consulting firms). In addition, MS thesis degree students completing this program are well prepared to meet the challenges of any PhD program.

## B. The MS Professional Degree

### *Prerequisites*

Candidates for an MS professional degree in this concentration will be admitted based on their academic training, work experience, and letters of recommendation. At a minimum, candidates will be expected to possess:

- 1) a Bachelor's degree in:
  - a natural resources field or environmental sciences; or
  - the biological sciences with an emphasis in ecology; or
  - any field with strong background in mathematics, applied statistics, and policy with some coursework in biological and physical sciences, and professional experience working as a natural resource professional.

Note, prerequisites exist for many of the required courses. Students are expected to have satisfied these prerequisites prior to commencing the program or in addition to the curriculum requirements outlined below.

### *Requirements*

Students in this concentration are expected to meet all of the requirements for a MS degree in ECo, as outlined in the student handbook, including the following:

- 1) A minimum of 30 credits is required, 21 of which must be in the major (defined broadly), 12 of which must be at the 600 level or above; up to 6 graduate credits can be transferred from previous course work from UMass or another university;
- 2) Successful completion of a comprehensive exam based upon the student's academic training in environmental conservation, encompassing three "core" topic areas (environmental science, quantitative science, and human dimensions) in addition to the required ECo core courses; and
- 3) Successful final exam conducted by the committee.



Working with wildlife and fisheries faculty, students get opportunities to investigate human-wildlife interactions.

*Curriculum*

Please check the SPIRE online and department's course offering sheet (<https://tinyurl.com/y7pz3uu2>) for the current course number listing.

**1. Required Core Courses (1 credit)**

ECO 691A            Current research in environmental conservation (1cr)

**2. Core Topic Areas (29 credits)** (including a minimum of one 500-level or above 3-4 credit course in each core topic area below, plus a minimum of three additional courses approved by student's committee; note, students may take courses other than those listed here to fulfill the core topic area requirements if they are approved by the students advisory committee and the Graduate Concentration Coordinator; course numbers are subject to change)

**a. Environmental Science** (take one or more of the following)

NRC 564            Wildlife habitat management (fall, 4cr)  
NRC 565            Wildlife population dynamics & management (fall, 4cr)  
NRC 571            Fisheries science & management (fall even yrs, 4cr)  
NRC 597            Aquatic Ecology (spr odd yrs, 3cr)  
NRC 597            Ecology of fish (spr even yrs, 4cr)  
NRC 597            Conservation genetics (fall, 4 cr)  
ECO 621            Landscape ecology (spr even yrs, 4cr)  
ECO 697            Conservation biology (fall odd yrs, 3cr)  
ECO 697            Diadromous fisheries ecology & conserv. (fall even yrs, 3cr)  
ECO 697            Predator-prey interactions (spr odd yrs, 3cr)  
ECO 697            Urban ecology (fall, 4cr)  
ECO 697            Urban Forestry (spr, 3cr)  
ECO 697            Applied conservation genetics (fall even yrs, 4cr)  
ECO 697            Conservation of aquatic ecosystems (spr odd yrs, 3 cr)  
ECO 697            Perspectives in Sustainability (spr, 3cr)  
ECO 720            Ecological interactions of fishes (spr odd yrs, 3cr)  
ECO 757            Advanced Fisheries Management (tbd, 3cr)

Note: The above is just a subset of eligible courses for the Environmental Science topic area for students concentrating in Environmental Policy and Human Dimensions. To explore other possibilities, please refer to the Environmental Science course lists in the handbooks for (1) Building Systems, (2) Forest Resources and Arboriculture, (3) Water, Wetlands and Watersheds, or (4) Wildlife, Fish and Conservation Biology.

**b. Quantitative Science** (take one or more of the following)

NRC 577            Ecosystem modeling & simulation (fall odd yrs, 3cr)

NRC 587	Digital remote sensing (spr odd yrs, 3cr)
NRC 585	Introduction to GIS (both, 3cr)
NRC 697	Information Technology in the Public and Nonprofit Sectors)
ECO 631	Multivariate statistics for environmental cons. (spr odd yrs, 4cr)
ECO 697	Advanced topics in GIS (fall odd yrs, 3cr)
ECO 697	Intermediate statistics for environmental cons. (spr, 4cr)
ECO 697	Advanced statistics for environmental cons. (fall even yrs, 4cr)
ECO 697	Analysis of environmental data - lab (fall, 2cr)
ECO 777	Advanced systems ecology (spr even yrs, 3cr)
GEO-SCI 595A	Advanced GIS (spr, 3 cr)
PLSOIL 661	Intermediate biometry (fall, 3 cr)
PPA 605	Economics & public policy (fall, 3 cr)
PPA 607	Policy methods (fall, 3 cr)
PPA 608	Introduction to statistical methods (fall, 3 cr)
SOC 710	Research methods (spr, 3cr)

**c. Human Dimensions** (take one or more of the following courses)

NRC 697	Water resources management and policy (fall even yrs, 3 cr)
NRC 697	Land use and watershed management (tbd, 3 cr)
NRC 597	Case studies in conservation (fall, 3 credits)
ECO 697	Federal environmental law & regulation (spr even yrs, 3cr)
ECO 697	Human dimensions of natural res. cons. (tbd, 3cr)
ECO 697	Natural resources policy & administration (tbd, 3cr)
PPA 697	Nonprofit governance (fall even years, 3 cr)
PPA 697	Nonprofit program management (fall odd years, 3cr)
PPA 602	Public management (fall, 3cr)
PPA 601	Politics of the policy process (fall, 3 cr)
PPA 603	Public policy analysis (spr, 3 cr)
PPA 606	Applied public-sector economics (fall, 3 cr)
PPA 697	Budgeting & financial management (spr, 3 cr)
PPA 697	Comparative public policy (fall, 3 cr)
PPA 697	Communication campaigns & public advocacy (fall, 3 cr)
REGIONPL 553	Resource policy & planning (spr even yrs, 3 cr)
REGIONPL 575	Environmental law & resource management (tbd, 3 cr)
RES-ECON 720	Environmental & resource economics (fall even yrs, 3 cr)
RES-ECON 721	Advanced natural resource economics (fall, 3 cr. Requires significant math and economics background and permission from instructor.)
GEO-SCI 666	Water resource policy (tbd, 3 cr)
GEO-SCI 694v	Rivers as regions (tbd, 3 cr)
GEO-SCI 694T	Political ecologies of conservation (tbd, 3 cr)
GEO-SCI 694P	Political geography: states, territory & environment (spr, 3 cr)
GEO-SCI 697G	Geography, policy & the environment (fall even yrs, 3 cr)
GEO-SCI 697	Water geographies: conflict & sustainability (spr odd yrs, 3 cr)

POLSCI 784	Environmental policy (tbd, 3 cr)
POLSCI 794J	International environmental politics (tbd, 3 cr)
ENVDES 574	City planning (fall, 3 cr)
LANDARCH691E	People & the environment (fall, 2-3 cr)

## C. The MS Thesis Degree

### *Prerequisites*

Candidates for an MS thesis degree in this concentration will be admitted on the basis of their academic training, work experience, and letters of recommendation. At a minimum, candidates will be expected to possess:

- 1) a Bachelor's degree in:
  - a natural resources field or environmental sciences; or
  - the biological sciences with an emphasis in ecology; or
  - any field with strong background in mathematics and biological, physical and/or social sciences, and professional experience working as a natural resource professional.

Note, prerequisites exist for many of the required courses. Students are expected to have satisfied these prerequisites prior to commencing the program or in addition to the curriculum requirements outlined below.

### *Requirements*

Students in this concentration are expected to meet all of the requirements for an MS degree in ECo, as outlined in the student handbook, including the following:

- 1) A minimum of 35 credits is required, 21 of which must be in the major (defined broadly), 8 of which must be at the 600 level or above, and 12 of which must be a thesis specific to this concentration and approved by the student's advisory committee; up to 6 graduate credits can be transferred from previous course work from UMass or another university;
- 2) Successful completion of a comprehensive exam based upon the student's academic training in environmental conservation, encompassing three "core" topic areas (environmental science, quantitative science, and human dimensions) in addition to the required ECo core courses;
- 3) Successful final defense of the thesis; and
- 4) A minimum of one publishable-quality scientific paper resulting from the thesis research project.

### *Curriculum*

Note, all courses ending in 97 have an additional letter designation (e.g., 697A) not specified

below because it is subject to change; check SPIRE online for the current course number listing.

**1. Required Core Courses (7 credits)** (take all of the following)

ECO 601	Research concepts (fall, 3cr)
ECO 602	Analysis of environmental data - lecture (fall, 3cr) or equivalent social science quantitative course
ECO 691A	Current research in environmental conservation (both, 1cr)

**2. Core Topic Areas (15 credits)** (including a minimum of one 500-level or above 3-4 credit course in each core topic area approved by student's committee; note, students may take courses other than those listed here to fulfill the core topic area requirements if they are approved by the students advisory committee and the Graduate Concentration Coordinator)

**a. Environmental Science** (take one or more of the following)

NRC 564	Wildlife habitat management (fall, 4cr)
NRC 565	Wildlife population dynamics & management (fall, 4cr)
NRC 571	Fisheries science & management (fall even yrs, 4cr)
NRC 597	Aquatic Ecology (spr odd yrs, 3cr)
NRC 597	Ecology of fish (spr even yrs, 4cr)
NRC 597	Conservation genetics (fall, 4 cr)
ECO 621	Landscape ecology (spr even yrs, 4cr)
ECO 697	Conservation biology (fall odd yrs, 3cr)
ECO 697	Diadromous fisheries ecology & conserv. (fall even yrs, 3cr)
ECO 697	Predator-prey interactions (spr odd yrs, 3cr)
ECO 697	Urban ecology (fall, 4cr)
ECO 697	Urban Forestry (spr, 3cr)
ECO 697	Applied conservation genetics (fall even yrs, 4cr)
ECO 697	Conservation of aquatic ecosystems (spr odd yrs, 3 cr)
ECO 697	Perspectives in Sustainability (spr, 3cr)
ECO 720	Ecological interactions of fishes (spr odd yrs, 3cr)
ECO 757	Advanced Fisheries Management (tbd, 3cr)

Note: The above is just a subset of eligible courses for the Environmental Science topic area for students concentrating in Environmental Policy and Human Dimensions. To explore other possibilities, please refer to the Environmental Science course lists in the handbooks for (1) Building Systems, (2) Forest Resources and Arboriculture, (3) Water, Wetlands and Watersheds, or (4) Wildlife, Fish and Conservation Biology.

**b. Quantitative Science** (take one or more of the following)

NRC 577	Ecosystem modeling & simulation (fall odd yrs, 3cr)
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NRC 587	Digital remote sensing (spr odd yrs, 3cr)
NRC 585	Introduction to GIS (both, 3cr)
ECO 631	Multivariate statistics for environmental cons. (spr odd yrs, 4cr)
ECO 697	Advanced topics in GIS (fall odd yrs, 3cr)
ECO 697	Intermediate statistics for environmental cons. (spr, 4cr)
ECO 697	Advanced statistics for environmental cons. (fall even yrs, 4cr)
ECO 697	Analysis of environmental data - lab (fall, 2cr)
ECO 777	Advanced systems ecology (spr even yrs, 3cr)
GEO-SCI 595A	Advanced GIS (spr, 3 cr)
PLSOIL 661	Intermediate biometry (fall, 3 cr)
PPA 605	Economics & public policy (fall, 3 cr)
PPA 607	Policy methods (fall, 3 cr)
PPA 608	Introduction to statistical methods (fall, 3 cr)
SOC 710	Research methods (spr, 3cr)

**c. Human Dimensions** (take one or more of the following courses)

NRC 697	Water Resources Management & Policy (fall even yrs, 3 cr)
NRC 697	Land Use & Watershed Management (tbd, 3 cr)
NRC 597	Case Studies in Conservation (fall, 3 credits)
ECO 697	Federal environmental law & regulation (spr even yrs, 3cr)
ECO 697	Human dimensions of natural res. cons. (tbd, 3cr)
ECO 697	Natural resources policy & administration (tbd, 3cr)
PPA 697	Nonprofit governance (fall even years, 3 cr)
PPA 697	Nonprofit program management (fall odd years, 3cr)
PPA 602	Public management (fall, 3cr)
PPA 601	Politics of the policy process (fall, 3 cr)
PPA 603	Public policy analysis (spr, 3 cr)
PPA 606	Applied public-sector economics (fall, 3 cr)
PPA 697	Budgeting & financial management (spr, 3 cr)
PPA 697	Comparative public policy (fall, 3 cr)
PPA 697	Qualitative methods (spr, 3 cr)
PPA 697	Communication campaigns & public advocacy (fall, 3 cr)
REGIONPL 553	Resource policy & planning (spr even yrs, 3 cr)
REGIONPL 575	Environmental law & resource management (tbd, 3 cr)
RES-ECON 720	Environmental & resource economics (fall even yrs, 3 cr)
RES-ECON 721	Advanced natural resource economics (fall, 3 cr. Requires significant math and economics background and permission from instructor.)
GEO-SCI 666	Water resource policy (tbd, 3 cr)
GEO-SCI 694v	Rivers as regions (tbd, 3 cr)
GEO-SCI 694T	Political ecologies of conservation (tbd, 3 cr)
GEO-SCI 694P	Political geography: states, territory & environment (spr, 3 cr)
GEO-SCI 697	Geography, policy & the environment (fall even yrs, 3 cr)
GEO-SCI 697	Water geographies: conflict & sustainability (spr odd yrs, 3 cr)



POLSCI 784	Environmental policy (tbd, 3 cr)
POLSCI 794J	International environmental politics (tbd, 3 cr)
ENVDES 574	City planning (fall, 3 cr)
LANDARCH691E	People & the environment (fall, 2-3 cr)

### 3. Practicum (6 credits)

ECO 699	Thesis
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## D. The PhD Degree

### *Prerequisites*

Candidates for a PhD degree in this concentration will be admitted based on their academic training, work experience, and letters of recommendation as evaluated by the faculty sponsor. At a minimum, candidates will be expected to possess:

- 1) a Bachelor's degree in:
  - a natural resources field or environmental sciences; or
  - the biological sciences with an emphasis in ecology; or
  - any field with strong background in mathematics, applied statistics, and policy with some coursework in and the biological and physical sciences, and professional experience working as a natural resource professional.



Students in ECo get opportunities to learn technologies and analytic approaches for studying human-induced landscape change.

\*Note, students wishing to pursue a PhD with only a BS degree can choose to obtain a MS degree along the way toward completion of Ph.D. degree requirements. MS is not a requirement.

### *Requirements*

Students in this concentration are expected to meet all the requirements for a PhD degree in ECo, as outlined in the student handbook, including the following:

- 1) A minimum of 18 dissertation credits is required, based on a research project specific to this concentration and approved by the student's advisory committee; no other course credits are required other than those determined by the student's advisory committee;
- 2) Successful completion of a comprehensive exam based upon the student's academic training in environmental conservation, encompassing three "core" topic areas (environmental science, quantitative science, and human dimensions);
- 3) Successful final defense of the dissertation; and

- 4) A minimum of three publishable-quality scientific papers resulting from the dissertation research project.

## E. Resources & Facilities

Related to Environmental Science activities, two University forests (totaling 2,000 acres), the 800-acre Swift River Wildlife Management Area of the Massachusetts Division of Fisheries and Wildlife, and the 81,000-acre Quabbin Reservation of the Massachusetts Department of Conservation and Recreation offer unique field study areas close to campus. The University of Massachusetts also maintains the Nantucket Field Station and the Marine Station at Gloucester. The Conte Anadromous Fish Research Center in Turners Falls offers excellent, modern facilities for both lab and field study of migratory fish behavior, ecology and physiology. Cooperation with the National Marine Fisheries Service allows graduate students to participate in research cruises in the Northwest Atlantic, as well as use facilities at the NMFS Woods Hole Laboratory. As members of the Five College School of Marine Science Program, students have access to research laboratories at Woods Hole and Waquoit Bay on Cape Cod. In the area of Environmental Policy and Human Dimensions, Holdsworth Hall is home to the Family Forest Research Center and the Natural Resource & Environmental Conservation (NREC) program (a component of UMass Extension) both of which involve human dimensions-related research and activities. We also have a strong and active Quantitative Science Group (see main ECo Graduate Program Handbook) and a Geographic Systems laboratory, as well as a Graduate Student computer lab. Moreover, ECo graduate students have opportunities to connect to other strong social science research organizations on campus such as the Center for Public Policy and Administration ([www.masspolicy.org](http://www.masspolicy.org)) and the Development, Peacebuilding and the Environment program at the Political Economy Research Institute ([www.peri.umass.edu/dpe](http://www.peri.umass.edu/dpe)).

## F. Matriculation & Financial Aid

This program typically takes a full-time MS professional degree student 2-4 semesters to complete, a full-time MS thesis degree student 3-5 semester to complete, and a full-time PhD student 8-10 semester to complete, including the completion of a practicum, thesis, or dissertation. However, some students may be able to complete the degree in less time and



ECo PhD student Alfred Kikoti (standing) interacts with wildlife conservation stakeholders in Tanzania.

some take longer depending on their academic preparedness and the dictates of the practicum or thesis/dissertation research project.

Funding opportunities are limited, yet financial assistance is provided to our MS *thesis* and PhD students through teaching or research assistantships (at Graduate Employee Organization bargained wage rates), University fellowships, or hourly wages. Tuition is waived during semesters in which at least a 10-hour assistantship or fellowship is awarded, but the student is responsible for most fees. Research

assistantships are available through faculty members who have grant-supported research, and many faculty only accept students if they can provide grant-supported assistantships. Limited University fellowships are awarded by the Graduate School in open competition for those (including foreign applicants) who are endorsed by the Department.

Funding opportunities are more limited for students in the MS *professional* degree option. Some teaching assistantships and University fellowships may be available, or internship institutions may be able to provide some assistance, but most professional degree students are self-funded. Again, tuition is waived during semesters in which at least a 10-hour assistantship or fellowship is awarded (or the equivalent from an internship employer), but the student is responsible for most fees.

## G. Concentration Coordinator & Faculty Affiliates

The following on-campus faculty (both regular and adjuncts), including the Graduate Concentration Coordinator, are principally affiliated with this concentration and regularly serve in the role of the student's advisory committee chair or member and instructor for core courses; other faculty are occasionally involved in this concentration. See Departmental website for information about the faculty (<http://eco.umass.edu/index.php/people/>).

### *Graduate Concentration Coordinator:*

Ezra Markowitz  
Dept. of Environmental Conservation  
University of Massachusetts  
303 Holdsworth Hall  
Amherst, MA 01003-4210  
Tel: 413-545-1237  
Fax: 413-545-4358  
Email: [emarkowitz@eco.umass.edu](mailto:emarkowitz@eco.umass.edu)

### *Principal Faculty Affiliates:*

- Alison Bates ([awbates@eco.umass.edu](mailto:awbates@eco.umass.edu))
- Brett Butler ([bbutler@fs.fed.us](mailto:bbutler@fs.fed.us))
- Paul Catanzaro ([cat@umext.umass.edu](mailto:cat@umext.umass.edu))
- David Damery ([ddamery@eco.umass.edu](mailto:ddamery@eco.umass.edu))
- Andy Danylchuk ([danylchuk@eco.umass.edu](mailto:danylchuk@eco.umass.edu))
- Stephen DeStefano ([sdestef@eco.umass.edu](mailto:sdestef@eco.umass.edu))
- Dave Kittredge ([dbk@eco.umass.edu](mailto:dbk@eco.umass.edu))
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- Paige Warren ([pswarren@eco.umass.edu](mailto:pswarren@eco.umass.edu))