The Center for Agriculture, Food and the Environment

UMass Extension
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Initiative: Fish, Wildlife and Biodiversity Conservation

Project Leader: Scott Jackson

Initiative Overview

Massachusetts is the third most densely populated state in the nation. The rate of land consumption for residential development is steadily increasing far out of proportion to its population growth. Haphazard growth has impacted water resources, natural resource-based enterprises, open space, wildlife habitat, and community character. Climate Change is already impacting natural resources and the way that people interact with natural systems. Nearly half the state's communities lack professional planning staff, while volunteer boards struggle with increasing levels of responsibility, liability, time demands and public mistrust.

The Fish, Wildlife & Biodiversity Conservation Project addresses these concerns through related initiatives that focus on habitat loss and fragmentation, establishing priorities for ecological restoration, mitigating development impacts on wildlife and ecosystems and climate change adaptation. Major initiatives include:

The Conservation Assessment and Prioritization System (CAPS) is a computer software program and an approach to prioritizing land for conservation that provides an objective, dynamic, and flexible tool to support decision-making for land conservation, land management, project review and permitting to protect habitat and biodiversity.

The River & Stream Continuity Project - focuses on the impact of road-stream crossings (culverts, bridges, fords) on fish and other aquatic organism passage by providing technical guidance and standards, field surveys, and other tools and approaches for setting priorities for culvert upgrade or replacement

Wildlife Conservation engages in applied research and provides information, educational materials and programs based on current research to promote wildlife conservation including efforts to better understand the impacts of roads and highways on wildlife and ecosystems and to develop and evaluate techniques for mitigating those impacts.

Wetlands Regulations and Protection - part of a broader effort to provide training and information to municipal officials, this initiative provides workshops and materials for conservation commissions in the implementation of the Massachusetts Wetlands Protection Act.

Climate Change Adaptation – conducting research, outreach education and facilitating a coordinated response to climate change that includes vulnerability assessments, climate adaptation planning, and coordinated action to protect natural resources/systems and strengthen their contributions to the resiliency of human communities in MA

Total educational contacts

	Adult Contacts
In Person	962
Indirect Contacts (Print, Web, etc…)	76272

Activity Summary – 2018

- Create, coordinate and lead the Massachusetts Climate Adaptation Partnership (1)
- Create, expand and maintain the Massachusetts Wildlife Climate Action Tool (1)
- Workshops, presentations and technical assistance on climate change adaptation and the Climate Action Tool (6)
- Continue development of CAPS software and related tools (1)
- Development of Aquatic Connectivity Scenario Analysis Tool (1)
- Update CAPS IBI Analyses (1)
- Graduate Student Support: Funding for graduate research (1)
- Interpret and apply CAPS results, update and extend CAPS analyses to all 13 states in the North Atlantic Region (1)
- Maintain the UMassCAPS Web Site (1)
- Wetlands Assessment and Monitoring Methods: Research on the Relationship between CAPS Metrics and Wetland Condition (1)
- Workshops on the results and use of CAPS analyses (3)
- Continue development and refinement of crossing standards, assessment protocols and training materials, and scoring algorithm (1)
- Coordinate and lead the North Atlantic Aquatic Connectivity Collaborative (1)
- Maintain and expand content for the "streamcontinuity.org" web site (1)
- Manage and continue to improve and expand the NAACC Crossings Database for volunteer assessment of road-stream crossings (1)
- Training programs on regulations, assessment, prioritization and technical issues related to road-stream crossings (9)
- Development of a Comprehensive State Monitoring and Assessment Program for Freshwater Wetlands in Massachusetts (1)
- Workshops, presentations and technical assistance on wetlands and wetlands protection regulation (3)
- Maintain the MA Snakes web site (1)
- Workshops, presentations and technical assistance on mitigating the impacts of transportation on fish, wildlife, and ecosystems (5)
- Workshops, presentations, & technical assistance on wildlife natural history and conservation (3)

Climate Change Adaptation

A new focus of my work over the past couple of years has been climate change adaptation, especially with regard to ecosystem integrity and conservation. In cooperation with the MA Division of Fisheries and Wildlife and the Northeast Climate Science Center, I lead a team that developed a web-based MA Wildlife Climate Action Tool. Our goal in creating this tool was to provide information to municipalities, landowners, land trusts and other local conservation organizations on the science of climate change and actions that can be taken to protect natural resources in the face of that change. The tool includes detailed information about how climate change is likely to affect Massachusetts, climate related stressors likely to affect wildlife and other natural resources, vulnerability assessments for over 60 wildlife species, and specific actions that can be taken to protect natural resources in the face of climate change. The tool also includes a spatial data viewer that allows users to view GIS data relevant to whatever stressor, assessment or adaption page they are viewing.

Developing content for the Climate Action Tool, I realized how little conservation effort is explicitly directed at climate-related threats. Little is being done to identify ecosystems that are most vulnerable to climate change and the particular climate-related stressors that need to be addressed. In response I, along with Melissa Ocana, created an informal partnership to focus on ecosystem-based climate adaptation, with representation from the Northeast Climate Adaptation Science Center, MA Division of Fisheries and Wildlife, MA Division of Ecological Restoration, MA Coastal Zone Management, The Nature Conservancy, EcoAdapt, Harvard Forest, and the Executive Office of Environmental Affairs. The implementation elements of this work are 1) ecosystem or issue-based work groups intended to identify research and information needs, and opportunities to collaborate on adaptation based conservation action, and 2) a community of practice called the Massachusetts Ecosystem Climate Adaptation Network (Mass ECAN) to create a network of climate adaptation practitioners to promote collaboration and share information, ideas, and success stories. I've had conversations with Vandana Rao, from the Executive Office of Energy and Environmental Affairs, about potential for creating a "slow-the-flow" work group.

River and Stream Continuity Project

I created the River and Stream Continuity Project in 2000 and have served as project leader ever since. I convened a group of people from a variety of agencies and organizations who were concerned about the impact of road-stream crossings on fish and other aquatic organism passage. In 2005, three of the organizations/agencies that were key players in initiating and implementing the project joined to create the River and Stream Continuity Partnership. In 2015, the project expanded significantly and is now called the North Atlantic Aquatic Connectivity Collaborative (NAACC) and covers 13 states in the northeastern U.S. I have served as project leader for the NAACC since its beginning.

Creation of the NAACC required coordinating with various agencies and organization that were already involved in road-stream crossing assessment using a variety of methodologies (CT, VT, NH, ME and USFS) and developing a unified crossing assessment protocol that could be used throughout the 13 state, North Atlantic region. I oversaw the development of a web-based GIS mapping tool to assist cooperators in the prioritization of stream crossings for assessment, creation of field data forms and instructions, creation of electronic data forms and mapping utilities for digital data collection using tablet computers, algorithms for scoring crossing data, and an elaborate online database for housing, scoring and distributing data from NAACC field assessments. Under my leadership, the NAACC is expanding rapidly, both in terms of the number of people involved and crossings assessed, but also in the development of new assessment modules to complement the aquatic passability module that was implemented in 2016.

In addition to expanding efforts to assess road-stream crossings geographically I've continue to work with Paula Rees (WRRC) and Steve Mabee (Geosciences) to deepen the culvert-related work to include culver condition assessments, structural, hydraulic and geomorphic risk of failure, and potential disruption of services due to storm-related culvert failures. These projects will allow us to make common cause between environmental agencies/organizations interested in protecting and enhancing aquatic connectivity and highway and emergency management agencies that seek to create more resilient transportation infrastructure

Wetlands Assessment, Protection and Education

I continue to play a leadership role in Massachusetts and the region for wetlands assessment and wetlands protection. I serve as a project leader working with the MA Department of Environmental Protection (MassDEP), MA Office of Coastal Zone Management (CZM) and the U.S. Environmental Protection Agency (EPA) to develop cost-effective tools and techniques for assessment and monitoring of wetland and aquatic ecosystems. A central focus of our work has been the development of field-based Indices of Biological Integrity (IBIs) referenced to CAPS landscape-based models. Analysis of vegetation data from shrub swamp wetlands continued in 2017-2017 in order to better understand the robustness of IBIs both geographically and across a wider range of wetland types. A new aspect of my wetlands work is focusing on salt marshes. These coastal wetlands are being degraded across the northeast by a variety of stressors, including sea level rise, changing sediment dynamics, nutrient enrichment, crab herbivory, erosion, and general marsh dieback. The close collaboration with MassDEP, MA CZM and EPA ensures the relevance of this work for policy and regulations related to wetlands assessment and protection. I continued my long-standing collaboration with the MA Association of Conservation Commissions (MACC) to provide training to conservation commissioners.

Fish, Wildlife and Biodiversity Conservation

I serve as a general resource on fish, wildlife and biodiversity conservation with a particular emphasis on reptiles and amphibians, and the impact of roads and highways on wildlife and ecosystems.

The Conservation Assessment and Prioritization System (CAPS)

Since 1999 Kevin McGarigal and I have co-led a major integrated research and extension project known as the Conservation Assessment and Prioritization System (CAPS). CAPS combines principles of landscape ecology and conservation biology with the capacity of modern computers to compile spatial data and characterize landscape patterns. It is an ecosystem-based (coarse-filter) approach for assessing the ecological integrity of lands and waters and subsequently identifying and prioritizing land for habitat and biodiversity conservation. Critical Linkages is an extension of CAPS that involves scenario analysis to identify land that is most critical for maintaining landscape-scale connectivity as well as the best opportunities to restore connectivity through culvert replacement, dam removal and the use of wildlife passage structures on roads and highways.

The CAPS statewide assessment for Massachusetts, originally completed in 2011, was rerun in July 2015 with updated models and four newly developed integrity metrics. A version of CAPS and the Critical Linkages analysis was applied across the 13-state North Atlantic region of the U.S. As these assessments in other states were completed, I was more involved in providing outreach and training throughout the region on the use of CAPS for conservation decision-making.

CAPS is integrated into two other projects that I organized and continue to lead: 1) the River and Stream Continuity Project and 2) the MA Wetlands Assessment and Monitoring Project

Collaborating Organizations

- **Massachusetts Department of Agriculture**
- **MA Division of Fisheries and Wildlife**
- **MA Division of Fisheries and Wildlife**
- **MA Office of Coastal Zone Management**
- **MA Department of Environmental Protection**
- **Northeast Climate Science Center**
- **North Atlantic Aquatic Connectivity Collaborative**
- **Massachusetts Audubon Society**