

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	1390
Indirect Contacts (Print, Web, etc...)	168982

Activity Summary – 2017

- 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 (2)
- Continue development of CAPS software and related tools (1)
- Critical Linkages Analysis for Millbury, Auburn & Tewksbury MA (1)
- Development of CAPS IBI Software (1)
- Interpret and apply CAPS results, update and extend CAPS analyses to additional states (1)
- Revise and Enhance MassCAPS Web Site (1)
- Service on Graduate Research Committees (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 (6)
- Continue development and refinement of crossing standards, assessment protocols and training materials, and scoring algorithm (4)
- 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 (10)
- Development of a Comprehensive State Monitoring and Assessment Program for Freshwater Wetlands in Massachusetts (1)
- Wetlands Assessment and Field Techniques (1)
- Workshops, presentations and technical assistance on wetlands and wetlands protection regulation (6)
- Maintain the MA Snakes web site (1)
- Maintain the Massachusetts North American Amphibian Monitoring Program (NAAMP) web site (1)
- Update and maintain the MA Herp Atlas Web Site (1)
- Workshops, presentations and technical assistance on mitigating the impacts of transportation on fish, wildlife, and ecosystems (2)
- Workshops, presentations, & technical assistance on wildlife natural history and conservation (4)

The Conservation Assessment and Prioritization System (CAPS)

Since 1999 Kevin McGarigal and I have co-lead 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 (see below for details). Following are specific CAPS-related activities that I engaged in during the 2016-2017 year.

The River & 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. Last year 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 served as PI on two grants to create the NAACC and continue to serve as project leader.

In addition to expanding efforts to assess road-stream crossings geographically I've continue to work with Paula Rees (WRRC), Steve Mabee (Geosciences) Rick Palmer (Civil and Environmental Engineering), and Dan Sheldon and Schlomo Zilberstein (Computer Science) on a million dollar plus project 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.

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 last summer (2016).

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. A major focus over the past couple of years, in cooperation with the MA Division of Fisheries and Wildlife and the Northeast Climate Science Center, has been the creation and maintenance of 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. In May 2017, we received the Climate Adaptation Leadership Award for Natural Resources at the National Adaptation Forum.

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, MA Office of Coastal Zone Management and U.S. 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. Collection of vegetation data from shrub swamp wetlands continued in 2015 and 2016 in order to better understand the robustness of IBIs both geographically and across a wider range of wetland types. This past summer I, in collaboration with Charlie Schweik, began experimenting with use of Unmanned Aerial Systems (UAS) to assess wetland condition in salt marshes. The close collaboration with MassDEP 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 Division of Fisheries and Wildlife MA Association of Conservation Commissions (MACC) to provide training to conservation commissioners.

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**

