

North Atlantic LCC 2011 Annual Report

North Atlantic  Landscape Conservation Cooperative



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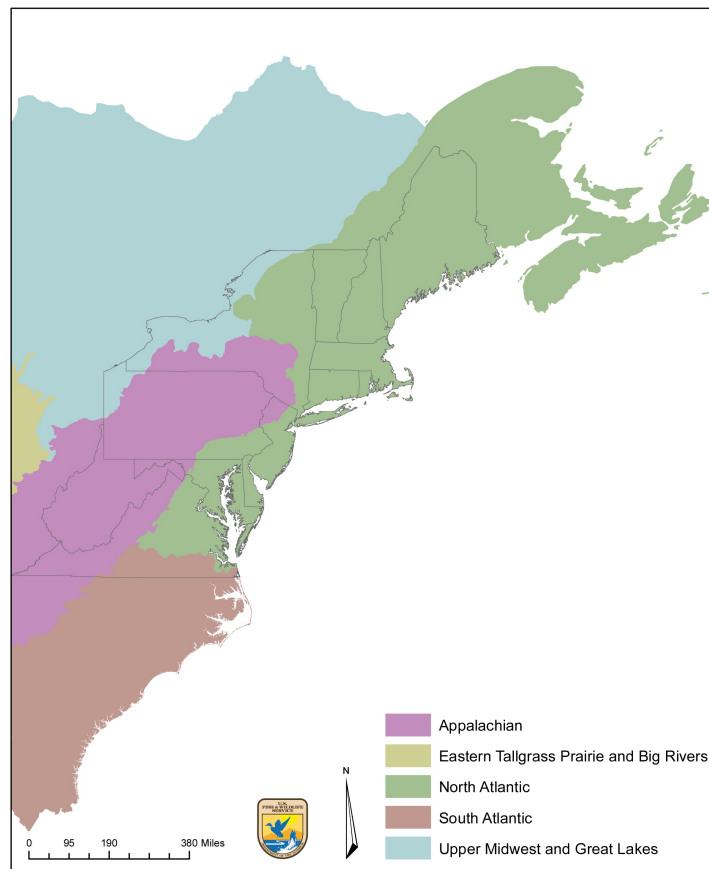
NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE: 2011 ANNUAL REPORT

Introduction

This report reviews the progress and accomplishments of the North Atlantic Landscape Conservation Cooperative (LCC) in 2011 and identifies major goals for 2012.

The North Atlantic LCC was formed late in the fall of 2009 as a conservation partnership, consisting of federal agencies, states, tribes, universities and private organizations working collaboratively to develop scientific information and tools needed to prioritize and guide conservation actions in the North Atlantic Region from southeast Virginia north to Atlantic Canada (Figure 1). The North Atlantic LCC is part of a network of LCCs across the United States and adjacent areas of Canada and Mexico.

Figure 1. Landscape Conservation Cooperatives in the Northeast Region including proposed LCC boundary revisions



In 2011, the North Atlantic LCC made significant progress in several areas including:

- Vision, mission and goals
- Partnership development and operations;
- Science needs assessment, Northeast Conservation Framework and Conservation Science Strategic Plan
- Priority science project selection and implementation
- Communications and information management

Vision, Mission and Goals

In 2011 the North Atlantic LCC Steering Committee agreed on the following vision and mission, as well as more detailed components and goals.

Vision (vision for the future, future desired condition):

Landscapes that sustain our natural resources and cultural heritage maintained in a healthy state through active collaboration of conservation partners and partnerships in the North Atlantic region.

Mission Statement (purpose of LCC):

The North Atlantic Landscape Conservation Cooperative provides a partnership in which the private, state, tribal and federal conservation community works together to address increasing land use pressures and widespread resource threats and uncertainties amplified by a rapidly changing climate. The partners and partnerships in the cooperative address these regional threats and uncertainties by agreeing on common goals for land, water, fish, wildlife, plant and cultural resources and jointly developing the scientific information and tools needed to prioritize and guide more effective conservation actions by partners toward those goals.

Components and Goals (what the LCC does):

- Coordination and Organization: Provide structure, staff and process that bring together and coordinate partners, develop consensus on common goals (resource outcomes), build on and integrate existing partnerships and capacity, leverage and generate funding and other resources, prioritize and develop scientific information and tools to make conservation more effective, and evaluate progress toward resource outcomes by partners and partnerships within the LCC area and as part of the LCC national network.
- Ecological Planning: Compile, organize and provide information from existing partners and partnerships on status, trends, current and emerging threats, and limiting factors for priority fish, wildlife and plant species and cultural resources; agree on regional objectives for these species and resources; and assess their relationship to limiting factors, habitats and landscapes to provide a scientific basis for conservation actions.

- Conservation Design: Develop and provide tools and information to guide decision makers and inform conservation actions to more effectively address threats, limiting factors, and uncertainties and efficiently achieve objectives and ensure functional systems under current and predicted future conditions, and link site-scale actions to landscape and regional scale goals.
- Conservation Adoption and Delivery: Assist partners with use of science and tools and work with partners to implement actions to test, validate and improve scientific information and tools developed by the LCC to enhance the ability of our lands and waters to sustain fish, wildlife, plant, and cultural resources and unique ecosystems.
- Monitoring and Evaluation: Facilitate monitoring of populations, resources, habitats and landscapes and track conservation actions in a way designed to assess the effectiveness of conservation actions, assess progress toward common goals, and guide future planning and actions based on the results.
- Research: Facilitate the pursuit and support of priority research activities based on needs identified and prioritized by partners and partnerships that test key assumptions in planning and inform future planning and delivery; provide guidance to Climate Science Centers on climate science needed by the LCC; and work with partners to coordinate ongoing research initiatives on priority conservation issues.
- Communication and Outreach: Develop effective communication products to enhance communications among partners and partnerships, develop and sustain the LCC partnership, attract new partners, support existing funding and seek new funds, improve internal and external relations, and raise awareness of LCC priorities targeted to specific audiences.
- Information Management: Compile, synthesize, organize and make available information, data, science and tools developed by partners, partnerships and the LCC in scales and formats needed by partners.

Reference Documents: North Atlantic Landscape Conservation Cooperative Vision, Mission and Goals, http://www.northatlanticlcc.org/annual_report2012/references.

Partnership Development and Operations

In 2011, the North Atlantic LCC agreed on and implemented initial governance structures and processes needed to achieve its mission effectively while also recognizing that these structures and

processes will evolve over time. Key components of the governance include the structure and function of the steering committee and technical committee, staff roles and an annual process.

Steering Committee

The North Atlantic LCC Steering Committee has 34 formal members, including 14 agencies from northeast states and the District of Columbia, tribal representatives (initially through United South and Eastern Tribes), nine federal agencies, Canadian partners (initially through the Canadian Wildlife Service), and eight non-governmental organizations. The steering committee approved a governance document to guide the organization and function of the partnership. The steering committee agreed to meet in person at least twice a year in conjunction with the Northeast Fish and Wildlife Conference each April and the Northeast Association of Fish and Wildlife Agencies (NEAFWA) Directors meeting each November. During the year, at least two steering committee conference calls will be scheduled in addition to in-person meetings. The steering committee elected a chair and vice-chair in 2011. The current chair is Ken Elowe, Assistant Regional Director for Science Applications in the U.S. Fish and Wildlife Service's Northeast Region; current Vice Chair is Patricia Riexinger, Director of the Division of Fish, Wildlife and Marine Resources in the New York State Department of Environmental Conservation.

Steering Committee Organizations

State Agencies

Connecticut Department of Environmental Protection
 Delaware Division of Fish and Wildlife
 District of Columbia Department of the Environment
 Maine Department of Inland Fisheries and Wildlife
 Maryland Department of Natural Resources
 Massachusetts Division of Fisheries and Wildlife
 New Hampshire Fish and Game Department
 New Jersey Division of Fish and Wildlife
 New York State Department of Environmental Conservation
 Pennsylvania Game Commission
 Pennsylvania Fish and Boat Commission
 Rhode Island Department of Environmental Management
 Vermont Department of Fish and Wildlife
 Virginia Department of Game and Inland Fisheries

Tribes

United South and Eastern Tribes

Federal Agencies

U.S. Fish and Wildlife Service
 U.S. Geological Survey
 U.S. Forest Service
 National Park Service
 Bureau of Ocean Energy Management

Federal Agencies cont.

National Oceanic and Atmospheric Administration
 U.S. Environmental Protection Agency

Northeast Climate Science Center

Canadian Agencies

Environment Canada, Canadian Wildlife Service

Non-Governmental Organizations

Ducks Unlimited
 Manomet Center for Conservation Sciences
 National Wildlife Federation
 The Nature Conservancy
 National Fish and Wildlife Foundation
 Trust for Public Land
 Wildlife Management Institute
 Wildlife Conservation Society

Adjacent LCCs (ex-officio)

Appalachian LCC
 Upper Midwest Great Lakes LCC
 South Atlantic LCC

Technical Committee

The North Atlantic LCC Technical Committee includes a broad partnership of 25 scientists representing a diversity of taxonomic, ecosystem and jurisdictional perspectives. A number of standing and ad-hoc sub-teams have also been formed, including terrestrial/wetland, aquatic, coastal/marine, and demonstration projects. The technical committee provides science and technical recommendations to the steering committee.

Technical Committee Affiliations

State Agencies

Delaware Division of Fish and Wildlife
Maine Department of Inland Fisheries and Wildlife
New Jersey Division of Fish and Wildlife
Pennsylvania Fish & Boat Commission
Vermont Fish and Wildlife Department
New York State Department of Environmental Conservation

Canadian Agencies

Environment Canada, Canadian Wildlife Service

Federal Agencies

U.S. Fish and Wildlife Service, Division of Migratory Birds
U.S. Fish and Wildlife Service, Division of Fisheries
U.S. Fish and Wildlife Service, Science Applications

Federal Agencies cont.

National Park Service, National Capital Region
National Park Service, Northeast Region
U.S. Geological Survey, Leetown Science Center
U.S. Geological Survey, Northeast Area
U.S. Geological Survey, Patuxent Wildlife Research Center
U.S. Geological Survey, Woods Hole Science Center
U.S. Environmental Protection Agency, Office of Research and Development

Non-governmental Organizations

Manomet Center for Conservation Sciences
The Nature Conservancy
Ducks Unlimited, Inc.
NatureServe
Wildlife Management Institute
Wildlife Conservation Society

Staff

In 2011, the North Atlantic LCC added two contract positions, a science coordinator to help deliver its overall conservation science work and a conservation design specialist to work on conservation design, adoption and delivery. The National Park Service added a full-time coastal landscape adaptation specialist to work with coastal parks and the LCC on coastal issues. The LCC also started a series of short-term details with experts to address specific issues including invasive species, contaminants and aquatics. A list of staff is provided in Table 1.

Table 1. Full and Part-time Staff Affiliated with the LCC in 2011

<i>Dedicated to North Atlantic LCC</i>			
Position	Agency	Person	Contact
Coordinator	U.S. Fish and Wildlife Service	Andrew Milliken	andrew_milliken@fws.gov
Science Coordinator	Contract to U.S. Fish and Wildlife Service	Scott Schwenk	wschwenk@uvm.edu
Conservation Design Specialist	Contract to U.S. Fish and Wildlife Service	Steve Fuller	sfuller71@comcast.net
Biological Technician	U.S. Fish and Wildlife Service	Lora Mathers	lora_mathers@fws.gov

<i>Partial Support to North Atlantic LCC</i>			
Position	Agency	Person	Contact
Communications Coordinator	U.S. Fish and Wildlife Service	Megan Nagel	megan_nagel@fws.gov
GIS Coordinator	U.S. Fish and Wildlife Service	B.J. Richardson	bj_richardson@fws.gov
Administrative Assistant	U.S. Fish and Wildlife Service	Heather Zackaricz	heather_zackaricz@fws.gov
Assistant Regional Director	U.S. Fish and Wildlife Service	Ken Elowe	ken_elowe@fws.gov
Regional Scientist	U.S. Fish and Wildlife Service	Rick Bennett	rick_bennett@fws.gov
Liaison to LCCs	U.S. Environmental Protection Agency	Tai-ming Chang	chang.tai-ming@epa.gov
Coastal Landscape Adaptation Coordinator	National Park Service	Amanda Babson	amanda_babson@nps.gov
Presidential Management Fellow	National Oceanic and Atmospheric Administration	Helen McMillan	helen.mcmillan@noaa.gov

Annual Process

The North Atlantic LCC Steering Committee agreed to an annual process and meeting schedule for science needs and projects that parallels the annual process set up by the Northeast states for their Regional Conservation Needs program (Table 2).

Table 2. North Atlantic LCC Annual Process for Assessing Science Needs and Selecting Projects

Date(s)	LCC Event	LCC Decision or Process
October	October LCC Technical Committee Meeting/Call	Make recommendations on projects for LCC funding
		Make recommendations on Climate Science Center needs
November	November LCC Steering Committee Meeting	Make funding decisions on LCC projects (including Regional Conservation Needs (RCN) projects for LCC support)
		Approve recommendations on Climate Science Center needs
December		Notify applicants/announce funding decisions
January-February		Request input on science needs from partners
	LCC Steering Committee Conf. Call	Additional decisions on projects (as needed)
March	Technical Committee Call/Meeting	Develop recommendations on science needs and additional phases of ongoing projects

Date(s)	LCC Event	LCC Decision or Process
April	Steering Committee Meeting at Northeast F&W Conference	Approval of science needs (including RCN topics that LCC could support) and additional phases
	Northeast F&W Conference	Presentations on completed LCC projects
May-June		Assess need for RFP or direct contracts
		Issue targeted RFP if needed
July	Technical Committee Call/Meeting	Initial recommendations on science projects
August-September	LCC Steering Committee Conf. Call	Initial decisions on projects (as needed)

Boundary

The North Atlantic LCC initiated a proposal that would result in a revised boundary between the North Atlantic, Upper Midwest Great Lakes, and Appalachian LCCs, and improved ecologic homogeneity and partnership efficiency. The proposal is now being considered by the other affected LCCs (Figure 1).

Reference Documents: North Atlantic Landscape Conservation Cooperative Structure and Governance; North Atlantic LCC Annual Process for Assessing Science Needs and Selecting Projects; North Atlantic LCC Boundary Revision Proposal. Visit: http://www.northatlanticlcc.org/annual_report2012/references.

Science Needs Assessment, Northeast Conservation Framework and Conservation Science Strategic Plan

Science Needs Assessment

In 2011, in order to make informed decisions about priorities for additional science and technical projects and capacity, the North Atlantic LCC made a broad request for science needs to conservation programs, partners, and partnerships in the North Atlantic LCC area. The LCC asked for science needs and projects that were landscape or regional in scope; were focused on informing management decisions and actions (including habitat protection, restoration and management, policies and regulations, and targeted outreach); and addressed major threats and uncertainties to sustaining natural or cultural resources. The LCC received 207 needs from partners in multiple categories and systems (Table 3).

The LCC staff and technical committees compiled, assessed and synthesized these needs, then developed and applied a set of criteria to prioritize the needs. The result was 17 priority common science needs and four priority information management needs that linked to about 80 more

specific needs and projects. These needs were presented to and approved by the North Atlantic LCC Steering Committee in April 2011 (Table 4).

Table 3. Number of Needs Received by Component and System

Component	#	System	#
Monitoring	34	Coastal/Marine	73
Ecological Planning	39	Terrestrial/Wetland	97
Conservation Design	68	Aquatic	37
Research	46		
Demonstration Project	5		
Information Management	15		

Table 4. North Atlantic LCC Prioritized Common Science Needs, April 2011

Common Science Need	Specific Needs/Projects	Rank
Vulnerability of coastal wetlands and beaches to sea level rise and other anthropogenic stressors	Assessment of the current state and greatest needs for sea level rise models related to coastal wetlands and beaches; comprehensive assessment of tidal wetlands that unifies existing work.	1
General vulnerability assessments to northeastern fish and wildlife habitats and species	Assessment of the impacts of climate change on northeastern fish and wildlife habitats and species through expert-driven model; complement expert-driven approach with data, models and maps.	2
Specific vulnerability assessments of northeastern amphibians and reptiles	Identification of highest priorities and gaps in distribution data for amphibians; vulnerability assessments including vernal pools, migratory barriers, sea level rise.	3
Specific vulnerability assessments of cold water stream habitats and species including brook trout	Bring together multiple approaches to assessing habitat and population factors for brook trout and other coldwater species including: habitat modeling to predict distribution; vulnerability assessments to altered stream temperature and hydrology; identification of resilient habitat; barrier identification in headwater streams; population genomics.	4
Habitat mapping and modeling of marine bird distributions and coastal migration of birds and bats	Spatial mapping of nearshore and offshore marine bird hotspots in the Atlantic Flyway and migration routes and distributions of birds and bats along the Atlantic Coast.	5
Species-habitat modeling and mapping of aquatic species	Refine tools to classify and map aquatic habitat including hydrology, temperature and connectivity; develop habitat occupancy models; identify priority areas for conservation.	6
Species habitat modeling and mapping of terrestrial and wetland species	Model and map the current and predicted future distributions and extents of representative habitats and species.	7
Assessment of forest condition and management	Assessment of the influence of forest condition and forest management on regional habitat capability and connectivity.	8
Climate model downscaling	Climate model downscaling at scales useful for stream flow and temperatures	9

Common Science Need	Specific Needs/Projects	Rank
Assessments of landscape connectivity	Assess the current and future status of connectivity and regional and local scales.	10
Analysis of recent landscape change	Contemporary land-cover change in the North Atlantic LCC for guiding management decisions.	11
Identifying focal areas for conservation	Advancing landscape-scale conservation for northeastern herpetofauna through support of the Priority Amphibian and Reptile Conservation Area (PARCA) system.	12
Best management practices	Developing conservation and management strategies for vernal pool-dependent herpetofauna of the Northeast, including best management practices and model regulations.	13
Detecting changes in species distribution	Rapid assessment and response to coastal marine invasive species.	14
Adaptation planning pilot projects	Project the impacts of climate change and identify adaptation options at specific pilot sites; e.g., Chincoteague National Wildlife Refuge/Assateague National Seashore Complex.	15
Habitat mapping and modeling at North Atlantic LCC scale	A characterization and gap analysis of the LCC.	16
Adaptive management frameworks for representative species	Developing an adaptive management framework for American black duck habitat conservation or other representative species in the LCC.	17

Prioritized Information Management Needs

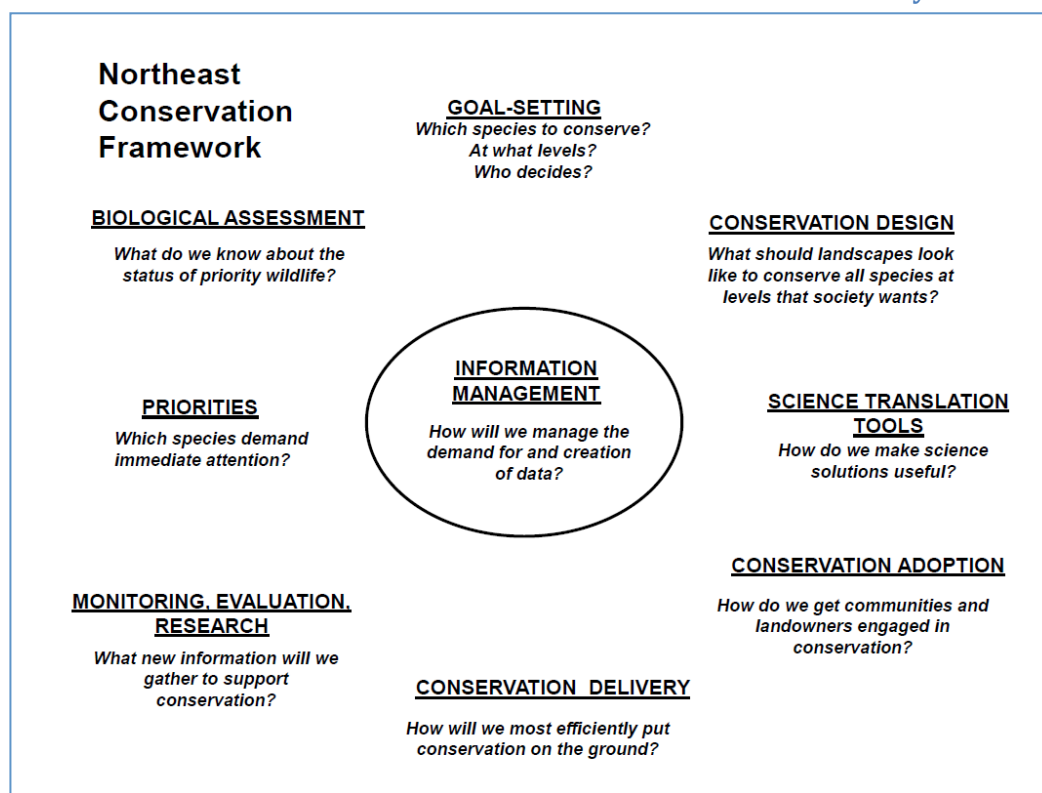
Information Management Need	Specific Needs/Projects	Rank
Long-term data management system	Overall project; Phase 1: data needs assessment; Phase 2: technical alternatives assessment; Phase 3: pilot database	1
Managed lands database development	Consistent/updated habitat management database for Northeast Region.	2
Consistent/updated secured lands database	Consistent, annually updated secured lands data for the Northeast Region.	3
Online tool for accessing the most recent conservation designs	Spatial database of conservation designs; RCN and LCC projects have a rapidly growing need for dissemination of spatial data products; would be part of overall data management needs but is highly feasible as a separate component to be integrated into future comprehensive database.	4

Northeast Conservation Framework Workshop

The Northeast Regional Conservation Framework Workshop (“Albany II”) was held in Albany, New York, June 14-16, 2011, with 86 participants, representing a cross section of 13 state agencies, six federal agencies and 12 non-governmental organizations and universities. The workshop was convened and sponsored jointly by the Northeast Association of Fish and Wildlife Agencies (NEAFWA) and the LCCs in the Northeast Region.

The specific objectives of the workshop included reviewing, synthesizing and increasing understanding of the Regional Conservation Needs (RCN) and initial LCC projects completed or underway; discussing challenges, needs, and opportunities for the RCN program and LCCs in the Northeast; exploring and discussing opportunities for collaborations between RCNs and LCCs in the Northeast to address common needs; and developing initial consensus on a common conservation framework, vision, and highest priorities going forward (Figure 2). Major outcomes of the workshop were agreement on a vision of landscapes that sustain natural resources and human needs and the need for a regional framework to achieve that vision. Specifically, the group agreed that the elements in this common conservation framework, including multi-species landscape designs, are logical and necessary to inform decision-making by the conservation community to achieve that vision.

Figure 2. The Northeast Conservation Framework as Presented at the Albany II Workshop



Several overarching themes emerged from these priorities and came up repeatedly during discussions at the workshop.

- **Focus on communications, dissemination and adoption:** There was consensus on the immediate need to better communicate regional projects and disseminate the results in a way that is meaningful and targeted.

- **Develop an effective information management system:** A set of immediate needs were identified relating to the development of an information management system that will provide easy access for states, LCCs, and other partners to conservation information and tools produced by or compiled in support of regional projects.
- **Expedite delivery of the right actions in the right places:** Immediate needs were identified related to finishing and validating mapping of species and habitats, developing conservation designs, and identifying conservation focus areas based on a variety of approaches.

North Atlantic LCC Conservation Science Strategic Plan

The staff and partners of the North Atlantic LCC completed the Conservation Science Strategic Plan. The purpose of this strategic plan is to articulate a vision, common conservation framework, process and initial priorities for developing shared science capacity for the North Atlantic LCC. The intent is to show how the LCC science capacity will build upon and link together ongoing and completed science by partners and partnerships and support a conservation framework in the Northeast. The strategic plan ties together the mission and vision statement, the results of the science needs assessment, and the results of the Northeast Conservation Framework Workshop. The strategic plan includes a matrix of actions, projects, priority needs, next steps and responsibility that will be kept up to date. The steering committee approved the strategic plan in November.

Reference Documents: North Atlantic LCC Science Needs Assessment and Criteria; LCC Common Science Needs, Northeast Conservation Framework Workshop Summary; North Atlantic LCC Conservation Science Strategic Plan. Visit:
http://www.northatlanticlcc.org/annual_report2012/references.

Priority Science Project Selection and Implementation

Initiation of 2010 Projects

In late 2010 and early 2011, four major North Atlantic LCC projects funded in fiscal year 2010 were initiated. These projects were all priorities of existing partnerships in the Northeast, including NEAFWA, the Atlantic Coast Joint Venture, the Brook Trout Joint Venture, and the Piping Plover Recovery Team. The common theme of these projects is increasing understanding of how landscapes and habitats are changing due to climate change and land use change and providing science and tools to make conservation decisions in light of these changes for terrestrial, aquatic, and coastal systems. For each of these projects, the LCC has developed a science and management advisory team and scheduled a webinar. A total of \$1,249,450 was allocated to these projects (Table 5).

Table 5. 2010 LCC Funded Projects

Year	Project Title	P.I.s and Organizations	Completion Date	LCC Funding
2010	Evaluating the Vulnerabilities of Ecological Resources to Climate Change in the Northeast	Hector Galbraith, Manomet Center for Conservation Sciences, Austin Kane, National Wildlife Federation	12/31/2012	\$100,000

The Northeast Association of Fish and Wildlife Agencies (NEAFWA) is working with Manomet Center for Conservation Sciences and National Wildlife Federation to evaluate the vulnerabilities of important fish and wildlife habitats in the Northeast to current and future climate change. Specific objectives of this research include: quantifying the likely vulnerabilities of habitats to changing climate; mapping the variability in habitat vulnerabilities across the entire region; providing essential information to inform future decisions about the allocation of finite conservation resources among the 13 states of the region; and helping build capacity among state agencies to respond to current and future climate change. Project includes application of a predictive model for evaluating climate change impacts to non-coastal resources including forests, grasslands, wetlands, rivers, lakes and ponds. For coastal habitats, project outcomes are a comprehensive catalogue and database of past and current climate change-related research, restoration, and adaptation work in the Northeast; a user-friendly tool for evaluating the vulnerabilities of coastal sites and parcels; and the application and testing of the coastal tool.

2010	Providing Science and Tools in Support of the North Atlantic Landscape Conservation Cooperative (LCC): Designing Sustainable Landscapes for Wildlife	Kevin McGarigal, University of Massachusetts Amherst	06/01/2012	\$435,000
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There is an increasing need for conservation planning over broad spatial extents that accounts for uncertainty in the effects of future climate, urban growth and other land use changes on ecological integrity and wildlife habitat capability. To address this concern in the Northeast under the auspices of the North Atlantic LCC, this project is developing a modeling framework that will: (1) simulate landscape changes driven by climate, urban growth and other disturbance processes, (2) assess the consequences of those changes to ecological integrity (coarse filter) and habitat capability for representative species (fine filter), and (3) identify priorities for land protection (e.g., what lands to protect to get the most conservation out of our investment), land management (e.g., what should be the management priorities on existing conservation lands), and ecological restoration (e.g., where should we place a wildlife road crossing structure or upgrade a stream culvert to achieve the greatest improvement in ecological integrity). The first phase of this project is designed to build the core components of the landscape change and assessment model and apply it to three pilot watersheds distributed throughout the region.

2010	North Atlantic Landscape Conservation Cooperative (LCC): Wildlife Habitat Models for Terrestrial Vertebrates	Terri Donovan, Vermont Cooperative Fish and Wildlife Research Unit	10/1/2011	\$90,005
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For representative species selected for the North Atlantic LCC, the Vermont Cooperative Fish and Wildlife Research Unit will develop models that relate characteristics of the landscape at multiple scales to suitability of the landscape as species-specific terrestrial wildlife habitat. The ultimate goal is to be able to assess the capability of the landscape to support populations of wildlife. These species-habitat relationship models for representative species are part of the broader *Designing Sustainable Landscapes* project.

2010	Forecasting Changes in Aquatic Systems and Resilience of Aquatic Populations	Ben Letcher, USGS Silvio O. Conte Anadromous Fish Lab	12/31/2013	\$420,000
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Working with the North Atlantic LCC, this project is developing models that can reliably forecast effects of future scenarios on population growth and persistence of stream-dwelling salmonids. The major environmental drivers for stream fish are stream temperature and stream flow, which respond in complex ways to the physical forcing factors of local geology, land use, water withdrawals, air temperature and precipitation. The project has developed stream temperature and flow models that respond to these physical forcing factors and provide the necessary link between physical forcing on the landscape and fish population response. Detailed demographic models that culminate in an estimate of population growth (can be positive or negative) based on the responses of fish body growth, movement, survival and reproduction to temperature and flow have also been developed. These linked, integrated models can be used to forecast population response to changes in land use (provided by the *Designing Sustainable Landscapes* project), climate change (acting through air temperature and precipitation) and other disturbances (including water withdrawal or mitigation strategies). Importantly, these linked models provide forecasts of the magnitude, direction and uncertainty of population growth. These forecasts will be useful for both evaluation of alternate management strategies and creation of maps of susceptible and resilient watersheds. In phase one of this project, these models are being applied to selected watersheds within the North Atlantic LCC.

2010	Forecast Effects of Sea level Rise on Habitat of Piping Plovers & Identify Responsive Conservation Strategies	Sarah Karpanty, Virginia Tech	12/31/2013	\$204,445
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Sea level rise and associated changes in storm magnitude and frequency are major issues of concern associated with climate change in the North Atlantic LCC. Piping plovers (*Charadrius melodus*) respond rapidly to change and depend on these low-lying coastal areas throughout their life cycle, making them excellent indicators of climate change effects. This project will develop predictions of how piping plover breeding habitat will change as a result of sea level rise and altered storminess, using a coupled risk-assessment model. The first portion of the model assesses changes to coastal geomorphology using dynamic sea level rise predictions and is linked to the second portion of the model that assesses plover habitat selection. The first task will utilize the vast data sets documenting plover habitat preference for, and utilization of, topographic, hydrodynamic, and vegetation regimes. This task will develop a plover model that is quantitatively tied to measurable physical variables including elevation, slope, frequency of inundation and overwash, and amount of vegetation. Future scenarios will be modeled in order to analyze the efficacy of existing and alternate conservation strategies against plausible sea level and other future climate variables.

Selection of 2011 Projects

In 2011, the North Atlantic LCC went through a science needs assessment process, co-hosted a conservation framework workshop with Northeast partners and developed a conservation science strategic plan (see descriptions above). As a result, the LCC identified priority science and

information management needs to be addressed. The LCC staff, technical committee, and partners worked with existing partnerships, including the Northeast Association of Fish and Wildlife Agencies, the Northeast Partners in Amphibian and Reptile Conservation, the Northeast Regional Ocean Council, and the Northwestern Atlantic Marine Birds Conservation Collaborative to develop projects and select contractors to address these priority needs. The technical committee reviewed project proposals and made recommendations to the steering committee. The steering committee allocated a total of \$935,331 to the projects (Table 6).

These projects address the top priorities from the science needs assessment and strategic plan that were not already being addressed and additional high priorities identified at the Northeast Conservation Framework Workshop, including information management and conservation design. The projects include development of foundational habitat mapping (marine mapping and completion of the terrestrial mapping); assessment of landscape connectivity (permeable landscapes); mapping of important areas for species groups that are not well mapped (amphibians and reptiles and marine birds); continuation of species-habitat modeling and a second phase of regional vulnerability assessments. Also included is an information management needs assessment and a conservation design project that will focus on the translation, compilation, synthesis and application of existing science and tools. These projects, combined with staff hired in 2011, will allow the LCC to move forward with both the development of new science and tools and management and application of existing information.

Table 6. 2011 LCC Funded Projects

Year	Project Title	P.I.s and Organizations	Completion Date	LCC Funding
2011	Northeast Regional Species Vulnerability Assessment incorporating the NatureServe Climate Change Vulnerability Index	Lesley Sneddon, NatureServe	12/31/2012	\$75,000

Numerous studies show that ongoing climate change will have major effects on the distribution and conservation status of biodiversity. Resource managers urgently need a means to identify which species and habitats are most vulnerable to decline in order to direct resources where they will be most effective for those species and habitats. To address this need, NatureServe and State Heritage Programs collaborators have developed a Climate Change Vulnerability Index (CCVI) to provide a rapid, scientifically defensible assessment of species' vulnerability to climate change. The CCVI integrates information about exposure to altered climates and species-specific sensitivity factors known to be associated with vulnerability to climate change. This project will apply the CCVI to 60 species to be selected in collaboration with state wildlife diversity experts, the technical committee of the North Atlantic LCC, and Manomet Center for Conservation Sciences. Species selected for assessment will represent: (a) representative species for the North Atlantic LCC; (b) foundational species for habitats currently being assessed for climate change vulnerability by the Manomet; and (c) high concern, high responsibility Species of Greatest Conservation Need (SGCN) identified by the Northeast states.

2011	Species-habitat Modeling of Additional Representative Species for the Designing Sustainable Landscapes project	Kevin McGarigal, University of Massachusetts Amherst	06/01/2012	\$45,000
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The University Of Massachusetts Amherst will build on work by the Vermont Cooperative Fish and Wildlife Research Unit to develop models for an additional set of representative species to evaluate the species-habitat model and its complementarity to the ecological integrity model in three pilot watersheds using the landscape modeling framework developed in the *Designing Sustainable Landscapes* project.

2011	Permeable Landscapes for Species of Greatest Conservation Need and Representative Species	Mark Anderson, The Nature Conservancy	12/31/2013	\$49,868
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Landscape permeability is the ability of a heterogeneous land area to provide for passage of animals, equivalent to what some authors call “habitat connectivity.” In this project we will evaluate and map the relative landscape permeability across a region of 13 states, and determine how permeability coincides with the locations and habitat of Species of Greatest Conservation Need and representative species. The analysis will be based on new analytical tools (e.g., Circuitscape and Resistant Kernel models) applied to the Northeast Regional Habitat Map, and corroborated with species locations and land cover maps. The project aims to identify where the most important regional movement concentrations are, particularly those areas where movements may be funneled due to constriction in the landscape. Using this information, the project will measure the amount of flow, permeability and resistance present in the region’s roads and secured-lands network. This project will build on previous projects developed through the Regional Conservation Needs process and will be closely coordinated with the ongoing *Designing Sustainable Landscapes* project.

2011	Information Management Needs Assessment	Contractor TBD	06/01/2012	\$45,000
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The North Atlantic LCC, along with its partners, is working together on an information management needs assessment. LCC staff have assembled a team that will be in charge of selecting, working with and reviewing the work done by an assessment contractor. The assessment will be distributed broadly to partners and users in the LCC conservation community. After the needs assessment is completed and the highest priority needs are selected, the team will select the contractor best suited to develop an information management needs system that builds on or links to existing and planned systems.

2011	Application of the Coastal and Marine Ecological Classification Standards (CMECS) to the Northeast	Jennifer Greene, The Nature Conservancy; Kathryn Ford, Massachusetts Division of Marine Fisheries; John W. King, University of Rhode Island	12/31/2013	\$130,000
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This project will utilize the national Coastal and Marine Ecological Classification Standard (CMECS) to classify estuarine and marine environments in the northwest Atlantic region (Maine to Virginia). This classification effort will be informed by the habitat mapping approach that The Nature Conservancy (TNC) developed for the northwest Atlantic and will be cross-walked to existing state marine classification systems. This project will coordinate, as appropriate, with regional activities surrounding offshore benthic habitat mapping that are being led by the Northeast Regional Ocean Council (NROC) and academic and non-profit partners. Since CMECS will be released in the next few months, the project aims to work closely with the

CMECS Implementation Group to appropriately apply CMECS. It is anticipated that the process of applying CMECS will require an active dialog with regional partners to resolve issues regarding thresholds and units. Lastly, the project will examine the scalability of this classification by conducting pilot projects at three different scales relevant to planning and conservation efforts. At the regional scale (1:5,000,000), we will apply the classification to The Nature Conservancy's Benthic Habitat Model from the 2010 Northwest Atlantic Marine Assessment. An intermediate-scale classification (1:250,000) will utilize datasets assembled for marine spatial planning efforts in Rhode Island, Massachusetts, and adjacent federal waters. Finally, this project will classify small-scale, estuary-specific, high-resolution benthic information for Boston Harbor (1:5,000 scale). These pilots will be used to assess the ability of CMECS to convey consistent ecological data across several relevant scales.

2011	Assessing Priority Amphibian & Reptile Conservation Areas (PARCAs) and Vulnerability to Climate Change in the North Atlantic Landscape Conservation Cooperative (LCC)	Priya Nanjappa, Association of Fish & Wildlife Agencies; Kyle Barrett, University of Georgia; Phillip deMaynadier, Maine Department of Inland Fisheries and Wildlife; Cyndy Loftin, Maine Cooperative Fish and Wildlife Research Unit	04/01/2014	\$312,862
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Amphibians and reptiles are experiencing severe habitat loss throughout North America; however, this threat to herpetofaunal biodiversity may be mitigated by identifying and managing areas that serve a disproportionate role in sustaining herpetofauna. Identification of such areas must take into consideration the dynamic nature of habitat suitability. As climate rapidly changes, it is possible that areas currently deemed suitable may no longer be so in the future. To address these needs, this project will generate spatially explicit data that will: (1) identify discrete areas most vital to maintaining reptile and amphibian diversity; (2) project regions of current and future climatic suitability for a number of priority reptiles and amphibians in the North Atlantic LCC; and (3) identify gaps in distributional data for species that may prevent or inhibit the identification species-level climatic suitability. Objective 1, identification of Priority Amphibian and Reptile Conservation Areas (PARCAs) will proceed by collecting natural history information, distributional data, and by weighing expert opinion for key species. This process will result in a deductive modeling approach akin to the national GAP analysis program. Objectives 2 and 3 will rely on collection of known locality data and the use of inductive species distribution modeling. Collectively, this process will take place over two years (2012 – 2013), and will represent the assembling and processing of all necessary information for identifying PARCAs. By synthesizing the deductive and inductive modeling approaches, we will offer a long-term assessment of PARCAs that may provide refugia as the climate changes.

2011	Mapping the Distribution, Abundance and Risk Assessment of Marine Birds in the Northwest Atlantic Ocean: Phase 1	Tim Jones, Atlantic Coast Joint Venture and P.I. TBD	12/31/2013	\$175,000
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This project will develop a series of maps depicting the distribution, abundance and areas of high, medium and low risk to marine birds from offshore activities (e.g., energy development) in the northwestern Atlantic Ocean. There are numerous efforts underway to identify marine habitats of importance to marine birds in the offshore environments of the eastern U.S. Many of these efforts are gathering similar types of information (i.e., baseline data) but are focusing on different regions and using different technologies. This project will

bring together a unique partnership to pull together data from a variety of sources, including ships of opportunity, aerial surveys, species-specific telemetry studies, and the historic (from the 1970s to present) marine bird database (Atlantic Seabird Compendium) maintained by the U.S. Geological Survey (USGS). These data will be used to model distribution and abundance patterns of many species or species groups of seabirds and then combine them with species risk assessments to create a spatially explicit risk surface. The resulting “best bird map” can be used for informing decisions about siting offshore activities such as wind turbine installations, marine spatial planning efforts, or other uses requiring maps of seabird distributions such as identifying marine protected areas. The goal of this effort is to document and predict areas of frequent use and aggregations of birds and the relative risk to marine birds within these areas. The resulting risk surface can be used to inform offshore energy development and, more generally, marine spatial planning efforts about the importance of the pelagic habitats to marine birds.

2011	Completion of Terrestrial Habitat Map for Virginia & Maryland Piedmont and Coastal Plain to be Consistent with Rest of Region.	Mark Anderson, The Nature Conservancy	6/1/2012	\$14,470
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The Northeast Terrestrial Habitat Classification Map has been underway for several years with support from the Doris Duke Foundation and Northeast Association of Fish and Wildlife Agencies and is largely complete. This project would complete the mapping in the Virginia and Maryland Piedmont and Coastal Plain to make the map comparable across the entire Northeast region.

2011	Conservation design: compilation, synthesis, modification, translation and adoption of existing spatial data and tools	Steve Fuller, North Atlantic LCC	2/1/2013	\$91,627
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Establish cooperative means to make existing and future conservation design information and tools more available and accessible to conservation partners; to produce composite maps depicting landscape conservation designs; and to develop spatial data layers summarizing environmental conditions affecting a suite of important ecological and cultural resource elements in the Northeast.

Representative Species Selection Project

An additional foundational project that North Atlantic LCC staff and partners were involved in during 2011 was the selection of representative species for conservation planning. Representative species are species whose habitat needs, ecosystem function, or management responses are similar to those of a group of other species. The assumption is that conservation planning and actions based on representative species will also address the needs of other species in that group.

The purpose of the representative species process was to identify species that could best represent the larger group of priority species for designing conservation and management strategies that will most effectively sustain fish and wildlife populations at desired levels in the face of land use change, climate change, and other stressors. Specifically, these conservation and management strategies are intended to help develop maps, tools and landscape designs focused on providing habitat for multiple species, to help understand the current and future capability of landscapes to

support fish and wildlife populations, and to help guide strategic decisions about how much of what habitat conservation actions are needed where to sustain populations.

The project was led by the University of Massachusetts Amherst and conducted in close collaboration with the U.S. Fish and Wildlife Service's Northeast Region Strategic Habitat Conservation Steering Committee. Steps in the process included the following:

- **Priority Species Lists:** Terrestrial and aquatic priority species lists were compiled by the U.S. Fish and Wildlife Service and included 341 terrestrial and 75 aquatic species, of which 106 were federally-listed as threatened or endangered and 32 were additional Species of Greatest Conservation Need from State Wildlife Action Plans.
- **Species Habitat Association Database Design and Development:** Species-habitat associations were developed for the potential representative species using the habitat systems defined in the Northeastern Terrestrial Wildlife Habitat Classification and Northeastern Aquatic Habitat Classification, both developed by NatureServe and The Nature Conservancy for the Northeast Association of Fish & Wildlife Agencies. More than 50 species experts conducted an expert review of the databases.
- **Hierarchical Clustering and Indicator Species Analyses:** A cluster analysis of the species and habitat systems was conducted that resulted in groupings of habitat systems based on similarity in priority species composition and an indicator species analysis to identify those species most strongly associated with each habitat system cluster.
- **Criteria for Selecting Representative Species:** A suite of additional criteria was developed to facilitate selection of the final set of representative species at workshops.
- **Regional Workshops:** Three workshops were held, one in each sub-region of the North Atlantic LCC, in which federal, state, and NGO partners identified a list of representative species for the LCC.

Eighty-seven terrestrial species were selected as representative species for the three sub-regions of the North Atlantic LCC, including 66 birds, nine reptiles, four mammals, four amphibians, two plants and two invertebrates. There were 35 species selected for northern New England, 34 for southern New England and 54 for the mid-Atlantic sub-region. Participants at the southern New England workshop also selected 13 aquatic representative species for six habitat system clusters. It was recognized that additional work is needed on the selection of aquatic representative species.

Next steps include the development of species-habitat capability models for a subset of terrestrial representative species in three pilot areas in the LCC (Kennebec watershed in Maine, Connecticut River watershed in Massachusetts, and the Pocomoke and Nanticoke River watersheds in Maryland and Delaware) as part of the Designing Sustainable Landscapes project (see description in Table 5). In these pilot areas, the multiple species-habitat models will be used for landscape designs and compared to a coarse filter ecological integrity approach. For each representative species, species-habitat models along with compiled information on existing population goals and

population estimates for that species will inform the setting and evaluation of initial conservation targets. These pilot efforts will inform broader use of representative species in the LCC. The LCC aquatic technical team and staff will also work with partners to refine the process and develop more complete lists of aquatic representative species for the LCC.

Reference Documents: Fact sheets for 2010 projects; Representative Species Summary. Visit: http://www.northatlanticlcc.org/annual_report2012/references.

Communications and Information Management

The staff and partners of the North Atlantic LCC recognize that communicating and managing information are critical to the success of the LCC partnership. The LCC is continuing to assess needs and build communications and information management capacity to meet those needs, including the approaches described below.

LCC Website

In 2011, staff developed an initial website for the LCC (<http://www.northatlanticlcc.org>) that has background and contact information on the LCC, specific meeting information, project fact sheets, links to additional resources, news and events, and web pages on representative species and the Northeast Conservation Framework Workshop. The existing website is fairly simple and does not have the full capability needed. The LCC has hired a contractor and is developing a website and knowledge management system with geo-referencing and integrated networking that will serve web, document sharing, social networking and data portal functions. The results of the *Information Needs Management Assessment* project will be used to guide the development of the knowledge management system.

Webinars

The North Atlantic LCC developed a series of five webinars on the Northeast Conservation Framework and current projects of the LCC as part of the monthly Science Seminar Series hosted by the U.S. Fish and Wildlife Service's Northeast Region. The seminars are broadcast live over the internet and then archived on the seminar website. The webinars conducted in 2011 and early 2012 were:

- *Regional Conservation Needs, Landscape Conservation Cooperatives and a Conservation Framework for the Northeast: How the Results of a Recent Workshop Will Help Conservation Partners Develop Shared Science Capacity*, Andrew Milliken, North Atlantic LCC
- *Northeast Region Habitat Vulnerability Assessment and Use of a Vulnerability Index to Assess Species Most likely to be Impacted by Climate Change*, Hector Galbraith, Manomet Center for Conservation Sciences and Lesley Sneddon, NatureServe

- *Forecast Effects of Accelerating Sea level Rise on the Habitat of Atlantic Coast Piping Plovers and Identify Responsive Conservation Strategies*, Sarah Karpanty, Virginia Polytechnic Institute
- *Assessment of Landscape Changes in the North Atlantic Landscape Conservation Cooperative: Decision-Support Tools for Conservation (Designing Sustainable Landscapes)* Kevin McGarigal, University of Massachusetts Amherst
- *Forecasting Changes in Aquatic Systems and Resilience of Aquatic Populations in the North Atlantic Landscape Conservation Cooperative: Decision-support Tools for Conservation*, Ben Letcher, U.S. Geological Survey, Silvio O. Conte Anadromous Fish Lab and University of Massachusetts Amherst

Fact Sheets

The North Atlantic LCC has developed a variety of fact sheets for various audiences including a North Atlantic LCC general fact sheet, a national LCC fact sheet and fact sheets on all funded projects.

Congressional Visits

North Atlantic LCC staff and steering committee members met with Senate staff from the North Atlantic states and staff from the Senate Interior, Environment, and Related Agencies Appropriations Sub-Committee in fall 2011 to discuss and answer questions regarding the North Atlantic LCCs and the national LCC network. Steering committee members from those states also called their Senate staff members before or after the Senate and Committee staff meetings.

Information Management System

Partners in the North Atlantic LCC and attendees at the Northeast Conservation Framework Workshop indicated the importance of information management to link science to management. In 2011 and 2012, the North Atlantic LCC is working on an *Information Management Needs Assessment* project to better understand partner needs and design a system that meets those needs. LCC staff have assembled a team that will be in charge of selecting, working with, and reviewing the work done by an assessment contractor. The assessment will be distributed broadly to partners and users in the LCC conservation community. After the needs assessment is completed and the highest priority needs are selected, the team will select a contractor best suited to develop an information management needs system that builds on or links to existing and planned systems.

These resources will enable the staff and partners of the LCC to communicate and share information more effectively. A significant commitment of time will also be needed to reach out individually to the many programs and partners in the North Atlantic region.

Reference Documents: LCC Communications Plan; LCC website; archived LCC webinars; LCC fact sheets; Information Management Needs Assessment proposal. Visit: http://www.northatlanticlcc.org/annual_report2012/references.

Looking Toward 2012

The progress and accomplishments of the North Atlantic LCC and its partners in 2011 set the stage for important next steps in 2012.

Partnership Development and Operations

With the core partnership of state and federal agencies and nongovernmental organizations established, the LCC needs to build on that core and strengthen coordination and engagement with other key partners. A few important needs are addressed here.

- Canadian partners are currently represented on the steering committee and technical committee by the Canadian Wildlife Service and Association of Fish and Wildlife Agencies. The LCC needs to build on this relationship by engaging directly with provinces (Quebec, New Brunswick, Nova Scotia and Prince Edward Island) and relevant Canadian or multinational conservation organizations. An increased level of involvement will be important as more trans-boundary projects are developed.
- Further coordination and engagement is needed with tribes in the LCC area. All federally recognized tribes were invited to participate in the LCC and the United South and Eastern Tribes (USET) agreed to provide a representative. The LCC needs to reach out again to USET and the tribes to assess their needs and increase their involvement. Two opportunities in 2012 are participation in the Native American Fish and Wildlife Society Conference and articulation of climate science needs of tribes from the College of the Menominee Nation through the Northeast Climate Science Center.
- With an increased emphasis on conservation design, translation and adoption, it is important that agencies and organization that are directly involved in land protection, habitat restoration, habitat management and land use are involved in developing, applying and evaluating LCC science and tools. An example is the Natural Resources Conservation Service that implements Farm Bill programs in the North Atlantic LCC and is able to target those programs to priority areas. The LCC also has the opportunity to reach out to the land use planning community through the Northeast Landscape Conservation Initiative of the Regional Plan Association.

Additional operational needs for 2012 include increased capacity for conservation design, translation and adoption. Initial capacity needs to support these components are geographic information systems (GIS) technical support within the LCC staff and within organizations and universities that develop and maintain regional scale spatial data.

Science Needs Assessment and Project Selection

The science needs assessment, Northeast Conservation Framework Workshop, and strategic plan resulted in a set of science needs and projects to support the mission and goals of the LCC. It is important in 2012 to use and refine these science needs to focus on the highest priorities, including the following actions.

- The LCC needs to communicate and implement a transparent annual process for identifying specific needs and seeking and selecting projects for LCC funding. Programs and partners need to understand what to expect and what their role is in that process. Requests for proposals should be developed as appropriate to ensure an open and competitive process for selecting project contractors.
- The LCC needs to broaden technical engagement for refining science needs by developing terrestrial/wetland, aquatic and coastal/marine teams with additional partner agency and organization membership.
- The North Atlantic LCC needs to increase coordination with neighboring LCCs, specifically the Appalachian, Upper Midwest Great Lakes, and South Atlantic, on developing consistent approaches where possible.
- The North Atlantic LCC needs to help lead efforts with neighboring LCCs, specifically the Appalachian, Upper Midwest Great Lakes, and Tallgrass Prairie and Big Rivers, to identify key climate science needs for the Northeast Climate Science Center (CSC) and participate in the ranking and selection of CSC projects for funding.

Science Project Implementation

With two years of projects now underway, it is increasingly important that LCC partners are engaged and involved in oversight, application, and evaluation including the following steps.

- For each project, there needs to be regular technical oversight from partners and staff to ensure that the scientists and their projects maintain a strong link to the LCC.
- Each project should be linked to managers and potential users through manager/user groups or other means early in the process to ensure that the projects are designed to meet their needs and the results are in the appropriate scale and format.
- The methodology and results of each project should be available through the LCC website and presented as part of the Science Seminar Series

Conservation Design and Delivery

In addition to addressing science needs and developing new science projects, there is an increasing need to ensure that completed projects and existing information are used to prioritize and guide more effective conservation actions by partners toward common goals. A conservation design proposal developed by the LCC in 2011 and approved early in 2012 addressed these needs and included the following needs.

- The LCC needs to develop GIS capacity and compile and synthesize existing regional spatial data and conservation designs and work with partners to develop translational tools.
- The LCC needs to support demonstration projects to apply science and tools to conservation actions and evaluate the tools.

- The LCC needs to develop an initial process for setting conservation targets including goals for representative species and habitats as part of its ecological planning and conservation design and to refine these targets through conservation design.

Communications and Information Management

A major focus for 2012 is increasing the communication and information management through a variety of approaches, including the following priorities.

- The LCC needs to complete an information management needs assessment and develop pilot phases of an information management needs system.
- The LCC needs to develop a fully functional northatlanticlcc.org content management website with information management capability.
- With increased staff capacity, in-person visits to partners, programs, and Congress will be a high priority.

More Information...

For more information, please visit the North Atlantic LCC website, <http://www.northatlanticlcc.org> or contact the LCC Coordinator, Andrew Milliken at andrew_milliken@fws.gov.