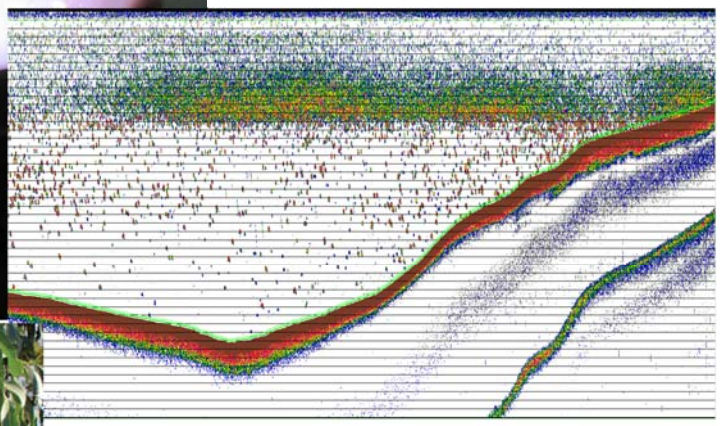
2013-2015 Unit Report

Vermont Cooperative Fish and Wildlife Research Unit



In Cooperation With

- U.S. Geological Survey
- Vermont Department of Fish and Wildlife
- University of Vermont
- Wildlife Management Institute

Vermont Cooperative Fish and Wildlife Research Unit

2013 - 2015
Report of Activities

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Cover photos clockwise from top: Stonecat captured on the Chazy River; Acoustic transects with YOY rainbow smelt targets highlighted (red box) at thermocline; Wildlife Acoustics recording device for remote monitoring of birds, amphibians, insects and bats.

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Program Direction Statement

The Vermont Cooperative Fish and Wildlife Research Unit is located at the University of Vermont (UVM) in Burlington, Vermont, and is housed on campus in The Rubenstein School of Environment and Natural Resources. Overall goals of the Unit are (i) to address technical and research needs of federal fish and wildlife agencies, the Vermont Department of Fish and Wildlife, the University of Vermont, and other federal, state, and private entities; (ii) to participate in the education of graduate students and advanced undergraduate students at the University of Vermont; and (iii) to disseminate findings of research conducted by Unit personnel, graduate students, and cooperators. Unit personnel coordinate Unit activities with federal fish and wildlife agencies, the Vermont Department of Fish and Wildlife, and other agencies and groups involved in the management of natural resources.

Research by current Unit personnel is directed primarily toward aquatic and terrestrial ecosystems within the state of Vermont. Unit research is conducted in the context of a comprehensive, ecosystems approach that recognizes the importance of ecological and human interactions among species and their habitats. Research activities focus on the biology/ecology of fish, mammal, and bird species, and the biological consequences of human impacts on aquatic and terrestrial systems.

Research in these areas is conducted by Unit personnel who possess technical expertise in fish/aquatic ecology, landscape ecology, species/habitat associations, bioenergetics modeling, population viability modeling, and hydroacoustics technology.

To achieve the Unit research goals, Unit personnel aggressively pursue funding sources for projects of scientific merit that advance our knowledge of natural resources and their management. This involves both field and laboratory studies in which integrated research is conducted with colleagues at UVM and elsewhere. Along with these studies, Unit activities include enhancement of methodological and analytic capabilities at UVM in the areas of fish and wildlife biology.

Assistant Unit Leader Terri Donovan (left) and Unit Leader Donna Parrish (right) with Secretary of the Interior Sally Jewell (March 2015)

Unit educational goals are achieved in several ways, including the teaching of formal courses at the graduate and upper undergraduate level. Courses recently taught by Unit personnel include Ecology of Fishes, Population Dynamics and Modeling, and Occupancy Modeling and Estimation. Several on-line courses have been developed in collaboration with the U.S. Fish and Wildlife Service National Conservation Training Center. Unit staff also participate in the classroom through presentation of guest lectures and seminars. Unit staff act as advisors for graduate students, and are involved as committee members on graduate research committees. To the extent possible, Unit personnel also participate in training and education programs for personnel in the Vermont Department of Fish and Wildlife.

Our vision for this Unit is to provide the best possible science to natural resource management agencies for the restoration of habitats and recovery and sustainability of Vermont's fish and wildlife species. In achieving our vision, we will continue to conduct research that is highly relevant to and valued by managers and policy makers.

Research Project Narratives

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NON-NATIVE ALEWIFE AND NATIVE RAINBOW SMELT IN LAKE CHAMPLAIN: A MODELING APPROACH TO DESCRIBE INTERACTIONS AND SYSTEM-WIDE CONSEQUENCES

Principal Investigators: Donna L. Parrish, Lars G. Rudstam and Patrick J. Sullivan (Cornell University), and Bernie Pientka (VTFW)

Graduate Student: Paul W. Simonin (M.S. Student, UVM; Ph.D. Student, Cornell University)

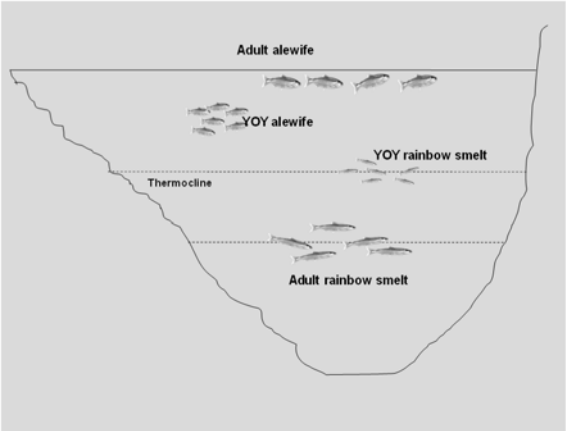
Project Cooperators: Lake Champlain Sea Grant and Vermont Department of Fish and Wildlife

Project Period: 1 February 2009 – 31 January 2014

Objectives: 1) To develop a model of YOY rainbow smelt and alewife survival through their first summer that includes explicit attention to changes in spatial distributions of cannibalistic predators (adult alewife and rainbow smelt) and prey (YOY alewife and rainbow smelt) in Lake Champlain, 2) Using the results of objective (1), develop a coupled, age-structured population dynamics model of alewife and rainbow smelt in Lake Champlain, and 3) Evaluate the likely effects of the expansion of alewife on rainbow smelt and the greater Lake Champlain ecosystem.

Synopsis: Alewife became established in 2003 and are now quite abundant in most basins of Lake Champlain. Previous work on this project studied the distribution of rainbow smelt and alewife in relation to the abiotic environment, and predictive distribution models were created. Here we used these models, and empirical relationships between distribution and cannibalism, to simulate population and community dynamics for rainbow smelt and alewife. This model simulates possible future changes in the abiotic environment, and possible management decisions. Our distribution models and data are also being used to aid fish sampling design, and we compared trawl and acoustic sampling techniques in addition to developing shallow-water sampling methods. We also studied how salmonid predators have responded to alewife as prey. Tissue samples were analyzed to determine carbon and nitrogen stable isotope concentrations, and thus trophic positions in the system. Our results indicate that adult rainbow smelt feed at a higher trophic level than adult alewives, and that Atlantic salmon consume alewife in addition to rainbow smelt. The basic ecology of mysids (*Mysis diluviana*) in Lake Champlain was a complementary component and included trophic relationships, growth, and abundance (Hyrcik et al. 2015). This is the first such study in Lake Champlain.

Project Status: Completed.



Cartoon illustrating summer distribution of rainbow smelt and alewife at night in Lake Champlain.

Sampling on Lake Champlain at night.

MODELING THE EFFECTS OF CLIMATE CHANGE ON ANADROMOUS FISH POPULATIONS IN THE CONNECTICUT RIVER

Principal Investigators: Donna L. Parrish, Martha E. Mather (USGS-Kansas Coop Unit), and Elizabeth A. Marschall (The Ohio State University)

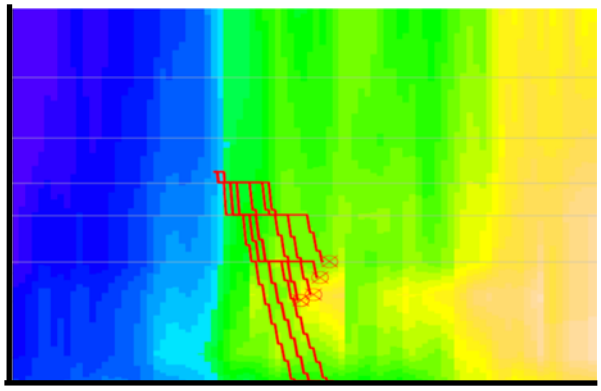
Project Cooperators: National Marine Fisheries Service and Vermont Department of Fish and Wildlife

Project Period: 1 August 2011 – 31 January 2016

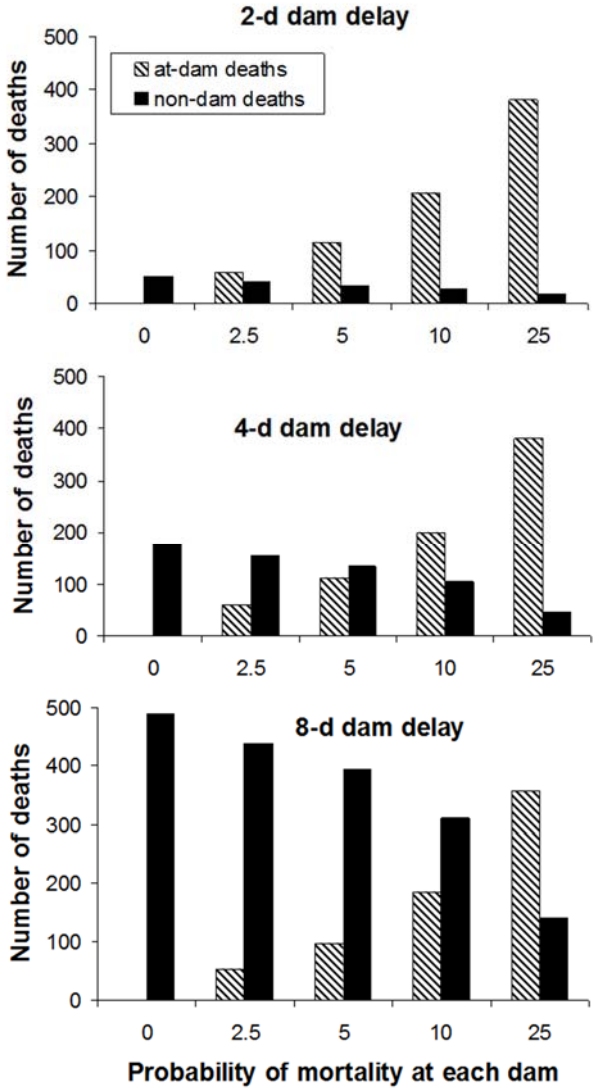
Objective: To model Atlantic salmon or other species to forecast survival of migratory fish in relation to increased temperature and fluctuating discharges.

Synopsis: Previously we explored how temperature, discharge, and the indirect effects of dams (by creating delays in migration) were related to survival of Atlantic salmon smolts. Here we are adding American shad to forecast survival of migratory fish in relation to increased temperature and fluctuating discharges. In switching our focus to a mainstem andromous species, we need to devise a framework for determining if there is an "environmental window of suitability." One possible approach is to investigate the patterns of phenology along the East Coast to guide our understanding in how American shad in the Connecticut River may respond to climate change. Fortunately, American shad range from Nova Scotia to Florida and their life histories move from long-lived, larger bodies in the north to short-lived, smaller bodies in the south. People speculate that temperature is an important driver for anadromous fish life history and movement events, but this has rarely been tested and the data are inconsistent. We have addressed the importance of temperature to migration timing through an analysis of original data in the primary literature along the range of latitudes where American shad occur. Many studies on American shad have been reported in the literature over the last 40 years. However, upon closer scrutiny some critical information, e.g., temperature at time of migration, refer to a single source that does not appear to be backed by original data. Thus, we took several steps back to attempt to recover information from papers with data. This process is helping us move forward to a better understanding of fish migration.

Project Status: Ongoing.



Simulations of Atlantic salmon smolts migrating (red lines) downstream—left panel without dams and right panel with dams. An X marks where a smolt dies during the migration. Fish most often die when encountering hotspots (yellow) caused by delay at dams not the dams themselves.



Right: Number of deaths (of 500 initial simulated migrants) directly at dams and at times and locations removed from dams for smolts from the Wells River (RK 428) at five levels of direct mortality at dams. From top to bottom, panels represent simulations with 2-d, 4-d, and 8-d delays at each dam.

MODELING A MAINSTEM SPAWNER: AMERICAN SHAD IN THE CONNECTICUT RIVER

Principal Investigators: Donna L. Parrish, Martha E. Mather (USGS-Kansas Coop Unit), and Elizabeth A. Marschall (The Ohio State University)

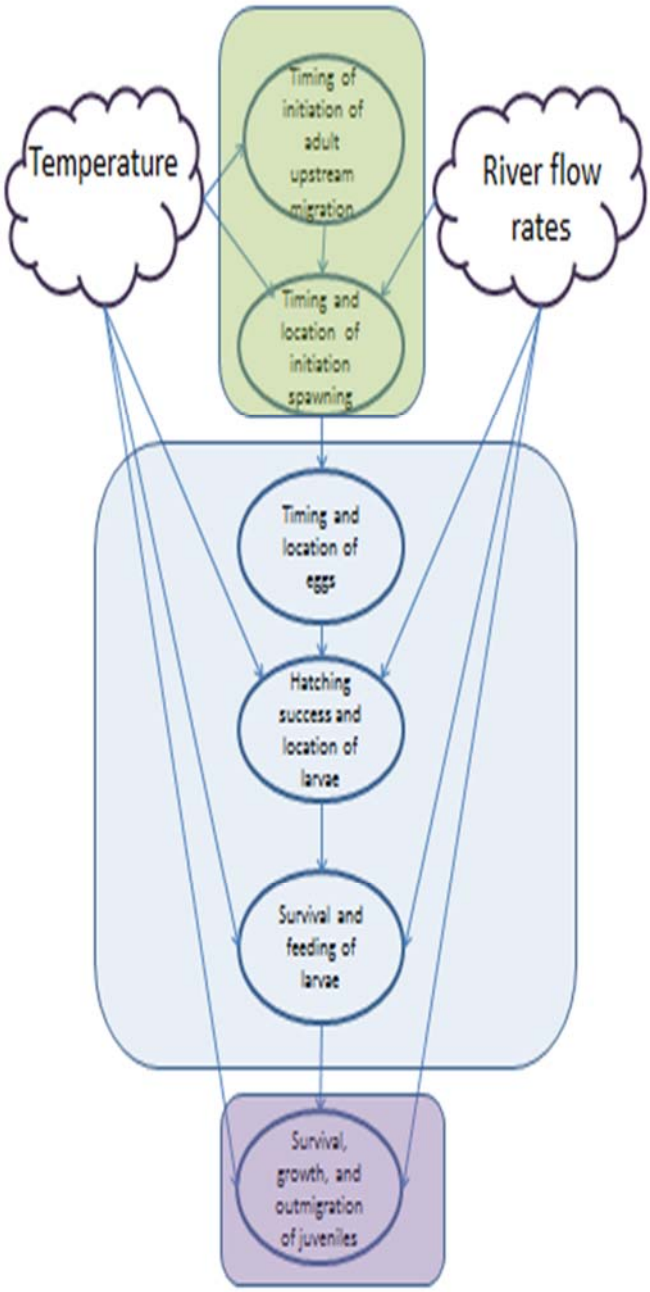
Project Cooperators: National Marine Fisheries Service and Vermont Department of Fish and Wildlife

Project Period: 1 January 2015 – 31 December 2017

Objective: To model juvenile American shad residence and migration within the mainstem river in order to forecast survival in relation to increased temperature and fluctuating discharges.

Synopsis: We propose to expand our modeling framework that we developed for Atlantic salmon to include a mainstem spawner, American shad. The goal is to forecast survival of shad in relation to increased temperature and fluctuating discharges. We can modify our original model to test how these changes affect residence and migration of juvenile American shad. Specifically, our goals are to expand our modeling to address how temperature, discharge, habitat, food, density may affect American shad. We may also be able to work on modeling upstream as well as downstream migration. Our results will be useful in predicting the effect of future thermal regimes and river flow conditions on residence and migration of juvenile American shad in the mainstem Connecticut River. From this research, we will be better able to predict the range of conditions in the future that will allow for successful conservation and management of American shad within the river.

Project Status: New.



The freshwater phase of the American shad life cycle including adult spawning, egg and larvae, and juvenile migration stages.

ASSESSMENT OF STONECAT (*NOTURUS FLAVUS*) POPULATIONS IN THE MISSISQUOI AND LAPLATTE RIVERS OF VERMONT

Principal Investigator: Donna L. Parrish

Graduate Student: Elizabeth A. Puchala (M.S. Student)

Project Cooperator: Vermont Department of Fish and Wildlife

Project Period: 1 June 2011 – 31 December 2015

Objective: To increase our knowledge of the current status of identified stonecat populations in the Missisquoi and LaPlatte rivers including estimates of abundance, survival rates, and other information critical to assessing the likelihood of long-term stonecat population persistence and viability faced with mortality resulting from lampricides and other threats.

Synopsis: Stonecats (*Noturus flavus*) are listed as endangered in Vermont because of their limited distribution to the LaPlatte and Missisquoi rivers. The restricted distribution and lack of knowledge on abundance is cause for concern in the survival of these populations. Based on capture numbers, we predicted the LaPlatte River population, which provides quality habitat, is stable. However, the Missisquoi River population has potential for increased intermittent mortalities from two sources, lampricide (3 -trifluoromethyl-4-nitrophenol) every four years and dewatering events. In 2012, 2013, and 2014 we captured, PIT-tagged (> 90 mm), and marked all Stonecats collected. Individuals in the LaPlatte (N=1252) and the Missisquoi (N=125) were PIT tagged. First we estimated survival and seniority of Stonecats in the LaPlatte River, using the Pradel Model, and derived an average annual lambda of 1.03. Population estimates from the LaPlatte River were modeled using population viability analysis (PVA). Few Stonecats were captured in the Missisquoi River, so we used the PVA model to estimate extinction rates with increased intermittent mortalities on 4-, 6-, and 8-year cycles to predict long-term viability. With an initial number of 2000 individuals, the population became extinct 100% of the time with an increase in mortality of 0.1 on a 4-year cycle. Results indicate that the LaPlatte River population is stable, but the Missisquoi River, in the area affected by lampricide, is not. These results are informative for developing future management scenarios, however, our approach has uncertainty that can only be addressed through obtaining more data on the Missisquoi River population. More data will be collected in 2015 and most sampling will be done in the Missisquoi River.

Project Status: Ongoing.

Juvenile stonecat collected in Missisquoi River.

Removing minnow traps from the Missisquoi River during low water phase in August 2012.

DOES WILDLIFE INFORMATION INFLUENCE PUBLIC ACCEPTABILITY OF DEVELOPMENT?

Principal Investigators: James Murdoch (UVM Rubenstein School), Therese M. Donovan, Robert Manning (UVM Rubenstein School), John Austin (VTFW).

Graduate Student: Jessica Espenshade (M.S. Student)

Project Cooperator: USDA Northeastern States Research Cooperative

Project Period: 1 September 2013- 30 August 2015

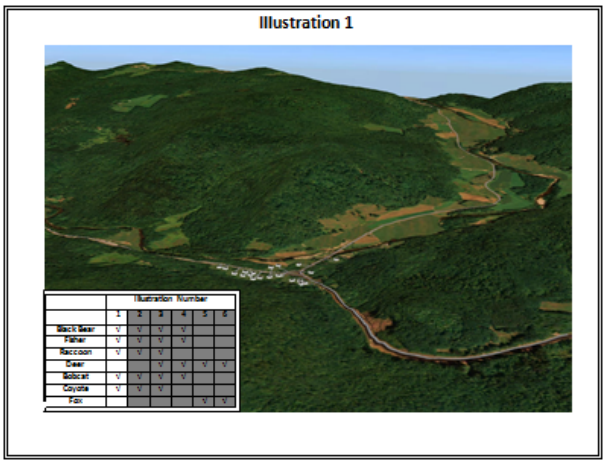
Synopsis: Landscape composition (the amount of forest, development, and agriculture) significantly affects which wildlife species will occur in a town, and how large the wildlife population size can be. It also affects the livelihoods of people living in those towns, providing the social and economic needs of people. In the Northern Forest, land conversion to housing and agricultural development is increasing and represents a threat to native species, especially those that are managed for hunting or considered species of greatest conservation need.

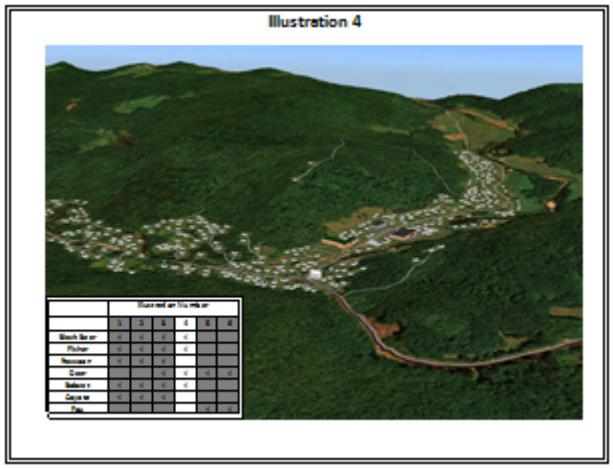
In a previous NSRC project, we used visual preference surveys to assess the public's "acceptability" of development in Vermont (Bettigole et al. 2013a). Survey respondents were provided a series of three-dimensional images depicting alternative landscape conditions that varied in their amounts of development, forest, and agriculture in a fictional Vermont town. Respondents were asked to rate the acceptability of each image (landscape scenario) on a scale of -4 (highly unacceptable) to +4 (highly acceptable). The results indicated that, on average, the public accepted an increase of 9.1% of development across the Vermont landscape. These results varied by town and were strongly dependent on the town's current population size, with smaller towns more willing to increase development. If the Vermont landscape develops to town-specific acceptability levels, then approximately 17,000 km² of forest will be lost. Bettigole et al. (2013b) estimated that a loss of 17,000 km² of forest would result in a 15% decline in occupancy rates of black bears and a 3% decline in bobcat occupancy rates statewide.

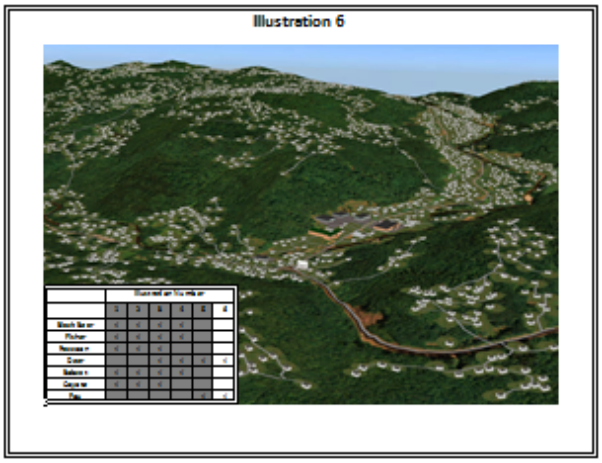
These results lead to a natural question: Would acceptability of development change if respondents were provided information on how wildlife populations may be altered? The current research effort will repeat the original survey issued in 2010, but with variations in information content. The first version will be the original survey, assessing only acceptability of development without wildlife information. The second version will include questions about acceptability of different levels of development given the likely presence of target species (black bear, bobcat, coyote, fisher, deer, raccoon, fox).

The results will indicate whether public opinion about development is influenced by information on how that development will affect wildlife.

Project Status: Ongoing.







Example images depicting different levels of development in a hypothetical town, to which survey respondents rated their "level of acceptability."

ADVANCING ADAPTIVE MANAGEMENT OF HARVESTED ANIMALS IN THE NORTHEAST WITH THE R PACKAGE, AMHARVEST

Principal Investigator: Therese M. Donovan

Post Doctoral Fellows: Jon Katz and Steve Brady

Project Collaborators: Shawn Haskell (Maine Fish and Wildlife)

Project Period: 1 April 2015 – 31 March 2016

Synopsis: A major initiative of the USGS Cooperative Research Unit (CRU) Program is to teach and apply formal structured decision making approaches to the management of natural resources. Structured decision making, or SDM, is "an organized approach to identifying and evaluating creative options and making choices in complex decision situations." In the context of natural resource management, SDM is designed to deliver insight to natural resource decision makers about how well their management objectives may be satisfied by potential alternative courses of action. The SDM process generally involves identifying the natural resource management problem, setting management objectives, identifying potential alternative management actions, estimating the likely consequences of each alternative (often through rigorous quantitative modeling), and then weighing each alternative and identifying trade-offs among alternatives. When the same decision problem is tackled on a recurrent basis, new (updated) information is used to provide fresh perspectives on alternatives, their likely outcomes, and trade-offs. "Adaptive management" is the application of SDM approaches when a decision problem is iterative.

While a significant amount has been written about the process of adaptive management, in practice it can be difficult to understand how to **implement** an adaptive management program that seamlessly integrates data collection, models, decision making, analysis, and outputs.

To aid this process, we are developing an R package called **AMHarvest** that includes a variety of functions for implementing an adaptive management program for harvested species using the open source modeling platform, R (R Core Team, 2013). R can be downloaded from the Comprehensive R Network website. The package AMHarvest will consist of several components, including:

- Functions for simulating the population dynamics of a species through time,
- Functions that simulate the process of harvest and the collection of data related to harvested animals, including errors,
- Functions for analyzing harvest datasets and ancillary datasets,
- Functions that permit estimator "performance" and value,
- Functions that carry out decision analysis problems related to game management.

At the heart of the R package is a MySQL relational database for storing simulated and real data, analyses, and outputs. The package facilitates adaptive management by storing models – mathematical expressions that represent the current belief in how the harvest system operates. These models can be used as inputs, generated as outputs, and refined via Bayesian approaches. The combination of R and database functionality will allow users to seamlessly analyze data, store output (which can then inform future analyses), and automate several tasks required for managing harvested species.

Project Status: Ongoing.

The Steps of Structured Decision Making. Source: http://www.structureddecisionmaking.org/

Black Bear at a feeder. Source: http://blog.nwf.org/2012/06/black-bears-are-on-the-move-in-vermont/

INTEGRATED FOREST ECOSYSTEM ASSESSMENT TO SUPPORT SUSTAINABLE MANAGEMENT DESCISIONS IN A CHANGING CLIMATE

Principal Investigators: Jennifer Pontius, Carol Adair, Therese Donovan, Clare Ginger, Gary Hawley, Robert Manning, James Murdoch, Shelly Rayback, Paul Schaberg

Graduate Student: Ph.D. Student to be named

Project Cooperator: USDA McIntire-Stennis

Project Period: 1 June 2014 - 31 December 2019

Synopsis: Since the 1970's, temperatures across the northeastern US have warmed 0.25 degrees Celsius per decade, which has been accompanied by a wide range of biological changes (Hayhoe et al., 2006). Climate change will continue to restructure forests over the coming century, although the details remain uncertain. To refine our understanding of how climate may impact forested ecosystems, we propose an integrated assessment of the role of climate in forest ecosystem health and function through a combination of monitoring, experimental and modeling activities. The resulting maps of current and projected forest structure and function will be used to assess various management alternatives in a spatial structured decision framework. This framework will allow land managers to compare the probability of management activity success on a pixel by pixel basis, reflecting the complexity of the Northeast's heterogeneous landscape.

While this work will advance our understanding of climate impacts on forests, and provide a tool to assess various management options, the challenge is determining how to quantify these responses to climate change on a scale that is useful to inform basic monitoring, management or planning activities. Further, to be useful the production of this knowledge must be linked to the infrastructure and network of forest management decision makers through which information is processed. Therefore, throughout this project we will partner with stakeholders to inform the development, utility and dissemination of the final decision support product. This merging of scientific knowledge with management needs is an important step towards both improving our understanding of the relationships between forests and climate, but more importantly effecting change on the ground by informing management and policy decisions.

This project lays the groundwork for an interdisciplinary research study to gather new data, test theoretical models, and provide land managers with maps that provide an integrated view of forest ecosystem function under a range of climate change scenarios. The project will consider how this integrated view can contribute to management decision making and be incorporated into existing decision networks and support tools.

The Coop Unit's role in this effort centers on modeling wildlife species distribution on current and projected landscapes, including the iconic species White-tailed Deer (*Odocoileus virginianus),* Moose (*Alces alces*), and American Black Bear (*Ursus americanus)*. A PhD student will be recruited for Fall 2015. Additionally, the Unit will play a vital role in developing a web-based spatially explicit decision support tool to aid natural resource managers in managing species in an uncertain climate.

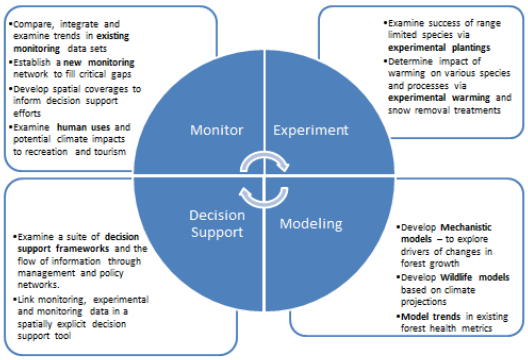


Figure 1. Schematic representation of the four foci of the proposed research program: 1) Monitoring, 2) Experimentation, 3) Modeling, and 4) Decision support.

Project Status: New.

ADVANCING ADAPTIVE MANAGEMENT FOR HEALTHY LANDSCAPE INITIATIVES

Principal Investigators: Therese Donovan, Jeff Marshall (National Science Foundation Integrative Graduate Education and Research Training Grant: http://www.uvm.edu/smartgrid/)

Rubenstein Collaborators: Therese Donovan, James Murdoch and Allan Strong

Graduate Students: Cathleen Balantic (Ph.D. student)

Project Cooperators: Bureau of Land Management

Project Period: 1 September 2014 - 31 August 2017

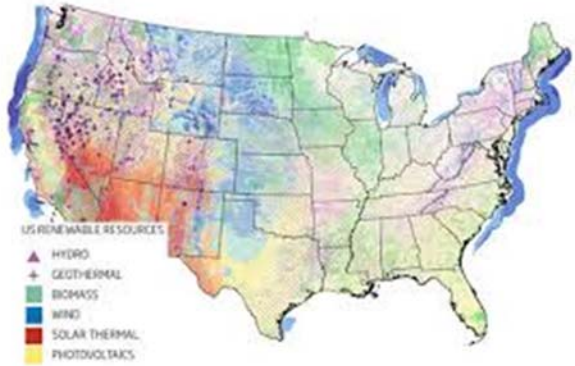
Synopsis: The smart grid uses modern information technology to make electric power systems work better – cleaner, cheaper, and more reliably. The Obama administration is rapidly advancing renewable energy sources, including solar and wind energy as a means of lowering carbon emissions to the atmosphere. Renewable energy projects, however, can impacts wildlife species in a variety of ways. For example, Defenders of Wildlife report that "building a single major solar facility in the California desert can require thousands of acres of biologically-fragile land – land that supports a wide range of sensitive and imperiled species (including the desert tortoise, desert bighorn sheep, and Mohave ground squirrel) and unique habitats – to be cleared and leveled. The sheer size and scope of these projects is difficult to comprehend. Some proposed projects could cover a land area a third to half the size of the island of Manhattan when completed." (http://www.defenders.org/sites/default/files/publications/making_renewable_energy_wildlife_friendly.pdf)

This project will partner with BLM to use landscape scale cell phone monitoring to collect environmental data across the Desert Renewable Energy Conservation Area is southern California. These data will be combined with existing field and spatial datasets collected by BLM's Assessment, Inventory, and Monitoring Program (AIM). The primary goal of this project is to develop a rapid prototype framework for linking the empirical data with a data analysis for the specific purpose of informing environmental decisions. While the decision context will focus on the Desert Renewable Energy Conservation Plan, the generalized framework for enabling adaptive management should be highly extensible.

Project Status: New.

A)

B)



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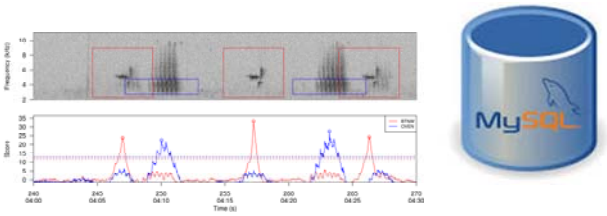


A) The adaptive management cycle requires managers set goals and monitors the current state of the system. B) The renewable energy potential of landscapes must be balanced with wildlife needs. C) Remote monitoring of landscapes with cell phones enables near real-time analysis with the program, R. D) Data can be analyzed and captured in a MySQL database, which stores monitoring information as well as outputs for decision-making.

EFFECTS OF FOREST BIOMASS ENERGY PRODUCTION ON NORTHERN FOREST WILDLIFE AND FOREST SUSTAINABILITY

Principal Investigator: Therese M. Donovan

Graduate Students: Michelle Brown (Ph.D. Student)

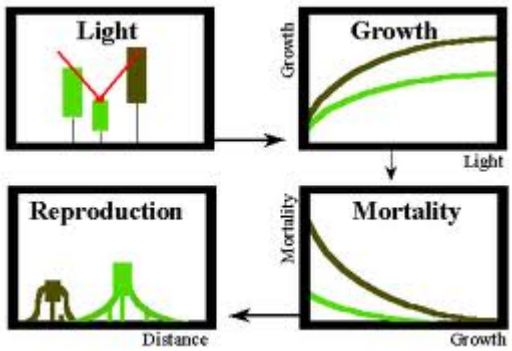
Project Cooperators: Northeastern States Research Cooperative

Project Period: 1 July 2012– 31 May 2016

Synopsis: Federal and state governments in the Northern Forest are actively engaged in assessing the potential role of forest biomass in meeting renewable energy portfolios. For example, the governor of Vermont recently announced a goal of meeting 90% of the state's energy needs through renewables by the year 2050). While current rates of timber harvest are generally sustainable, there is considerable pressure to increase the contribution of forest biomass for renewable energy. Maximizing the biomass energy supply could compromise (potentially seriously) other uses and values of forests, including a wide range of ecosystem services and the conservation of native species. What has been missing from this debate is a realistic, regional assessment of these trade-offs through time.

In this study, my colleagues and I are critically evaluating the capacity of the Northern Forest (NY, VT, NH, MA) to contribute to the energy needs of the region through forest biomass harvest. We are using USDA Forest Inventory and Analysis data and SORTIE (a spatially explicit model of forest dynamics) to evaluate the tradeoffs among biomass energy harvest, carbon storage, biodiversity levels, energy needs met, and carbon dioxide (CO_2) emissions. The model output will be used in a Multi-Criteria Decision Analysis (MCDA) framework to evaluate what different harvest regimes will mean for the Northern Forest in terms of carbon storage, biodiversity levels, energy needs met, and CO_2 emissions. The results will provide decision-makers with regional assessments of the benefits and impacts of biomass energy production to meet state and regional renewable energy portfolios on a landscape level that to date have been largely unavailable.

Project Status: Ongoing.



Publications

PEER-REVIEWED:

Bettigole, C., T. Donovan, R. Manning, J. Austin, and R. Long. 2014. Acceptability of residential development in a regional landscape: Potential effects on wildlife occupancy patterns. Biological Conservation 169:401-409.

Bettigole, C., T. M. Donovan, R. Manning, and J. Austin. 2014. Normative standards for land use in Vermont: Implications for biodiversity. Biological Conservation 169:392-400.

Brauer, C., T. Donovan, R. Mickey, J. Katz, and B. Mitchell. In Press. A comparison of acoustic montoring methods for common anurans of the northeastern United States. Wildlife Society Bulletin.

Brown, M. L., T. M. Donovan, W. S. Schwenk, and D. M. Theobald. 2014. Predicting impacts of future human population growth and development on occupancy rates of forest-dependent birds. Biological Conservation 170:311-320.

Hyrcik, A.E., P.W. Simonin, L.G. Rudstam, D.L. Parrish, B. Pientka, and T.B. Michuc. 2015. Mysis zooplanktivory in Lake Champlain: a bioenergetics analysis. Journal of Great Lakes Research. Available online 3 April 2015, doi:10.1016/j.jglr.2015.03.011

White, G., J. Claussen, C. Moffitt, B. Norcross, and D. Parrish. 2013. Dr. J Frances Allen: pioneer of women in fisheries. Fisheries 38:103-111.

TECHNICAL REPORT:

Tierney, G., B. Mitchell;, A. Miller-Rushing, J. Katz, E. Denny, C. Brauer, T. Donovan, A. D. Richardson, M. Toomey, A. Kozlowski, J. Weltzin, K. Gerst, E. Sharron, O. Sonnentag, and F. Dieffenbach. 2013. Phenology monitoring protocol: Northeast Temperate Network. Natural Resource Report. NPS/NETN/NRR—2013/681. National Park Service. Fort Collins, Colorado. Published Report-2197242.

eBOOK:

Donovan, T., M. Brown, and J. Katz. 2015. Vermont Cooperative Fish and Wildlife Research Unit R Projects: R for Fledglings. Retrieved from https://www.uvm.edu/rsenr/vtcfwru/R/?Page=fledglings/fledglings.htm

Theses and Educational Materials

DISSERTATIONS:

Cummings, Jonathan. 2014. Decision support for natural resources management. Ph.D. Dissertation, University of Vermont, Burlington, VT. Advisor: Therese Donovan

Katz, Jonathan. 2015. monitoR: Automation tools for landscape-scale acoustic monitoring. Ph.D. Dissertation, University of Vermont, Burlington, VT. Advisor: Therese Donovan

Rinehart, Kurt. 2015. Analytical and decision tools for wildlife populations and habitat management. Ph.D. Dissertation, University of Vermont, Burlington, VT. Advisor: Therese Donovan

UNDERGRADUATE HONORS THESIS:

Morris, Juliana. 2014. The relationship between landscape, tree, and bird biodiversity throughout Vermont. Honors Thesis. Advisors: Therese Donovan and Ruth Mickey.

EDUCATIONAL MATERIALS:

The VTCFWRU Spreadsheet Project http://www.uvm.edu/envnr/vtcfwru/spreadsheets/ Peer-reviewed spreadsheet, MARK, and PRESENCE exercises that focus on a variety of ecological and parameter estimation problems.

Principles of Modeling On-line Course https://sharepoint.uvm.edu/sites/modeling/default.aspx Co-instructed by Tony Starfield and Terri Donovan. This course was developed in concert with the BLM National Training Center and the National Conservation Training Center. It is offered as a semester-long on-line course via UVM and the National Conservation Training Center, targeting university graduate students and federal biologists. It consists of instructional videos, paired with weekly group modeling challenges.

Introduction to Conservation Biology http://www.uvm.edu/rsenr/vtcfwru/spreadsheets/?Page=conbio/cb.htm. Co-instructed by Jed Murdoch and Terri Donovan with support from the BLM National Training Center. This on-line course material pairs lectures, spreadsheet exercises, and homework to provide students a foundation in the principles of conservation biology. It is offered as a semester-long course via UVM.

Scholarly Activities

PRESENTATIONS:

Brown, M., T. Donovan, G. Warrington, W. S. Schwenk., and D. Theobald. Predicting effects of future human population growth and development on a territorial forest songbird: small declines in occupancy equates to large declines in landscape carrying capacity. 70th Annual Northeast Fish and Wildlife Conference, Portland, Maine, 13-15 April 2014.

Brown, M., T. Donovan, W. S. Schwenk, and D. Theobald. Predicting impacts of future human population growth and development on occupancy rates of forest-dependent birds. 70th Annual Northeast Fish and Wildlife Conference, Portland, Maine, 13-15 April 2014.

Cole, W., T. M. Donovan, M. Brown, and J. Murdoch. Effects of landscape development on bobcat carrying capacity in Vermont. Vermont Monitoring Cooperative Annual Meeting, Burlington, Vermont, 11 December 2014.

Cummings, J., and T. Donovan. The value of maps in natural resource management: an application of expected value of sample information. 70th Annual Northeast Fish and Wildlife Conference, Portland, Maine, 13-15 April 2014.

Katz, J. E., S. Hafner, and T. M. Donovan. monitoR: an R package for automated acoustic monitoring, tested on two northeastern warblers. 70th Annual Northeast Fish and Wildlife Conference, Portland, Maine, 13-15 April 2014.

Katz, J. E., S. Hafner, and T. M. Donovan. Automated acoustic monitoring: reporting survey presence for a northeastern warbler. 70th Annual Northeast Fish and Wildlife Conference, Portland, Maine, 13-15 April 2014.

Parrish, D.L. Forecasting pelagic species distribution patterns, cannibalism, and long-term community dynamics. Pukyong National University, Busan, South Korea, 2 July 2014. (Invited)

Parrish, D.L. Fisheries research that supports fisheries management in the USA. Annual Meeting of the China Society of Fisheries, 10-14 October 2014. (Invited)

Parrish, D.L., P.W. Simonin, L.G. Rudstam, P.J. Sullivan, and B. Pientka. Pelagic species interactions in Lake Champlain, USA-Canada. Annual Meeting of the Japanese Society of Fisheries Science, Shinagawa, Japan, 28-31 March 2015. (Invited)

Puchala, E.A., and D.L. Parrish. Endangered stonecats in Vermont: differential mortality effects on the likelihood of sustainability. 143rd Annual Meeting of the American Fisheries Society, Little Rock, Arkansas, 8-12 September 2013.

Scholarly Activities

PRESENTATIONS (continued):

Puchala, E.A., and D.L. Parrish. Modeling the potential effects of intermittent perturbations on endangered stonecats. 144th Annual Meeting of the American Fisheries Society, Quebec City, Quebec, 17-22 August 2014.

Puchala, E.A., and D.L. Parrish. Endangered stonecats in Vermont: a risk assessment approach. 145th Annual Meeting of the American Fisheries Society, Portland, Oregon, 16-21 August 2015.

Simonin, P.W., L.G. Rudstam, P.J. Sullivan, D. L. Parrish, B. Pientka. Forecasting native rainbow smelt and nonnative alewife distribution patterns, cannibalism, and long-term community dynamics. Joint Aquatic Sciences Meeting, Portland, Oregon, 18-23 May 2014.

Simonin, P.W., L.G. Rudstam, P.J. Sullivan, D.L. Parrish, and B. Pientka. Spatial community ecology of rainbow smelt and alewife in Lake Champlain. Ecology of Fish in Lakes and Reservoirs 2014, Ceske Budejovice, Czech Republic, 8 September 2014. (Invited)

Simonin, P.W., M. Riha, L.G. Rudstam, P.J. Sullivan, D.L. Parrish. Comparing and predicting spatial community ecology of rainbow smelt and alewife in Lake Champlain vs Lake Ontario. 58th Annual Conference of the International Association of Great Lakes Research, Burlington, Vermont, 25-29 May 2015.

Quist, M. C., M. E. Mather, D. L. Parrish, S. R. Chipps, T. J. Kwak, and C. P. Paukert. The voices of reality: why effective fisheries education is challenging and practical ways to move forward. 143rd Annual Meeting of the American Fisheries Society, Little Rock, Arkansas, 8-12 September 2013. (Invited)

COURSES OFFERED:

Aquatic Ecology and Watershed Sciences Seminar, UVM, Spring 2014.

Population Dynamics and Modeling (Principles of Modeling), UVM, Spring 2014.

Applied Ecology, Environment and Society, UVM, Fall 2015.

Professional Service and Technical Assistance

Therese M. Donovan

Rubenstein School Graduate Program Database, Developer and Maintainer.

USGS, Research Grade Evaluation Panel, Chair, October 2013.

Graduate Standards Committee, Rubenstein School, 2013-2016.

Mathematics and Statistics Department Search Committee, UVM, September 2014-March 2015.

Incentive Based Budgeting Advisory Committee, Rubenstein School, February 2015-present.

Conservation Leaders for Tomorrow, RSENR Representative, 2013-present.

Northern States Research Cooperative, Panel Member, January-February 2015.

North American Ornithological Council Scientific Program Committee, April-August 2015.

Principles of Modeling, National Conservation Training Center, Teaching Assistant, 2015.

Introduction to R workshop for Vermont Fish and Wildlife biologists, University of Vermont, Organizer and Instructor. 22, 23, and 29 May, 2014.

Donna L. Parrish

DOI, Motorboat Operator Certification Course, Instructor, 4-6 June 2013.

Faculty Standards Committee, Rubenstein School, UVM, 2012-2015.

American Fisheries Society (AFS), 2nd Vice President (2012), 1st Vice President (2013), President-elect (2014), President (2015), Immediate Past-President (2016).

Intro to R Using Fisheries Examples Workshop for Vermont and USFWS fisheries biologists, Rubenstein School faculty and graduate students, Organizer. Workshop taught by Derek Ogle, Northland College, MN, N=24 participants, 4-6 March 1014.

USGS, Research Grade Evaluation Panel, 2014.

President's Commentary, Fisheries monthly columns, 2014-2015.

Council of Aquatic Scientific Societies, AFS representative, 2014-2015.

World Council of Fisheries Societies, AFS representative, 2014-2015.

7th World Fisheries Congress, Busan, South Korea, 23-27 2016, Program Chair, 2015-2016.

Unit News

PROMOTION AND AWARDS:

Donovan, Terri. Promoted to GS-15 through USGS, Research Grade Evaluation Panel, January 2015.

Parrish, Donna. Recipient of the Dwight Webster Memorial Award of Merit, Northeastern Division of the American Fisheries Society, April 2015.

Parrish, Donna. Recipient of the Distinguished Service Award, American Fisheries Society, September 2013.

Assistant Unit Leader Terri Donovan (left) and Unit Leader Donna Parrish (right) with Secretary of the Interior Sally Jewell (March 2015)

Vermont Cooperative Fish & Wildlife Research Unit