

Adirondack Research Consortium

A not-for-profit organization dedicated to research on the Adirondacks
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Abstracts

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Snow Hydrology Study on Whiteface Mountain

We present the results of an ongoing study of water content in the snow pack at Whiteface Mt. This study has two purposes: first, to determine the effects of elevation on water content of snow; secondly, to study differences in water content between natural snow and groomed/artificial snow. Snow sampling began December 2006 and will continue until the end of the snow season.

Five sites were selected on the east to southeast facing ski trails at Whiteface Mt. for the study. The sites range in elevation between 515 and 1331 m. At some sites paired snow cores were collected. One snow core was collected of natural snow and the second core sample was from either groomed or artificial snow. Snow samples were collected in 2" PVC tubes. The volume of the melted snow sample was measured and compared to the volume of snow collected in the tube. Percent water content in the snow pack is typically between 10 and 50%. Preliminary results suggest that there is a difference in the water content of the snow pack as a function of elevation. At higher elevations the water content of the snow pack decrease relative to water content at lower elevations. Groomed or artificial snow tends to have higher water content than natural snow.

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Cox, Graham L.*¹; Jon D. Erickson²; William F. Porter³ and Anne M. Woods³

North Country Survey Tells How Respondents Would Invest For A Sustainable Future

Researchers conducted facilitated discussions with focus groups drawn from communities in Tug Hill and the Adirondack Park. They conducted follow-up mail and e-mail surveys with these groups and with a broader population in neighboring Northern Forest states. The question they explored was: if investment funds were available to help stimulate a sustainable economic and environmental future what choices would they make and would community-level, "bottom up" choices be similar to region-wide, "top-down" ones?

Results strongly suggest that respondents want to maintain and nurture a strong rural character as crucial to their future. They also rated encouraging a diverse local economy very highly and said that protecting the environment as the basis for improving their quality of life is also important. Respondents agreed on many issues and priorities but there were significant disagreements between local communities in New York, a larger group representing multiple communities and specific interest groups in the Park, and respondents in Vermont, New Hampshire and Maine.

Asked to choose between five types of investment, most respondents rated physical infrastructure at the top. Within that category, improving telecommunications, electric services and cell phone service were the most important. Overall, respondents rated investment in the economy and planning capacity as the second priority, followed by investment in environmental projects, and then investment in people, social and cultural projects.

The premise of the study was to understand investment priorities as the basis of a vision for future economic, social, and environmental well-being at the community, Park-wide and regional levels.

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Dawson, Chad

Challenges of Educating Wilderness and Wildland Managers in a Changing World

The current approaches to educating college students are shifting as technology and the interests and skills of the "net generation" require different adaptations of teaching techniques and pedagogy. Based on learning theory, educators adjust to styles of learning and technological advances, but there are unintended outcomes through the demonstration of high technology communication and teaching. For affects the professional expectations and standard operating procedures of managers. In turn, these skill sets will change the culture and atmosphere of how managers operate in agencies and on the ground in wilderness and wildland areas as well as how they interact with visitors. If managers are to understand the need for a "minimum tool" approach to management and the ways in which the wilderness experiences of visitors are affected by management, this must be part of the curriculum we need for educating future wilderness and wild lands managers.

SUNY College of Environmental Science

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Mercury Cycling in the Adirondacks

The Adirondacks is one of five biological hotspots for mercury in the Northeast. Measurements of the inputs, transformations and losses of mercury indicated that about 75% of the total input of mercury (Hg) to forested ecosystems was from leaves taking up mercury from the atmosphere and falling to the forest floor in autumn. The rest was from rain water and what it washed off leaves (throughfall). The loss of gaseous Hg from soil exceeded mercury input from throughfall and might be as much as 40% of all inputs to forests. Lab experiments demonstrated that when forest soils were water saturated and under anaerobic, sulfate reducing conditions, more mercury complexed with dissolved organic carbon (DOC), more methyl mercury (MeHg; the toxic form which bioaccumulates) was produced, and higher levels of DOC and both inorganic Hg and MeHg were exported from soils. Wetlands were important methylation sites. Lab experiments and seasonal variation in levels of methylmercury in wetlands showed that mercury methylation was very temperature sensitive. The absence of demethylation at all terrestrial habitats sampled explains in part the high levels of methylmercury in the Adirondacks. Sediments of Sunday Lake methylated and demethylated mercury with demethylation exceeding methylation. Twenty-six lakes sampled in 1992-1993 were resampled in 2004-2005 to examine the effects of regulations on acid rain and mercury emissions. Lake water conditions were better in 2004-2005: pH levels were higher and concentrations of sulfate, total mercury and methylmercury were lower. Levels of mercury in fish collected 1992-1993 and 2004-2005 will be compared.

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Browse preference of snowshoe hares (*Lepus americanus*) wintering at high and low elevation in the Adirondacks: Differences between *B. papyrifera* and *B. cordifolia* and correlations with plant chemical defense.

Research on plant/herbivore interactions has provided evidence for the co-evolution of plant chemical defense and browsing by mammalian herbivores. Much of this work has examined browse preferences of snowshoe hares (*Lepus americanus*) in northern parts of their range where populations cycle on an approximately 10 year time scale. Little is known about snowshoe hare population density and plant chemical defense in southern parts of their range where population cycles are not apparent - like the Adirondack Park. We set out browsing arrays at low (400-550m) elevation and high (1000-1300m) in winter of 2007 to begin to answer the following questions: 1) Do snowshoe hares wintering in low and high elevation habitats show a difference in browse preference for the two prevalent species of paper birch in our forests (*B. papyrifera* at low elevation, *B. cordifolia* at high elevation)? 2) Do snowshoe hares in these different habitats show preference for more mature twigs than younger twigs of either or both species of birch? And, 3) does intensity of browsing vary with the concentration of apparent chemical deterrents on twigs? We were able to collect data from 3 browsing arrays at the low elevation site and 2 arrays at the high elevation site. Our preliminary results show that when data from low and high elevations are combined there is no species browse preference, but there is a preference for the more mature twigs (p=0.02). When we analyze the low elevation arrays (n=3) and high elevation arrays (n=2) separately, there is no significant preference for either *Betula* species at the high elevation, but hares appear to prefer to browse more mature twigs (p=0.07). However, at the low elevation there is strong twig maturity effect (p=0.03) and a marginally significant (p=0.08) preference for *B. papyrifera* (naturally present at low elevation). Chemicals on twigs used in browse arrays are currently being

analyzed and correlations between chemical defense and browse intensity will also be presented. Our results corroborate other studies that show that young plant material is more chemically defended than more mature material. We also present novel evidence that *B. cordifolia* is less palatable than *B. papyrifera*. This data also suggests that there may be differences in snowshoe hare browse preferences in high and low elevation habitats where the different birch species grow exclusively.

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Glennon, Michale J.

Boreal Birds: Habitat, Distribution, and Abundance in the Adirondack Park.

Abstract – The Wildlife Conservation Society's Adirondack Program has been engaged in a project since 2003 to assess the status and distribution of a suite of boreal birds in the Adirondack Park. The goals of our work, which focuses on a suite of 10 species, are to (1) map the boreal habitats of the Adirondacks, (2) assess the status and distribution of a suite of species across the park, and (3) look at the protection status of these habitats and provide information to contribute toward a long term boreal conservation plan for the Adirondacks. Climate change is the primary threat to this habitat type. In addition to our own field surveys, we are also reviewing data from the New York State Breeding Bird Atlas as well as the nationwide Breeding Bird Survey, and information from Vermont Institute of Natural Science's Mountain Birdwatch program in order to more completely understand the status and population trends for these species. To date, we've surveyed the bird community at approximately 60 sites over the past 4 summers and funding from the State Wildlife Grants Program in NY will enable us to continue for at least 3 more. Overall, our lowland boreal work has provided a meaningful database from which to assess long-term trends in populations and distribution of boreal birds within the Adirondacks, which for many species serves as the southern extent of their range. Further work will focus on expanding our monitoring program and assessing the potential impacts of climate change on these species.

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Hadsell, Lester¹, Chad Colarusso¹

Seasonal Homes and the Local Property Tax: An Empirical Study of Upstate New York

This study examines the growth of seasonal (second) homes and their impact on local property tax rates in towns and villages in New York State between 1990 and 2000. We find that a greater concentration of seasonal homes in a municipality is associated with a lower effective property tax rate in towns, but we do not find a statistically significant relationship in villages. An alternative measure of tax burden, property taxes as a percentage of median household income, is negatively related to the presence of seasonal homes in rural towns and medium-sized villages but positively related in small and rural villages.

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Hill, Gregory

Regional Assessment of Community Viability

What is the current quality of life in the communities of the Adirondack Park, and how can it be enhanced to sustain populated, vibrant, economically viable communities? This fundamental question is at the heart of an upcoming, two-year assessment of municipal life from a public-administration perspective funded by the NYS Department of State under the Quality Communities Program. The initial study, to be undertaken jointly by the Adirondack North Country Association, the Adirondack Association of Towns and Villages, and the Towns of Arietta and Chester, will provide a foundation for economic development planning for all the Adirondack Park's towns and villages, and will be a beginning point for a comprehensive examination of community patterns, physical assets (infrastructure) and economic development needs, opportunities and constraints across the Park. Municipal involvement, public outreach and communication and data collection and analysis form the structure planned for the assessment process.

Primary components of the assessment include (1) an inventory and analysis of municipal infrastructure (water, sewer, storm drainage, telecommunications, public buildings, etc.), (2) documentation and analysis of community life (amounts of land in State ownership, for example, and the ways State ownership has helped or hindered community growth), and (3) development of a regional database with a range of formats for future applications such as GIS. A final report will

document the research methodology and will lay out options and recommendations for next steps that are well supported by the study data. An enhanced capacity for the management of municipal affairs from an informed, factual basis in anticipated resulting ultimately from the overall study.

Adirondack North Country Association
Houseal, Brian^{*1}, **John Davis**¹

Climate Change and Future Land Use in the Adirondack Park

It is widely accepted in the scientific community that climate change is affecting the Adirondack Park. Decisions made today by the general public and governmental agencies regarding uses of the natural environment and man-made infrastructure will affect the ecological integrity of Adirondacks long into the future. Potential solutions to address the ecological impacts of climate change include large core wilderness areas, habitat connectivity and wildlife corridors among natural areas, and permeability across the built landscape. In addition to these steps, new governance and policy frameworks are urgently needed to reduce air pollution, conserve energy, eliminate invasive species and prohibit inappropriate development.

¹ The Adirondack Council

Kretser, Heidi E¹ and Barbara A. **Knuth**²

Perceptions of human-wildlife interactions: Does a social exurbia exist?

People and wildlife have shared both peaceful and tenuous relations during the course of human history. With the United States population over 300 million, interactions between humans and wildlife have increased in intensity and magnitude in part due to development patterns across the landscape. Part of the landscape transformation includes the ability for people to live and work almost anywhere, including in low-density settlements in close proximity to high-amenity resources such as the protected lands of the Adirondack State Park in northern New York. While many interactions with wildlife are positive, increasingly complaints are reported to State wildlife agencies. The objective of our study was to examine differences in perceptions of and reactions to human-wildlife interactions across two social constructions of exurbia: community and individual. We completed a survey of 1,616 landowners in northern New York State. Four study areas, including two inside the Adirondack Park and two outside the park, representing a continuum from urban to high-amenity rural, were included in the survey effort. We examined differences in perceptions of interactions with wildlife and in reporting histories across study areas representing urban, traditional exurban, and high-amenity exurban communities as well as across respondents' individual characteristics based on their length of residency, whether they have a rural or urban background, and whether they are full-time or part-time residents. Social exurbia appears to be more evident at the community level. Further research is needed to understand the differences in perceptions and reactions at the individual level.

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Malchoff, Mark¹ and Robert **Schmidt**².

Global warming and potential range expansions of invasive fish: what's in store for the Adirondacks?

Range contraction/expansion of fishes in New York is well documented, and typically ascribed to habitat impairment and/or human intervention (i.e. introduction of fish to new watersheds). An examination of climatological data and recent fish distribution changes in Oneida Lake, Lake Champlain, and the freshwater tidal Hudson River suggest that climate changes may now be playing an additional role in range shifts of fishes across New York State. In addition, published research dealing with predicted effects of global climate change on northern fish populations has begun to emerge. This work provides an opportunity to speculate on future Adirondack range incursions by fish communities previously native to more southern watersheds.

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Pershyn, Carrieanne^{1,2*}, Jennifer. **Rushton**^{2*}, Justin. **King**¹, and Kathleen **Lavoie**².

Predicting Bat Mortality at a Proposed Windfarm Site in the Adirondacks.

There is increasing interest in understanding the impact of wind turbines on populations of bats. Studies so far have focused on post-construction surveys of mortality. We monitored bat activity using a bat detector at the site of a small (12 turbines) proposed wind farm in Beekmantown, NY, right on the edge of the Adirondack Park. Bats were present from mid-May to early October in 2006. Activity was overall low compared to bat activity in Kentucky. As expected, bats were most active

for the first three hours after sunset and bat activity varied by site. Nationally, reported bat fatalities at windfarm sites average 3.4 bats per turbine per year. The highest fatality rates reported nationally have come from the Appalachians, where an average of 30 bats per year are killed per turbine. Using nightly activity we recorded in Kentucky as a measure of comparable activity in the Appalachians, extrapolated to our data from the proposed sites, we predict a range of 0.049 bats killed/turbine/year using the national average, and up to a high of 2.89 bats killed/turbine/year using the high mortality rate. Such minimal impacts are not likely to affect local populations. We will continue our study after construction to determine how good our predicted mortality rates are.

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Pontius, J., J. Dukes, L. Rustad and the NERC CVC Group

Climate Change Impacts on Northeastern Forests: an Insect Pest Case Study

Recent projections suggest that the climate in the northeastern U.S. and eastern Canada will change dramatically over the current century. These changes will directly affect survival and growth of forest tree species, but will also indirectly affect forests through effects on “nuisance” species such as forest pests, pathogens, and invasive species. Here, we review how climate change might be expected to affect the abundance and impact of a regional nuisance species, the hemlock woolly adelgid (*Adelges tsugae*) (HWA). The recent unimpeded infestation of HWA across the northeastern U.S. provides an unusual opportunity and critical imperative to examine how climate may limit a pest as it expands into the range of its new host. Currently, HWA is distributed among hemlocks growing in areas where minimum winter temperatures stay above -28.8°C (Skinner et al. 2003). In addition to relaxing range constraints, milder winters may lead to increased survival and fecundity, and result in higher HWA population levels, which have been associated with more rapid decline of infested hemlocks (Pontius et al. 2002; Pontius et al. 2006). The northerly spread and ultimate impact of HWA may therefore be controlled by the severity, duration and timing of minimum winter temperatures (McClure and Cheah 2002). Hayhoe et al. (2006) has constructed a multi-model, extreme minimum temperature simulation for the northeast, which suggests that by 2081 the northeast will see increases in extreme minimum temperatures of 1 C to 8 C relative to extremes experienced during the period of 1961–1990. This increase in extreme temperatures may expand current thresholds for many insect pests including HWA. The potential impacts of widespread hemlock mortality include changes in forest composition, structure, nutrient cycling, surface water quality and populations of associated wildlife (Jenkins et al. 1999; Yorks et al. 1999; Snyder et al. 2002; Colbert et al. 2002; Yorks 2002; Kizlinski et al. 2002; Tingley et al. 2002; Ross et al. 2003; Snyder et al. 2003; Jefts and Orwig 2005).

Racette, Joe

The State Wildlife Grants Program

The State Wildlife Grants Program grew from congressional action regarding the Conservation and Reinvestment Act, and was first authorized by Congress in 2002. Congress authorizes funding annually, and allocations to states are derived from formulas involving geographic area and human population size. A goal of the program is to gather information and implement management actions in order to prevent additional species being listed as endangered.

To be eligible for funding, each state was required to develop a Comprehensive Wildlife Conservation Strategy (CWCS). The New York CWCS was approved in October 2005, and identifies 536 Species of Greatest Conservation Need (SGCN) towards which funding is to be directed. Since 2002, NY SWG funding has been used for watershed planning activities, SWG program staffing, and projects proposed by DEC staff.

A Request for Applications for \$2.94 million was released in January 2007, with applications due by March 31. Project categories, with available funding in parentheses, are Inventory and Research (\$590,517), Planning and Administration (\$738,146), Management and Restoration (\$1,181,034), and Performance Monitoring (\$442,888). Non-federal matching funds or in-kind services are required to be 25% of the project total for Research and Planning, and 50% of the total for Management and Performance Monitoring projects. An additional \$2.9 million will be made available through this RFA process in 2008.

DEC staff, advised and assisted by a Watershed Team, will be writing Watershed Action Plans as the next step to implement the CWCS. One expected outcome of this collaboration will be a shift in conservation efforts from single-species management towards a more interdisciplinary and comprehensive habitat management approach.

Ratner, Shanna

Engaging Communities in Sustainable Solutions

There are many energy efficient and environmentally friendly technologies that will help communities save money and improve quality of life. Through its Green Community TechnologiesSM program, Yellow Wood has been helping communities make informed infrastructure choices that will save money and energy; improve municipal service delivery; improve human health and quality of life; protect the environment; and engage the community. Yellow Wood is nearing the completion of its current work with eight communities throughout New England in conducting inventories and assessments

of municipally owned infrastructure and researching alternative green technologies that could address current and future infrastructure needs. Yellow Wood's projects in Richmond, Vermont on a variety of areas (alternative fuels for vehicles, alternative paving regimes, energy efficiency in a historic town hall, decentralized wastewater treatment, etc.); Hinesburg, Vermont on wastewater treatment; and Franklin, New York on greening municipal buildings provide interesting case studies that show how the program works to help small communities inventory and assess municipal infrastructure as well as research and implement green alternatives for particular infrastructure assets that can also save money and use energy and materials more efficiently.

Learnings from Green Community TechnologiesSM projects throughout New England include obstacles to implementing alternative technologies, how to use a life cycle costing framework to compare technologies, the need for local knowledge and perspective, and the many benefits of adopting green technologies.

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Robinson, George

Will climate warming accelerate the spread of terrestrial invasive plants?

Few exotic plant species are capable of building wild populations at rates that lead to invasions, and those do that are often confined to geographic regions defined by climate. Relatively rapid climate changes predicted to occur in this century are therefore likely to result in new opportunities for exotics to become invasive and also lead to new range expansions of established invasive species. Other landscape filters, such as dispersal barriers or lack of mutualists, may continue to prevent incursions and expansion of invasives into the Adirondack region, where few invasive plant species are so far established, however interactions with climate change may reduce these impediments as well. Drawing from principles of ecology and evolution, and from experimental research, we can set out a few general expectations. First, warmer winters will allow many invasive plants that infest the Lower Hudson Valley to get established in the Adirondacks, but it remains to be seen whether many of them will be able to take hold in this relatively undisturbed landscape. Second, with reported changes in "hardiness" zones, new points of spread may emerge, as a broader mix of invasive horticultural species gets introduced. A third expectation arises from the simple fact that rising atmospheric carbon dioxide will lead to shifts in plant growth and competitive interactions. For example, many vine species are better able to take advantage of the excess CO₂, resulting in significant competitive advantages. An awareness of these and other expectations will greatly assist efforts at early detection and control of invasive plant species that may threaten the Future Adirondack Park.

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Rooks, Mark

Toward a Method to Assess Ecological Impact Zones Associated With Exurban Development

Using GIS to Analyze Exurban Development in the Adirondacks Proposals for large-lot subdivisions and subdivisions in the Adirondack back-country are increasing. This type of development, called exurban development, poses challenges in terms of assessing the ecological effects of this low-density residential construction and occupation. Two examples will be presented to illustrate the use of Geographical Information Systems (GIS) to analyze and visualize exurban development.

AP Associate Project Analyst, Biological Resources, NYS Adirondack Park Agency

Ross, Angellina M.¹, James P. Gibbs², and Glenn Johnson³

Spruce grouse distribution, movements and habitat relationships in boreal peatlands of the Adirondacks of New York

We conducted surveys, radio telemetry and habitat measurements for spruce grouse in 52 sites in lowland coniferous forest patches in the northern Adirondacks from 2002-2006. Evidence of spruce grouse presence was found at 16 of 32 historically occupied sites and one new site. Forty-five individuals were radio-tagged and tracked throughout the study period. Analysis of landscape-scale habitat use indicated that spruce grouse home ranges contain greater amounts of needle-leaved and broad-leaved scrub/shrub vegetation than available habitat in the core of the species' current distribution. Microhabitat analyses showed that persistently occupied sites have younger ($p < 0.001$) and shorter trees ($p = 0.005$), more live foliar cover in the 0.2 – 1.0 meter range of the vertical strata ($p < 0.001$), more black spruce (*Picea mariana*) shrub cover ($p < 0.001$) and less balsam fir (*Abies balsamea*) shrub cover than extirpated sites. Findings support the idea that successional changes in the lowland boreal forests in New York State are rendering habitat less suitable for spruce grouse persistence.

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Common Loons – Iconic Indicators for Mercury Contamination of Aquatic Ecosystems

The charismatic common loon (*Gavia immer*) serves as an excellent indicator of mercury and other environmental contaminants in aquatic ecosystems because of its long-lived, territorial nature and its role as a fish-eating predator at the top of the aquatic food web. This study assesses the exposure of loons to mercury contamination, the risk mercury poses to wildlife inhabiting aquatic ecosystems in the Adirondack Park, and evaluates the synergistic interactions of mercury and acid deposition as related to loon mercury exposure. From 1998-2006, blood and feather samples have been collected from 265 loons on 80 Adirondack lakes. Loons are uniquely color-banded to enable subsequent monitoring to determine their long-term survival and reproductive success. The differences in productivity and survival of the banded loons in relation to their mercury exposure is being used to develop a mercury hazard profile. A population model is also being developed to determine if mercury contamination is affecting the loon population growth rate in the Adirondacks. Results of this project will provide researchers, regulatory agencies, and policy makers in New York State with a scientific basis for making informed decisions regarding regulation of airborne pollutants and management of wildlife species and freshwater ecosystems.

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Signell, Steve*¹, Stacy McNulty¹ and William Porter¹

Placing Forest Preserve Management Units in Context: Toward a Park-wide Approach

We report on progress of the initiative to develop digital data and GIS tools to assist Department of Environmental Conservation (DEC) planners with Unit Management Planning (UMP). The UMP-GIS Consortium initiative arose from the need to assemble existing digital data into a Geographic Information System (GIS) and develop datasets and tools to facilitate the inventory portion of the UMP process in the Adirondack Park. One of the main objectives of the project is to "Interpret the context of the unit within the surrounding landscape." Factors such as critical wildlife habitat, landscape diversity, fragmentation, ecological integrity, invasive species occurrence, human disturbance, road density and usage vary widely across units. This presentation will summarize how we have used GIS to analyze Forest Preserve units in relation to one another and to the park as a whole in terms of these parameters. Results from these analyses help planners make management decisions that will lead to greater stewardship not only for the unit in question, but for the entire Adirondack Park.

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Stager, J. Curt

Signs of climate change in the Adirondacks

As global average temperatures increase, and as societal interest in climate change intensifies, scientists and policymakers are paying more attention to the local-scale effects of planetary-scale change. But past global trends are not necessarily apparent in smaller, more localized settings, and modeled projections for planet-averaged climates may not necessarily be applicable to sub-regions such as the Adirondack Park. In this talk, I use information specific to the Adirondacks to show that many regional weather datasets, ice cover records, and biological observations from the 20th century displayed only weak or contradictory relationships to global patterns... until the last 2 decades or so. I also address some future projections that have been made for the 21st century and beyond, and offer some (admittedly wild) speculations of my own.

Weber, Richard E.

Management implications of mapping the remote areas in the Park

Agencies and NGO's have recently conducted various forms of GIS analysis in the northeast to identify remote, unfragmented habitat or roadless areas that remain in the region. The purpose of this work is to identify the extent and character of a resource that is being lost to development over time. The act of mapping these areas is the first step toward identifying them as an important resource having their own intrinsic value. In the Adirondack Park, such areas have been mapped by APA staff using the US Forest Service's ROS methodology. Management of these remote areas has important implications for the protection of biological resources, ecological research and planning as well as primitive forms of recreation.

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White, Erin L.^{1*}, Paul G. Novak²

The New York Dragonfly and Damselfly Survey: Background and Update.

The New York Dragonfly and Damselfly Survey is a three-year project (2005-2007) funded by the State Wildlife Grants Program and implemented by the New York Natural Heritage Program. The major objective of the project is to document the distribution of dragonfly and damselfly species that occur in New York State. In addition, intensive survey efforts are directed toward threatened damselfly species and habitats that support odonate Species of Greatest Conservation Need, as specified by the New York Comprehensive Wildlife Conservation Strategy. We currently have 248 volunteers registered, along with several NY Natural Heritage staff and contractors assigned to the project. All data are submitted on a yearly basis and compiled in a database by NY Natural Heritage staff. There are currently 1,600 vouchers (specimens, photos, or both) in the database and observations of odonate species from 408 locations across the state. Approximately 148 new county records representing 90 species have been confirmed as a result of this survey, and 12 of those were Species of Greatest Conservation Need. Knowledge of species' county distributions throughout the state and the number of odonate species per county can be gained from this database and added to existing statewide odonate distributional data. At the survey's conclusion, project results will be available in the form of a publication. Those interested in participating in the New York Dragonfly and Damselfly Survey may contact: Erin White, Project Coordinator, NY Natural Heritage Program, elwhite@gw.dec.state.ny.us

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Zuckerberg, Benjamin¹, Anne M. Woods¹, and William F. Porter¹.

Repeating Patterns: Birds Shift Their Ranges Northward in New York State.

Warming of the northern hemisphere over the past half-century has spurred research on responses of species to global climate change. Quantifying the ecological implications of climate change has been severely constrained, however, by lack of multi-species distributional data by which to compare long-term changes. The New York State Breeding Bird Atlas, a statewide survey of 25-km² blocks surveyed in 1980-1985 and 2000-2005, offers a unique opportunity to identify and measure the geographic shifts in breeding bird ranges over time. After controlling for range expansion and contraction, the northern margins of southerly species (n = 70) and the southern margins of northerly species (n = 77) have moved northward an average of 11.0 km (P = 0.033) and 8.1 km (P = 0.034), respectively. Species did not show a change in elevation. These patterns corroborate findings by Thomas and Lennon (1999; Nature 399:213) who observed range margins of breeding birds in Great Britain shifting northward over a 20-year period. This study represents one of the first analyses of long-term multi-species distributional changes in North America, and provides further evidence that species ranges are likely moving northward in response to global climate change.

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