

Baseline data development for Shingle Shanty Preserve and Research Station

Theme IV

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We delineated ecological communities, compiled historic land-use data and established weather stations at Shingle Shanty Preserve and Research Station, a 15,000 acre non-profit biological field research station in the Adirondacks of New York State. This project has already provided ecological, environmental and historic background data for a number of regional and local research projects

Funding support for this project was provided by the Northeastern States Research Cooperative (NSRC), a partnership of Northern Forest states (New Hampshire, Vermont, Maine, and New York), in coordination with the USDA Forest Service.<http://www.nsrcforest.org>

Project Summary

The goal of this project has been to develop ecological, weather and historic land-use baseline data to inform research projects at Shingle Shanty Preserve and Research Station (the Preserve), a non-profit, 15,000 acre research station located in the central Adirondacks of northern New York State. The Preserve's remoteness, location, habitats and land use history create unique opportunities for biodiversity research with implications throughout the Northern Forest from the species/population scale to the eco-regional scale.

Support from the Northeastern States Research Cooperative has allowed us to develop components of a geographic information system that informs research on the Preserve.

- We have mapped and described ecological communities of the Preserve, collecting data on abundance of understory, shrub-layer and over-story vegetation in ecological community at the Preserve and surrounding lands.
- We have deployed data logging weather stations and monitoring equipment to provide climatic conditions data for this remote location.
- Finally, we have compiled historic land-use data from a wide variety of sources, to inform research on the preserve.

This work has already provided important background information to a number of different research projects that have taken place at Shingle Shanty Preserve and Research Station by Paul Smith's College, SUNY College of Environmental Science and Forestry, New York State Department of Environmental Conservation, Wildlife Conservation Society, National Wildlife Federation, Smithsonian Institution National Museum of Natural History, and the New York State Museum.

Background and Justification

Shingle Shanty Preserve and Research Station's mission is to facilitate, disseminate and implement the study of the ecology, geology and wildlife of the Adirondacks in collaboration with academic organizations from research universities to community colleges and the general public. To this end the Preserve was established as a 501.C-3 non-profit organization and accredited by the New York State Department of Education. Though Shingle Shanty Preserve and Research Station was only established in 2008, the vision for a Research Station at this location is over a half century old. In the 1960s the property was donated to Syracuse University and operated as an experimental forest. Earlier, research was undertaken on the property as well,¹ likely because of the proximity to tracts of land of interest to forestry researchers² of the period.

¹E. McCarthy. 1919. Observations on unburned, cutover lands in the Adirondacks. *Journal of Forestry* 17 (4):386-397.

²McMartin, Barbara, (1994). *Great Forests of the Adirondacks*. Utica, NY: North Country Books.

Shingle Shanty Preserve and Research Station.

Established in 2008, the Shingle Shanty Preserve and Research Station is a 23 square mile tract of land located in the middle of the six million acre Adirondack Park. It is a truly unique resource dedicated to supporting research and education to enhance the future stability of ecosystems found in the Park and across the Northeastern United States. SSPRS's remoteness, elevation and location creates an unparalleled opportunity to pursue biome level work with national and international implications. All of the Preserve is protected by a conservation easement that assures continuity of long term research and monitoring.



Figure 1: Shingle Shanty Preserve and Research Station in the Adirondack Park.

Background and Justification (cont.)

Because of its remoteness and nearly a century and a half of private ownership, this 63 km² (15,500 acre) preserve is uniquely positioned to offer a variety of opportunities for biodiversity and other research on a landscape with limited direct human disturbance. The property, located at the elevational top of the Black, Oswegatchie and Raquette River watersheds, contains portions of the second largest wetland complex in the Adirondacks. It has 9 lakes and ponds, over 10 km of headwater streams and about 5200 hectares of northern hardwood forests. The Preserve has seen disturbance in the forms of fire, blow-down, beech-bark disease and timber management. Despite this, the New York Natural Heritage Program has identified 5 significant natural communities on the property, three of which were regarded as having the Program's highest quality ranking¹.

¹Gebauer, S. and A. Olivero. 2002. Five Ponds Matrix Site Landscape Scale Assessment. New York Natural Heritage Program. Albany, NY.



Figure 2: Cricket on pitcher plant flower in one of the bogs at the Preserve.



Figure 3: Black-backed woodpecker, a boreal bird dependent on low-boreal habitats.

Background and Justification (cont.)

The goal of this project is to provide researchers with a broad range of physiognomic, floristic and climatic variables relevant to the distribution of taxa at the Preserve. This project has three components:

1. ecological community mapping and description;
2. collection of weather data, and;
3. compilation of historic land use data.

Access to this type of information has strengthened on-going research projects and allowed research at the Preserve to be a functional component of large scale regional research of the entire Northern Forests.



Figure 4: Sedge meadow, an ecological community mapped under this project.



Figure 5: A northern white cedar dominated rich shrub fen at the Preserve.

Methods

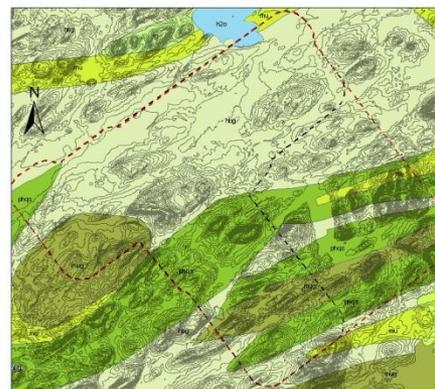
Land use and Disturbance History

A synopsis of disturbance history for the Preserve has been prepared that covers major wind, fire and logging disturbances. These data were compiled from the Adirondack Park Agency, the Adirondack Chapter of The Nature Conservancy and literature and records gathered over the years by members of the Brandreth family, the previous land owners of the Preserve. These data include: maps of historic fires and the major wind disturbances that impacted the Preserve, spatially explicit data on geology, ecological communities, timber inventories and timber harvests.



Figure 6: An American Beech tree that grew around a crosscut saw that was hung on a limb some time ago.

Shingle Shanty Preserve and Research Station
Bedrock Geology



Bedrock Geology
Material

O	mu
h2o	muq
hbg	phes
lg	

Figure 7: A bedrock geology map from the Adirondack Park Agency from one of many GIS datasets compiled under this grant.

Methods (cont.)

Weather and environmental variable data collection

As part of this project we have deployed two Hobo data logging weather stations and several data logging temperature sensors (Onset Computer Corporation). One weather station was permanently set up near Thayer Lake at the northwest part of the Preserve and the other temporarily deployed next to a Historic Climate Network weather station in Wanakena, NY, 31km North of Thayer Lake. The purpose of this deployment scheme was to both calibrate our instrumentation with higher quality instruments and to be able to begin to explore the relationship of temperature between the two sites.

The data logging temperature sensors have been used to monitor water temperature and determine ice out dates. The replicable batteries of these units will permit their use on a number of different projects.



Figure 8: Offloading weather data from the Thayer Lake Weather Station in March.

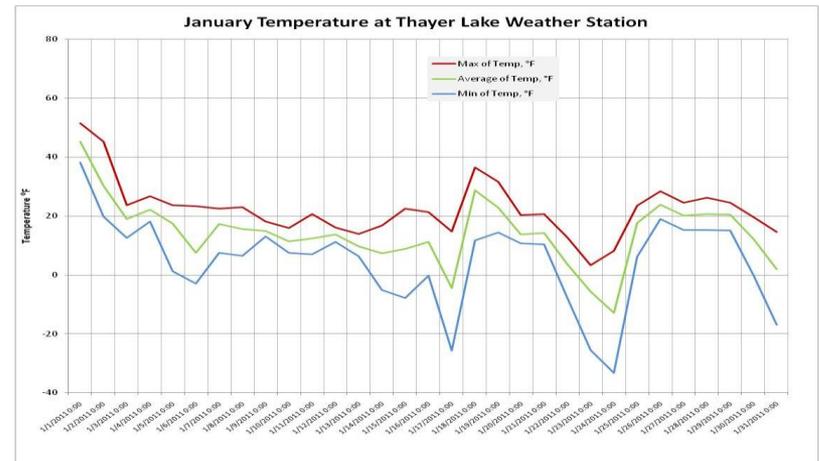


Figure 9: January air temperatures (max., mean and min.) From Thayer Lake Weather Station.

Methods (cont.)

Ecological Community Delineation

Ecological communities¹ were delineated using ArcMap 9.3 GIS software with interpretation of 2003 digital orthophotos. Several templates were used to aid in this process including surficial and bedrock geology data, slope models built from digital elevation models, pond watershed delineation and Adirondack Park-wide ecological disturbance maps. The Adirondack Nature Conservancy (the previous land owner) provided GIS data from their 2002 ecological community mapping project of their Five Ponds Matrix Site Landscape Scale Assessment project². This GIS data file was used as a starting point for delineation. The extent of the mapping project includes all of Shingle Shanty Preserve and Brandreth Park and lands within 1000m of these.

Ecological Community Description

Plots were located along transects through communities chosen by stratified random sampling. At each plot, up to three different community strata were sampled depending on the height of the dominant vegetation. For ground layer vegetation all plants in a series of 0.5 m x 0.5 m quadrats were identified and assigned relative abundance using the Daubenmire classification system³. For shrub layer, all plants in a nested 1m² plot that ranged from 0.5m to 3m above the ground or water were identified and their abundance was recorded. Voucher specimens are housed at the State University of New York College at Plattsburgh Herbarium. For the canopy layer, all trees and shrubs greater than 3 meters high, basal area were measured using an angle gauge (cruz-all, JIM-GEM corp.) with the appropriate basal area factor for the diameter class. For northern hardwood forests, an extensive 2009 survey at the Preserve⁴ was used to describe these communities, and permitted us to focus on the many smaller, biologically diverse ecological communities.

¹ Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2002. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. (Draft for review). New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

² Gebauer, S. and A. Olivero. 2002. Five Ponds Matrix Site Landscape Scale Assessment. New York Natural Heritage Program. Albany, NY.

³ Elzinga, C., Salzer, D., and J. Willoughby, (1998) Measuring and Monitoring Plant Populations. U.S. Department of the Interior Bureau of Land Management. Technical Reference 1730-1. BLM/RS/ST-98/005+1730

⁴ Jenkins, J., 2009. *Do Unharvested Adirondack Forests Contain Forest-Interior Plants?* A Final Technical Report to the Northeast States Research Consortium. WCS Adirondack Program. Saranac Lake, New York

Results

This work has enabled Shingle Shanty Preserve and Research Station to provide background information for a large landscape with ecologically interesting features to researchers using the Preserve. There are many interesting observations/results from this work.

1. The deployment of weather stations at this location fills a geographic gap in reliable weather station locations in the Adirondacks.
2. Previous ecological community mapping efforts classified many peatlands at this site as inland poor fens. This is not surprising given the bedrock and surficial geology of the preserve. We were surprised to find a small rich shrub fen and other wetlands with plants indicative of higher base cation concentrations.
3. We sampled 11 different ecological community types with 140 plots. The distribution of these data is explained below.
4. Thanks to the NSRC funding we were able to provide field and lab experience for 2 interns who worked on this project.

Results (cont.)

To describe ecological communities we sampled 11 different community types with 140 plots.

Table 1: Number of plots by ecological community type.

Community Type	Ground Plot	Shrub Plot	Over-story Plot	Jenkins' Plot
Beech-Maple Mesic Forest	5	5	5	60
Black Spruce Tamarack Bog	10	10	10	0
Dwarf Shrub Bog	10	3	0	0
Inland Poor Fen	22	17	13	0
Shallow Emergent Marsh	18	10	0	0
Spruce-Northern Hardwood Forest	8	8	8	0
Shrub Swamp	6	6	6	0
Rich Shrub Fen	10	10	3	0
Sedge Meadow	10	0	0	0
Spruce Fir Swamp	15	15	15	0
Spruce- Northern Hardwood Forest (Successional)	26	26	26	0
Total	140	110	86	60*

*Jenkins' data included 60 ground layer vegetation plots, 16 of which included over-story data.

Table 2: Extent of ecological communities at Shingle Shanty Preserve 2010.

Community	Number	Total Area (ha)	Smallest(ha)	Largest (ha)	Average Area (ha)	%Total
Beech-Maple Mesic Forest	4	2581.6	60.8	1339.3	645.4	41.6
Spruce-Northern Hardwood Forest (Successional)	16	1807.1	2.1	640.2	112.9	29.1
Spruce-Northern Hardwood Forest	22	858.6	0.3	225.6	39.0	13.8
Black Spruce Tamarack Bog	19	299.2	0.1	120.1	15.7	4.8
Spruce Fir Swamp	14	159.4	0.8	68.2	11.4	2.6
Shrub Swamp	69	156.5	0.0	16.5	2.3	2.5
Oligotrophic Pond	8	152.1	4.0	46.3	19.0	2.4
Inland Poof Fen	13	50.4	0.6	15.3	3.9	0.8
Pine-Northern Hardwood Forest (Successional)	1	39.8	39.8	39.8	39.8	0.6
Marsh Headwater Stream	7	34.3	0.4	22.8	4.9	0.6
Dwarf Shrub Bog	4	27.1	0.8	19.2	6.8	0.4
Shallow Emergent Marsh	15	20.8	0.1	6.2	1.4	0.3
Sedge Meadow	17	13.8	0.0	2.7	0.8	0.2
Rich Shrub Fen	1	5.0	5.0	5.0	5.0	0.1
Rail Road	1	1.3	1.3	1.3	1.3	0.0
Deep Emergent Marsh	1	0.6	0.6	0.6	0.6	0.0

Implications and applications in the Northern Forest region

The baseline data collected under this NSRC grant have proven valuable to researchers working on the Preserve and have enhanced the quality and efficiency of their research efforts. The diversity of research projects using this baseline data at the Preserve in 2011 illustrate the application of this work to biodiversity research in the Northern Forest Region. These are listed below:

- Biological surveys of small mammals from Boreal Forest habitats within the Adirondack Park. Darren Lunde and Kirstofer Helgen, Smithsonian Institution's National Museum of Natural History; Roland Kays, New York State Museum.
- Genetic Diversity and Distribution of Boreal Bird Species. Jeremy Kirchman, New York State Museum.
- Breeding Demographic and habitat selection of Rusty Blackbird (*Euphagus carolinus*). Shannon Buckley and Stacy McNulty, SUNY ESF.
- Comparison of stable carbon and nitrogen isotopes between living mammals, vegetation, and fossilized bone tissue. Robert Feranec, New York State Museum.
- Vegetation structure of a wind disturbed boreal peatland in New York State. Stephen Langdon, SUNY ESF.
- Survey of boreal bird species at Shingle Shanty Preserve. Stephen Langdon, Shingle Shanty Preserve and Research Station and Brian McAllister, Center For Adirondack Birding, Paul Smiths VIC.

Future Directions

These baseline data will continue to be updated by ongoing research at the preserve, and we expect that this work will be beneficial to many research projects in the future. We have begun discussions with others in the conservation and research community in the region about how best to curate and make accessible the products of this grant. The goal of the Preserve is to provide a locale for research to benefit the regional science and conservation community. Though currently the baseline data and other products of this grant are available only via communication with the Preserve Manager, our hope is to identify the most publicly valuable data sets and, in the future, to provide them digitally via an online interface.



Figure 10: DEC Wildlife Biologist and ESF intern surveying black spruce-tamarack bog for spruce grouse.



Figure 11: One of many moose seen on the property in 2010.

List of Products

1. Components of a geographic information system including:
 - Ecological communities delineations.
 - Geologic, ecological, disturbance and land-use history data.
2. Weather and lake temperature data.
3. Ecological Communities Map (see next slide).
4. Other publications
 - Mammals of Shingle Shanty Preserve and Research Station, (in preparation, expected completion date Spring, 2012) New York State Museum Bulletin. Roland Kays, New York State Museum; Darrin Lunde, Smithsonian Institution National Museum of Natural History; Stephen Langdon, Shingle Shanty Preserve and Research Station.
 - Vegetation structure of a wind disturbed boreal peatland in New York State. (expected completion date December 2012).MS Thesis, Stephen Langdon, SUNY ESF
 - Langdon, S. and Brian McAllister. 2011. Final report: Bird Surveys in Lowland Boreal Habitat at Shingle Shanty Preserve and Research Station (funded by Northern New York Audubon).

List of Products (cont.)

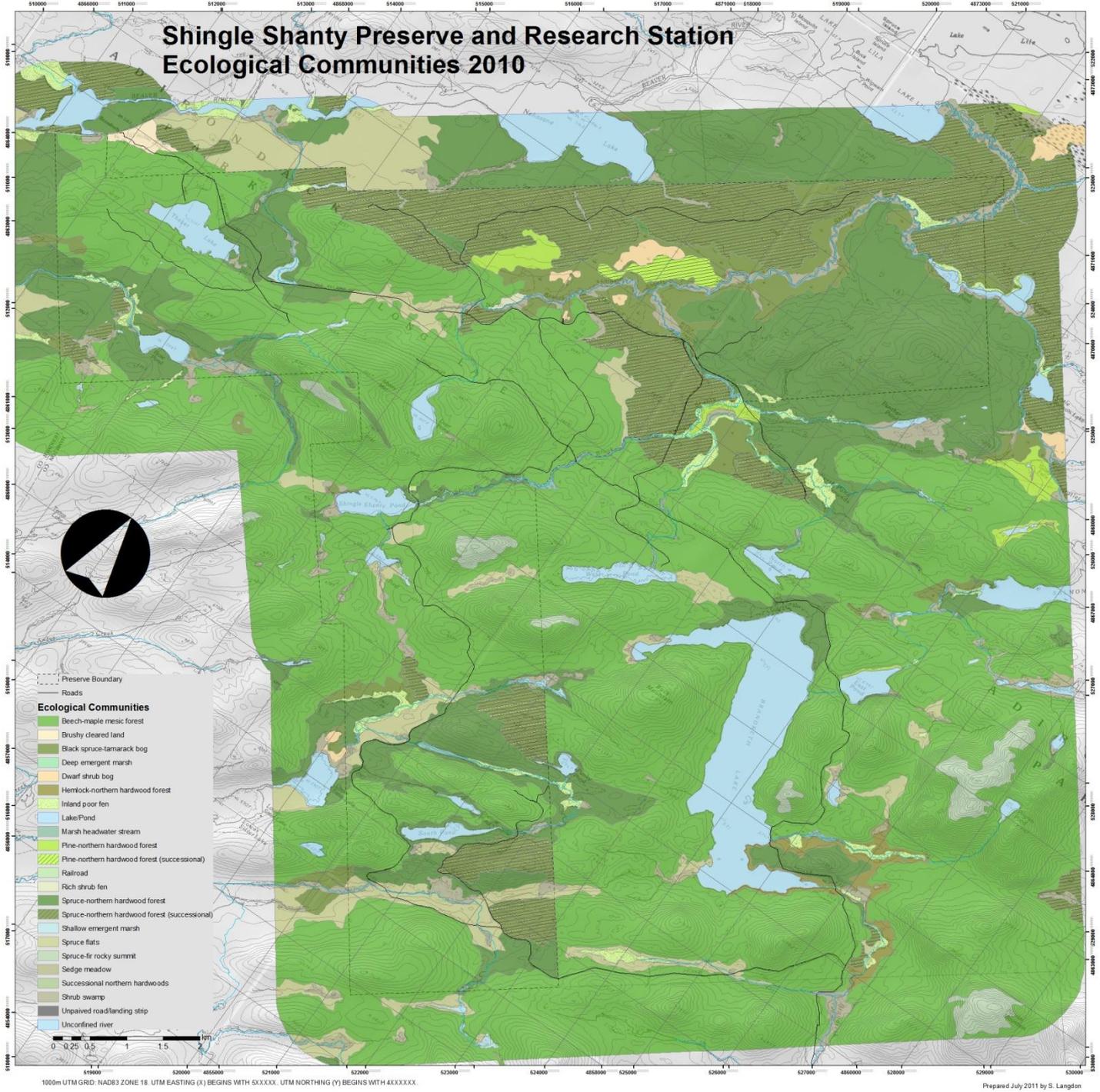


Figure 12: Map of ecological communities at Shingle Shanty Preserve and Research Station

Acknowledgments

This work would not have been possible without financial support from the Northeastern States Research Cooperative and raised privately by the Shingle Shanty Preserve and Research Station Board and Brandreth Park Association members. Thanks to Dr. Timothy Mihuc of the Lake Champlain Research Institute at Plattsburgh State University for providing a inexpensive mechanism to hire an intern; Dr. Christopher Martine, Curator of the Plattsburgh State University Herbarium and Megan Ward, Herbarium Assistant, for mounting and storing voucher specimens; and especially to Shaun J. Kittle, a tireless field assistant.