METHODS

HERITAGE METHODOLOGY

The Natural Heritage Network specializes in compiling biodiversity information through surveys for rare species and significant natural communities, and delivering this information to enable and enhance conservation. Natural Heritage Programs, NatureServe, and The Nature Conservancy have spent more than two decades developing and refining the inventory methodology used internationally by the Natural Heritage Network.

The Natural Heritage Network considers each plant species, animal species, and natural community type to be an "***element***" of biodiversity. The documented locations of rare plants, rare animals, and significant natural communities are called "***element occurrences***." These terms are used throughout this report.

The Coarse Filter/Fine Filter Approach

Heritage inventory methodology works by focusing on the identification, documentation, and mapping of all occurrences of rare species and significant ecological communities. A "coarse filter/fine filter" approach is used to identify and prioritize the protection of these significant biological resources. Ecological communities represent a "coarse filter," aggregates of biodiversity at a scale larger than the species level as defined in Reschke (1990a) and Edinger *et al.* (2002). Their identification and documentation can be used to describe whole assemblages of plant and animal species, both common and rare. The conservation of the best remaining examples of the natural communities assures the protection of most of the common species that make up the biological diversity of the state. Rare animals and plants often have narrow or unusual habitat requirements. These species may "fall through" the coarse filter, and are sometimes not protected within representative communities. Identifying and documenting viable populations of each of the rare species serves as the "fine filter" for protecting the state's biological diversity. This coarse filter/fine filter approach to a natural resources inventory has proven to be an efficient means of identifying the most sensitive animals, plants, and ecological communities of an area.

Element Rarity and Vulnerability

The NY Natural Heritage statewide inventory efforts revolve around lists of rare species and all types of natural communities known to occur, or to have historically occurred, in the state. These lists are based on a variety of sources including museum collections, scientific literature, information from state and local government agencies, regional and local experts, and data from neighboring states. Like all state Heritage Programs the NY Natural Heritage ranking system assesses rarity at two geographic scales. Each community and rare species is assigned a global rank and a state rank. The global rank reflects the rarity of the species or community throughout its range, whereas the state rank indicates its rarity within New York State. Both of these ranks are usually based on the range of the species or community, the number of occurrences, the viability of the occurrences, and the vulnerability of the species or community around the globe or across the state. As new data become available, the ranks may be revised to reflect the most current information. Infraspecific taxa are also assigned a taxon rank which indicates the infraspecific taxon's rank throughout its range. Individuals who are knowledgeable about the range-wide status of each particular species or

natural community typically assign global ranks. These knowledgeable individuals may come from either within or outside the Heritage Network. State ranks are assigned by biologists of NY Natural Heritage, with the assistance of other knowledgeable individuals from within or outside the state government. NY Natural Heritage ranking criteria are enumerated in Appendix A and used throughout this report.

Element Occurrence Quality/Viability

Individual occurrences of rare plants, rare animals, and natural communities are ranked according to their quality, or perceived viability, based on factors such as size, condition, and landscape context in which they are found. All occurrences of the elements documented in this report have been assigned a quality rank of A – F, H, or X (Table 1). Combinations of letters, or intermediate ranks, such as AB, BC, and CD are also possible.

Table 1. Explanation of element occurrence quality ranks used in NY Natural Heritage database reports.

Element Occurrence Rank	Definition
A	EXCELLENT
B	GOOD
C	MARGINAL
D	POOR
E	EXTANT. Existing, but not enough information to rank A-D
F	FAILED TO FIND. Not found at the previously documented site, but potential habitat was observed and /or a more thorough searching is needed.
H	HISTORICAL. No recent field information. For animals this means the particular population has not been seen or, in the case of a nest, has not been active within the last 15 years. For plants a "historical" rank means that the population has not been observed within the last 20 years.
X	EXTIRPATED. Believed to no longer exist. In many cases, habitat has been significantly altered and is believed to be no longer suitable for maintenance of the element.

Plant and animal occurrences, or populations, can be assigned any of the ranks listed above. Species occurrence ranks are based on historical evidence of presence and/or on current population data. The element occurrence rank of a species is determined by evaluating total population size, density, condition, the reproductive health of the population, ecological processes needed to maintain the population, total landscape condition, and a series of other factors. Each of these factors is compared against specifications gathered from other populations throughout its global range. A final element occurrence rank is calculated from this comparative review. Generally, an A-ranked occurrence is considered to represent one of the largest, most viable populations within a natural landscape known to support populations of the species. Significant natural communities are also assigned any of the ranks listed above, which are based on quality and are evaluated within the

context of the known or hypothesized distribution of that particular community. Several ecological and spatial factors must be considered when determining the element occurrence rank of a community. These include the occurrence size, maturity, evidence, and degree of unnatural disturbance, continued existence of important ecological processes, overall landscape context, and existing and potential threats. A-ranked community occurrences are among the largest and highest quality of their type. These community occurrences should be large enough to provide reasonable assurance for long-term viability of component ecological processes. They are essentially undisturbed by humans or have nearly recovered from past human disturbance, typically exhibiting little or no unnatural fragmentation. Exotic or particularly invasive native species are usually lacking in high quality community occurrences, or, if present, are observed at very low levels.

NY Natural Heritage Data Collection Priorities

"Significant" natural communities are determined using occurrence quality ranks in conjunction with global and state rarity ranks (Table 2). In this way, communities are documented and mapped in NY Natural Heritage databases if they are either rare in New York State or are an outstanding example of a more common natural community. Cultural communities (as defined in Reschke 1990) are not considered significant and are therefore not tracked by NY Natural Heritage.

Table 2. Criteria used by NY Natural Heritage to determine significant natural communities.

Element Rarity Rank		Element Occurrence Rank
G1, G1G2, G2, G2G3	or S1, S1S2	all occurrences ranked A-D
G3	or S2, S2S3	all occurrences ranked A-C
G3G4	or S3, S3S4	all occurrences ranked A-BC
G4, G4G5, G5	or S4, S4S5, S5	all occurrences ranked A-B

Heritage Programs typically maintain data on all plants and animals with fewer than one hundred occurrences statewide. In New York, information is gathered through active field inventory, review of museum records, and solicitation of records from other sources for all species ranked S1 or S2 by NY Natural Heritage (generally 20 or fewer occurrences statewide) or listed as Endangered or Threatened by the New York State Department of Environmental Conservation (NYS DEC). Information on each species' status and all known occurrences are entered into the computerized Biological and Conservation Data System (BCD). Population locations are delineated on official NY Natural Heritage maps, currently being converted to digital format for use in a geographic information system (GIS). In addition, information is gathered on some of the rarer S3 species (21 to 100 occurrences). Many S3 species, along with those ranked S1 and S2, are included on the NY Natural Heritage "Active Inventory List."

NY Natural Heritage also maintains records for other uncommon species and includes them on the Program's "Watch List." These species are usually ranked S3 by NY Natural Heritage or are listed as Special Concern (animals) or rare (plants) by the NYS DEC. Specific locations and other documentation for these species are maintained in manual files, but are not entered in the computer database and are not being stored in the Program's GIS.

Information may also be gathered on large Great Blue Heron rookeries and certain types of "Animal Concentration Areas," such as bat hibernacula, raptor concentration areas, and fish concentration areas. These areas are of conservation concern because of their vulnerability during specific seasons of the year when populations occur in large concentrations. Long standing interest on the part of the NYS DEC and the United States Fish and Wildlife Service have also contributed to the maintenance of these types of occurrences in NY Natural Heritage records. For these elements, however, only the highest quality occurrences, or those previously identified by NYS DEC as part of the Significant Habitat Unit, are currently being stored in the NY Natural Heritage database and GIS.

Legal Protection for Rare Elements in New York State

The United States Department of the Interior Endangered Species Act of 1974 protects listed plant and animal species from import, export, interstate commerce or sale. Before a species can become federally listed, it must be considered a candidate for federal listing. An explanation of Federal status for species listed under the U.S. Endangered Species Act are described in Appendix B. Additional federal laws, the Migratory Bird Treaty Act of 1918 and the Marine Mammal Protection Act of 1972, protect migratory birds and marine mammals, respectively.

Listing on New York's Endangered and Threatened Species List regulates animal protection under New York State's Environmental Conservation Law. Animals listed as endangered or threatened are protected against taking, importation, transportation, possession, or sale. Species listed as Special Concern usually have no legal protection unless they are among those taxa covered under a separate piece of federal or state legislation. However, listings of Special Concern indicate elevated interest in the status of the species within the state and serve as a mechanism for monitoring and tracking species that do not quite meet the criteria for active regulation. A summary of New York State Animal Status definitions is presented in Appendix B.

New York State's Protected Plant Law, passed in 1974, prohibits the collection or destruction of listed protected plants without prior consent from the landowner. Violations of this law are punishable by a $25.00 fine per stem. The most recent list of endangered, threatened, rare, and exploitably vulnerable plants was adopted through rule making in 2000. Criteria for assigning plants to these categories are shown in Appendix B.

Reschke (1990b) developed the first comprehensive ecological community classification for New York State. This classification and the subsequent draft revision (Edinger *et al.* 2002) have been the basis of natural community inventories conducted by NY Natural Heritage since 1985. One of the objectives of this effort is to assess the rarity of each perceived natural community type in New York State. To date, there is no comprehensive legislation at the federal or state level providing legal protection to rare natural communities or high quality examples of more common community types. Federal, state, and local laws protect certain types of wetlands, streams, and beaches, but most terrestrial communities have no legal status.

PROJECT METHODS

Methods used to identify and document rare elements in this study follow methodology developed by The Nature Conservancy and the network of Natural Heritage Programs (now known as the NatureServe). The goal for this project is to document the rare species and significant natural

communities that occur within selected wetlands in the Salmon River Corridor, as well as provide full community maps for each of the fifteen wetlands and select vernal pools. In all aspects of this project, the Heritage Program uses a prioritized approach to data collection, focusing first on those species and communities of global significance and, later, on those of regional and state importance. Wetlands surveyed for this project were selected by the Bio-Inventory Committee which consisted of local experts and NY Natural Heritage staff, including Sandy Bonanno, Elizabeth Bough, Shane Gebauer, Andy Nelson, and Paul Novak.

As mentioned above, species surveys for this project are based largely on existing information and leads, focusing on the rarest species first and secondarily on those that are rare or of limited distribution in New York, but believed to be regionally or globally secure. Rare species surveys conducted for this project are by no means comprehensive and should not be presented as such. It is possible that other rare plants or animals exist or could be found in the future. It is also possible that the boundaries of the communities identified and mapped under the scope of this project will need modification as further data on natural communities across New York State are gathered, existing information is updated and new community descriptions are developed. Further species surveys, natural community documentation, and monitoring are highly encouraged. Any observations of rare plants, rare animals or significant natural communities should be reported to the New York Natural Heritage Program in order to update the information in the Heritage database.

Communities

Community Element Occurrence Documentation

Natural community field surveys are conducted according to current program standards and all communities classified following Reschke (1990) or Edinger *et al.* (2002). Community surveys include collecting data on plant species composition and structure for all vegetative strata; sampling and noting important soil properties observed within the community; and recording information on surficial and bedrock geology, slope, aspect, elevation, and hydrologic regimes for the area. All of these data are used to accurately identify and delineate the community. Information on the maturity of the occurrence, anthropogenic, and natural disturbances influencing the community and the condition of the surrounding landscape are also recorded. Combined with the detailed information on the biological and physical properties of the community, data documenting landscape condition allow a complete assessment of the ecological quality of the occurrence. The collection of a consistent set of data on each natural community allows quick and accurate comparisons between communities of the same type, which ultimately determines the overall quality rank of the occurrence.

Community Mapping

Community mapping is done by first delineating preliminary polygons on 1:40,000 color infrared National Aerial Photography Program photos using a stereoscope and mylar overlay. The preliminary delineation is then validated and modified through field data collection. The final product of the field delineation is an edge-matched set of 1:40,000 photos with all community polygons delineated in ink, labeled, and all observation points indicated with a dot and point label. This set of photos is then used to create a complete community map for the wetland.

The final community coverage is created by screen digitizing in ArcView, using 1:12,000 Color Infrared Digital Orthophoto Quarter Quads (in NAD83 datum and true UTM projection zone) obtained through the United States Geological Survey, EROS Data Center. The screen digitizing process allows simultaneous use of aerial photography and several additional supplemental data layers useful in delineating community boundaries, including digital USGS Quadrangle maps, Department of Transportation digital road coverages, digital hydrology coverages, and New York State regulated freshwater wetlands. All polygons are attributed with a community code at the time of digitizing. The attribute table is then automatically populated with an area (m^2), a perimeter (m) and converted to total acres for each polygon using an ArcView script.

As a final step, the ArcView shapefile is converted to an ArcInfo polygon coverage through the use of the SHAPEARC and REGIONPOLY commands in ArcInfo. Final digital products for each wetland include a shapefile, an ArcInfo polygon coverage, and a DBF file containing information on each natural community observed in the wetland.

Rare Plants

Field surveys for rare plants involve mapping the extent of the population and collecting data on population size, reproductive biology, and habitat characteristics, including topography, geologic features, and associated species. Observations on disturbances, threats, and general site quality are also recorded. All of the information gathered is then compared to other occurrences of the species across its range and used to assign an overall rank to the occurrence. Specimens are collected when population sizes are large enough to ensure that collection will not adversely impact the occurrence. All voucher specimens are mounted, labeled, and deposited in the New York State Museum Herbarium. When collection is not possible due to population size or perceived vigor, photographs are taken and deposited in the New York Natural Heritage Program photo catalogue.

Rare Animals

Field surveys for rare animals are based on a review of records in Heritage files, records obtained through the NYS-DEC Endangered Species and Non-game and Habitat Units, Breeding Bird Atlas records, and consultation with other scientists and field biologists familiar with rare species locations and habitat within the local area. Systematic searches for priority species are completed during the season when the species of interest are most easy to detect, applying methods typically used for the taxa sought.

Field surveys involve mapping the extent of the population and collecting data on population size, reproductive biology, and habitat characteristics as time permits. Observations on disturbances, threats, and general site quality are also recorded. Voucher specimens are collected for some rare insects or fish, particularly for those species that are extremely difficult to identify in the field or where confirmation by a specialist may be required to confirm a tentative identification made in the field. Voucher specimens are typically deposited in the New York State Museum, Albany, NY.

RESULTS AND DISCUSSION

The full community delineations for the fifteen priority wetlands and the total area surveyed for rare species cover approximately 2730 acres. This represents 39% of the regulated wetland acres

within the area defined for the purposes of this study as the Salmon River Corridor, and less than 1% of the total acreage of regulated wetlands in Oswego County. Prior to this study, there were no rare species or significant natural communities documented within the NY Natural Heritage Database for any of the priority wetlands. Now, approximately 614 acres, or 22% of the area surveyed, harbors known rare species or natural communities. It is important to note that inventory effort almost always results in documentation of previously unknown occurrences of rare species or communities, or potential habitat that may be occupied in the future.

Below are the results of our inventory efforts. For the purposes of reporting, some of the wetlands were combined into logical groups and are discussed together. Thus, rather than fifteen separate sections, one for each wetland, the results are presented in twelve sections. Each section contains a site description providing a word picture of the area, as well as any site specific threats and management considerations. Threats and management considerations that apply to all the wetlands and are more general in nature are presented later in the report. Sites found to have the highest number of rare species and significant natural communities are discussed first; those with none follow in alphabetical order.

Following the site description is an explanation of the natural communities within the wetland. This section includes the discussion of any significant natural communities we have documented. The scope of this project is focused on the wetlands. We therefore modified the original boundaries provided for each wetland to correspond to the wetland boundaries on the base map used for digitizing: 1:12,000 scale digital orthophotos flown in the mid-1990s. In some cases, terrestrial communities are embedded in the wetlands and in these instances, they are mapped as part of the full community coverage and assigned a community type based on photo interpretation. While we provide a vegetation map of each site, it should be noted that landowner permission to access some wetlands was limited. For example, we were able to access less than 10% of two rather large wetlands, Cranburry Bog (135 acres) and Redfield Wetland (587 acres). Overall, we were granted access to only 40% of the acreage within priority wetlands. In wetlands with limited access, we identified and mapped the communities by extrapolating from observations done on lands where permission was granted in conjunction with aerial photo interpretation, information provided in previous studies (Dru Associates 2001), and existing knowledge of the site.

Finally, only wetlands determined to have potential to harbor rare plants and animals were visited by a NY Natural Heritage botanist, zoologist, or sub-contractor. A discussion of inventory effort and findings are included in the rare plants and rare animals section for each wetland visited. Appendix C contains a table listing the rare species and significant natural communities by site. Conservation Guides for each of the significant natural communities, rare plants, and rare animals are in Appendix D, Appendix E, and Appendix F, respectively, and can also be accessed via the World Wide Web at http://acris.nynhp.org/.

PENNOCK BOG

Most of Pennock bog is in public ownership (Chateaugay State Forest), and we were granted access to the small portions that are privately owned. Information was gathered throughout the open wetlands and the associated swamp.

Pennock Bog is an approximately 247-acre wetland lying between the hamlets of Orwell and Stillwater in the town of Orwell. The wetland is associated with both Pekin Brook and Pennock

Brook. Pekin Brook originates around the northeast corner of the State Forest and flows south through the village of Pekins and into the Lower Reservoir wetland complex. Pennock Brook flows out of a large wetland lying west of Beecherville and from there makes it way a short distance south to a broad flat valley that receives both of the brooks. Beaver activity within this valley has played a role in the maintenance of the large wetland known locally as Pennock Bog. Approximately 1800 meters south of the wetland, Pennock Brook empties into the Salmon River Reservoir. The underlying bedrock for the entire swamp is Oswego Sandstone a coarse-grained, mud-free, sandstone interspersed with thin shale layers (Isachsen *et al.* 2000).

To maintain the structural and biological integrity of this wetland, management goals should continue to allow full connectivity of the wetland and the natural flow of water throughout the wetland should be maintained (and barriers minimized). Embedded in a forested landscape that is managed primarily for timber production, the wetland is well protected from agricultural run-off common to other parts of the watershed. Using best management practices (BMPs) for stream and wetland health on timberlands within the watershed can be very effective at maintaining the biological integrity of these wetlands.

Natural Communities

There are eight natural communities in Pennock Bog and all are typical of the numerous stream valleys throughout this region of the state, particularly those that have historical beaver populations (Table 3). Two of the natural communities in Pennock Bog are considered significant from a statewide perspective and have been entered into the NY Natural Heritage database.

By the time it reaches the valley that holds Pennock Bog, Pennock Creek is a slow moving, open water stream that meanders through a hardwood swamp and through a marshy section of the wetland. This natural community is generally best described as a marsh headwater stream. A mosaic of wetlands extend from Pekin Creek, at the northwest end of Pennock Bog, to Jackson Road which marks the downstream end of the wetland complex. Beginning at Beecherville Road crossing on Pekin Creek, the wetland is an open shallow emergent marsh that was created by beaver that occupy the area. This marsh was given an overall rating of B, for its excellent condition and context, in spite of its small size (Figure 3). The open marsh grades into a shrub swamp and a small eutrophic pond about 500 meters downstream, and then becomes a boggy spruce-fir swamp. This 52-acre mixed conifer swamp was entered into our database in 2004 and is a good-quality (B rank) example of this community type (Figure 3). It is dominated by red spruce (*Picea rubra*) and red maple (*Acer rubrum*) and transitions to a red maple- hardwood swamp with several small inclusions of hemlock-hardwood swamp and shallow emergent marsh downstream. The red-maple hardwood swamp and hemlock-hardwood swamps are both very common community types and were not large enough to be considered significant from a statewide perspective.

Table 3. Ecological communities in Pennock Bog. Pairs of communities separated by double slashes are complexes too interwoven to distinguish individually. Significant natural communities are bolded and in italics.

System	Subsystem	Community Type	Acres
Palustrine	Open Mineral Soil Wetlands	***Shallow emergent marsh***	***36***
		Shrub swamp	42
		Shrub swamp//Shallow emergent marsh	11
	Forested Mineral Soil Wetlands	Hemlock-hardwood swamp	30
		Red maple-hardwood swamp	39
		Spruce-fir swamp	**52**
Riverine	Natural Streams	Marsh headwater stream	32
Lacustrine	Natural Lakes and Ponds	Eutrophic pond	5
Total Acres			247

Rare Plants

Computer models indicated that Pennock Bog may contain habitat suitable for pod-grass (*Scheuchzeria palustris*). A survey in 2004 was unsuccessful in locating this rare plant, but potential habitat does exist. While Pennock Bog is host to a wide variety of uncommon plants, including a number of orchids, no rare plants were documented. In addition to our surveys, Dr. Andrew Nelson of SUNY-Oswego has also surveyed this site. This does not mean that no rare plants are present, only that none were documented during these field surveys. Future surveys may find pod-grass or possibly other rare plant species.

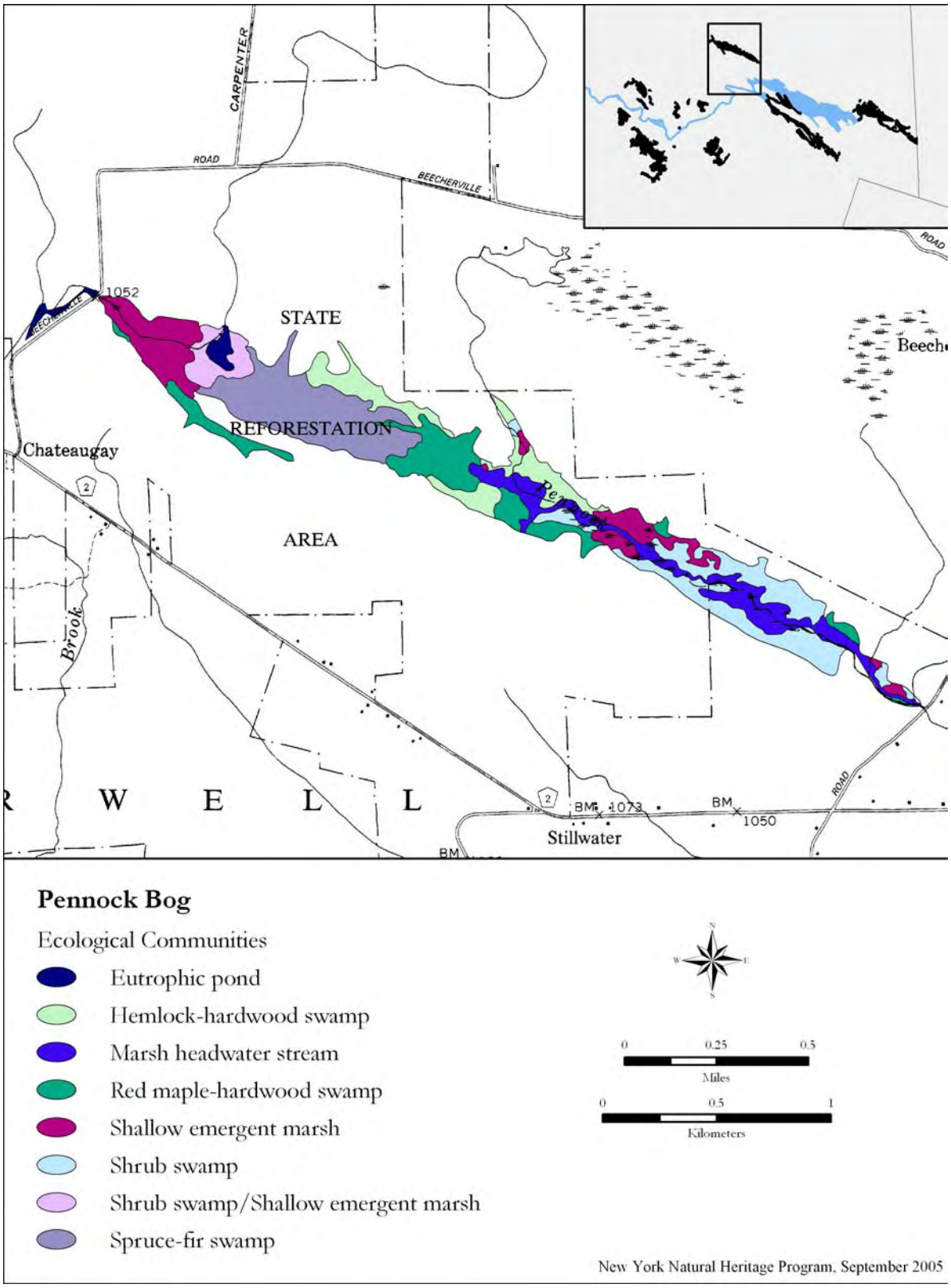

Figure 2. Ecological communities in Pennock Bog

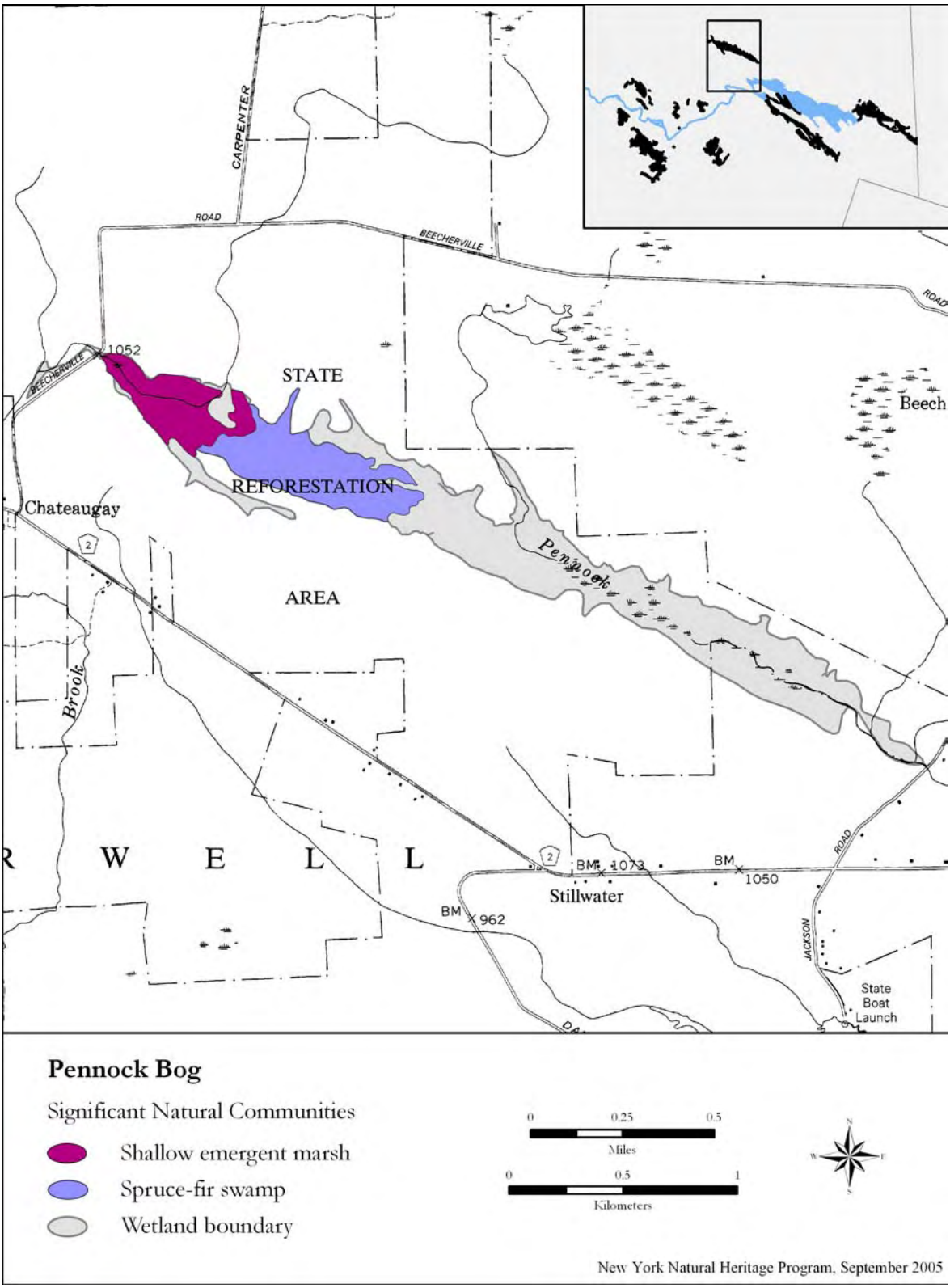

Figure 3. Significant natural communities in Pennock Bog

Rare Animals

This long, narrow wetland had been previously indicated as one with potential habitat for the federally and state listed bog turtle although the exact location of the suitable habitat was not known to NYNHP at the time of the surveys for this project (Rosenbaum pers. comm.). Two surveys were made during May 2004, one to the eastern-most portion of the wetland and one to the western-most portion. Both of these areas were shallow wetland areas formerly occupied by beaver. Although there was a boggy character to the western-most area with sedges and some sphagnum clumps it would not have been characterized as bog turtle habitat indicating that the area of potential bog turtle habitat observed by Rosenbaum probably occurred elsewhere within this large wetland system.

In addition to examining the two areas visited for bog turtle occupation, tape playback surveys were conducted for the state threatened least bittern (*Ixobrychus exilis*) and pied-billed grebe (*Podilymbus podiceps*) as part of the two visits. Neither species was observed and the habitat did not appear to be especially suitable for either species. Both areas were primarily largely drained down beaver ponds that lacked sufficient water depth, at least during 2004, for pied-billed grebe and neither site had the extensive patches of cattail (*Typha*) or other emergent aquatic plants that are typically associated with least bittern. A few small clumps of *Phragmites* were observed in the western portion of the wetland. The exact location of the potential bog turtle habitat previously observed by Peter Rosenbaum at this wetland should be determined. It is possible that the habitat has been altered by beaver occupation.

PINEVILLE BOG

Access to Pineville Bog was limited to 17 acres of a possible 76 and only a small portion of the western part of this wetland could be accessed without crossing other private parcels in the area. As a result, we identified and mapped the communities by extrapolating from observations done on lands where permission was granted in conjunction with aerial photo interpretation and existing knowledge of the site.

Pineville Bog is a 101-acre wetland complex located about 500 meters south of the Salmon River on the south side of the settlement of Pineville and in the town of Albion. There is no obvious channel draining the wetland. A small stream exits the broader wetland complex on the southeast corner, outside of the area delineated as Pineville Bog, but the headwaters of this stream appear to be cut off from Pineville Bog by a peninsula. The stream passes through a culvert under County Road 48 and then flows northeast toward the Salmon River. This same unnamed tributary also drains a large wetland (Route 22 Wetland) that lies south of the bog. While this small unnamed tributary and the large forested wetland in Altmar State Forest to the south may have some groundwater connection to Pineville Bog, no surface connections were observed on the ground nor are they readily evident on the base maps used in this study.

Pineville Bog is adjoined on the west by a narrow strip of agricultural land. Early successional communities (successional old fields and successional northern hardwoods), Pineville Cemetary and light residential development associated with the hamlet of Pineville lie to the north and east of the wetland. South of the wetland are successional northern hardwood forests and conifer plantations on state land and several private parcels. The underlying bedrock for the entire swamp is Oswego Sandstone, a coarse-grained, mud-free, sandstone interspersed with thin shale layers (Isachsen *et al.* 2000). The surficial geology consists of lacustrine sand deposited in proglacial lakes.

Runoff from the surrounding agricultural fields may contain pesticides, fertilizers, and sediment from erosion. The flow of these substances into the wetland will alter the water chemistry and or cause increased sedimentation of the wetland. Of particular concern are the numerous residences surrounding the wetland and the potential impact from septic discharge into the groundwater which could alter the nutrient levels within the wetland. Efforts should be made to maintain the natural hydrology and high water quality to sustain this important wetland.

Natural Communities

There are four community types at Pineville Bog (Table 4). The dominant natural community in the wetland is red maple-tamarack peat swamp which is represented by a large, 63-acre central patch and a smaller 2 acre patch located on the north edge of the bog complex. A 34-acre patch of dwarf shrub bog is situated between these two patches of red maple tamarack-peat swamp. Pine-northern hardwood forest and hemlock-northern hardwood forest is common on the sandy upland soils surrounding the wetland and a small patch of pine-northern hardwood forest is embedded within the wetland (Figure 4).

There are two significant natural communities at Pineville Bog (Figure 5). The red maple-tamarck peat swamp is a good example from a statewide perspective. Comparatively, it is of average

size and is in good to excellent condition. The canopy cover is dominated by red maple (*Acer rubrum)* and tamarack (*Larix laracina*) with white pine (*Pinus strobus*) scattered throughout. The canopy is variable but predominantly open, and is interspersed throughout with patches of dense closed canopy. The red maple-tamarack peat swamp slowly transitions to the north into a dwarf shrub bog that is also of average size within the state and in good to excellent condition. Leatherleaf (*Chamaedaphne calyculata*) is the dominant shrub throughout the bog and nannyberry (*Nemopanthus mucronata*) is dominant where the bog transitions into red maple-tamarack peat swamp.

Table 4. Ecological communities in Pineville Bog. Significant natural communities are bolded and in italics.

System	Subsystem	Community Type	Acres
Palustrine	Open Peatlands	***Dwarf shrub bog***	***34***
	Open Mineral Soil Wetlands	Shrub swamp	<1
	Forested Peatlands	***Red maple-tamarack peat swamp***	***65***
Terrestrial	Forested Uplands	Pine-northern hardwood forest	2
Total Acres			101

Rare Plants

A large portion of this site was searched, and species typical of an inland poor fen were encountered. This includes many interesting species, but no rarities. Some of these interesting species include typical bog/fen species like pitcher plant (*Sarracenia purpurea*), sundews (*Drosera intermedia* and *Drosera rotundifolia*), bog rosemary (*Andromeda polifolia* var. *glaucophylla*), orchids (including *Calapogon tuberosus* and *Pogonia ophioglossoides*), Labrador tea (*Rhododendron groenlandicum*), and cranberries (*Vaccinium macrocarpon*). All of these species are restricted to bog/fen habitats. With the number and quality of bogs/fens in this study area, there may be compatible eco-tourism opportunities.

Rare Animals

Although only a small portion of the western part of this wetland was accessible a visit was made to the site in late May 2004 to search for two rare dragonflies, the ebony and banded boghaunter (*Williamsonia fletcheri* and *Williamsonia lintneri*). While neither species was observed, shallow pools of water with sphagnum moss floating in the water column was observed. This is a microhabitat characteristic associated with known sites for these species and thus this beautiful bog appeared potentially suitable for these species as well as some other rare dragonfly species in the genus Somatochlora (Family Cordulidae). Peter Rosenbaum and three students visited Pineville Bog on three occasions during 2005 to survey for dragonflies and damselflies, but no *Williamsonia* or *Somatochlora* specimens or other rare dragonflies were collected as part of the surveys.

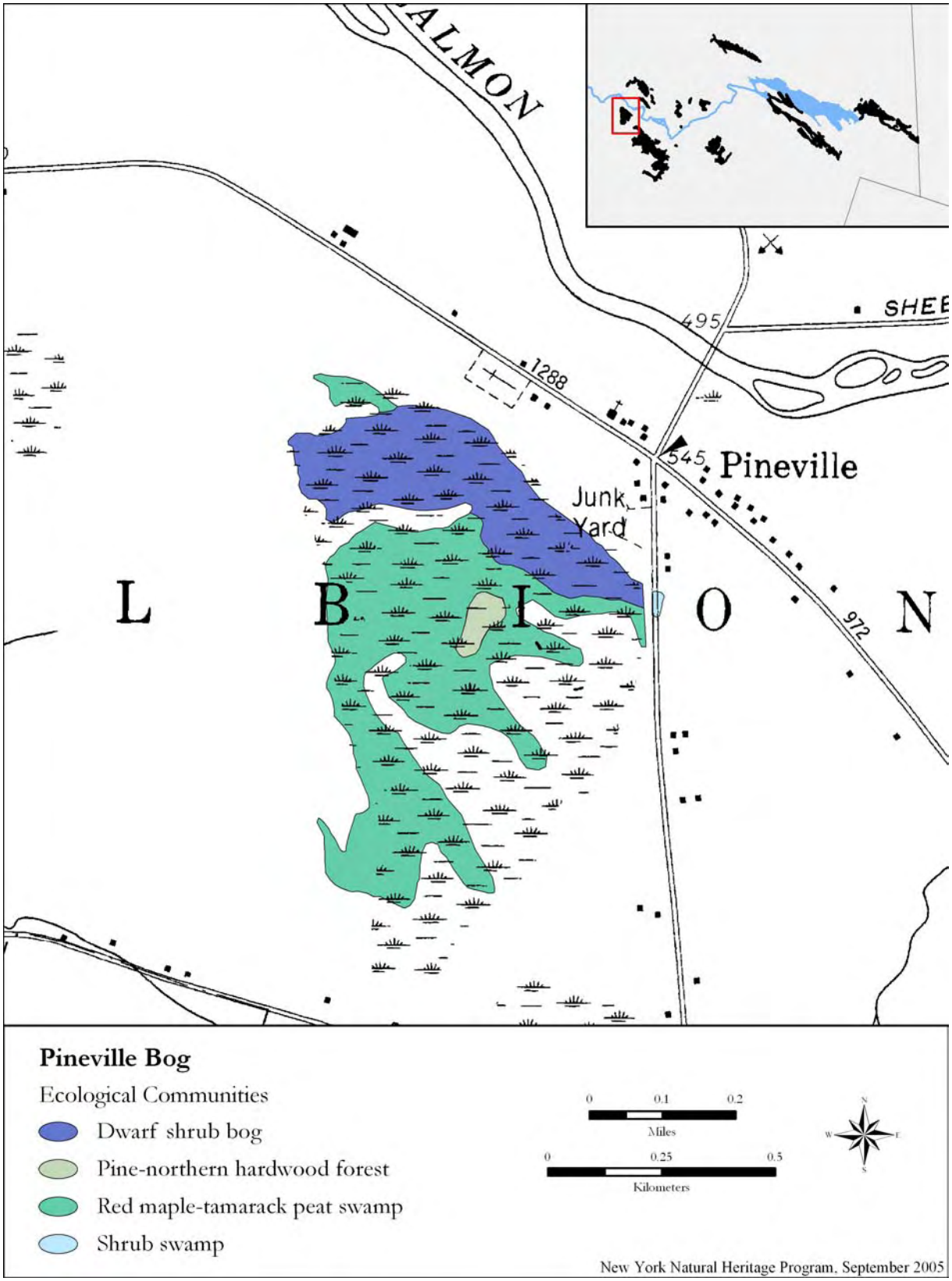

Figure 4. Ecological communities in Pineville Bog

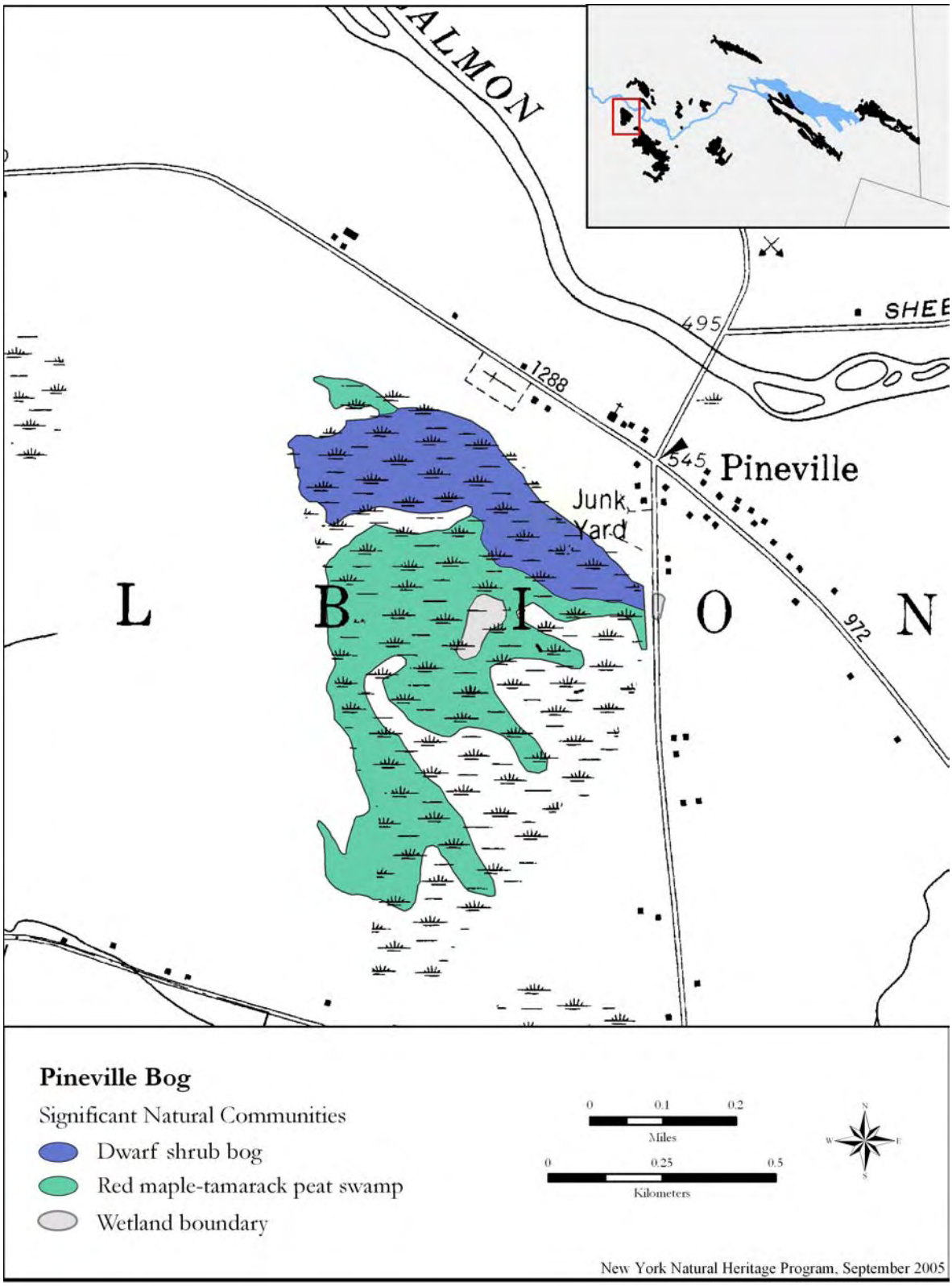

Figure 5. Significant natural communities in Pineville Bog

HOGSBACK BOG

Hogsback Bog is bisected by Hogsback Road which runs east to west through the center of the wetland. We were granted access to approximately 50% of the 38-acre wetland complex, which encompassed a majority of the south half of the wetland. Because access was limited to the southernmost portion, we identified and mapped the communities north of Hogsback Road by extrapolating from observations done in the section where permission was granted, in conjunction with aerial photo interpretation and existing knowledge of the site.

Hogsback bog is predominantly forested and is located about 1000 meters north of the Salmon River, not far from the village of Altmar and in the town of Orwell. The wetland drains to the north into upper Pekin Brook, a small tributary of Orwell Creek. Orwell Creek is a major tributary of the Salmon River originating in the far northeast corner of the Lower Salmon River watershed.

Agricultural land lies to the west of Hogsback Bog. The wetland is buffered from the agricultural land by a very narrow band of hemlock-northern hardwood forest and successional northern hardwoods which lies between the wetland and the tilled area. The rest of the wetland is surrounded by forests: a dense stand of hemlock-northern hardwood forest to the northwest and successional beech-maple mesic forest the the north, east, and south with embedded small conifer plantations. The underlying bedrock for the entire swamp is Oswego Sandstone, a coarse-grained, mud-free, sandstone interspersed with thin shale layers (Isachsen *et al.* 2000). The surficial geology consists of ice contact kame deposits.

Road runoff and the potential for agricultural runoff are the greatest threats to Hogsback Bog. Maintaining the narrow forested buffer between the wetland and the adjacent crop fields should help minimize the possible introduction of pesticides, fertilizers, and other by-products of intensive crop management. Of particular concern is the potential for undesirable runoff and soil erosion into the wetland at the road crossing, as well as the garbage that has been dumped over the steep slope on the south side of the road. The runoff from the roads which can contain oil, gas or salt, and the dumping of garbage, which may be contaminated, could alter the water chemistry and or cause increased sedimentation within the wetland. Road crossings can also impede the natural flow of water through the wetland. Routine monitoring of surface and groundwater for contamination and alterations to the water chemistry should be conducted, as well as monitoring the water levels to insure the natural hydrology is maintained. If necessary, adjust the number or installation of existing culverts and ensure they do not become obstructed with debris, particularly garbage that has been illegally dumped off the side of the road.

Natural Communities

We mapped eight community types at Hogsback Bog (Table 5). Since no permissions were granted to the north half of the wetland our activities were concentrated in the south half and the mapping of the northern hemlock-hardwood swamp (10 acres) and shrub swamp (7 acres) was done through aerial photo interpretation (Figure 6). The main focus of our inventory efforts within Hogsback Bog was the inland poor fen located in the depression just south of Hogsback Road. The small open peatland is dominated by stands of various sedges and rushes (*Rhynchospora alba, Juncus canadensis, Carex exilis*) and scattered patches of bog rosemary (*Andromeda polifolia*) and leatherleaf (*Chamaedaphne calyculata*). Pitcher plant (*Sarracenia purpurea*), sundews (*Drosera rotundifolia*, *Drosera*

intermedia), orchids (*Pogonia ophioglossoides*, *Calopogon tuberosa*), bog buckbean (*Menyanthes trifoliata*), and the state rare podgrass (*Scheuchzeria palustris*) are also found within the wetland. A ring of black spruce-tamarack bog surrounds the inland poor fen which transitions into a hemlock-hardwood swamp to the north of the fen and to a spruce-fir swamp and then a hemlock-hardwood swamp to the south. The southernmost lobe of the wetland contains a small bog lake surrounded by a narrow band of dwarf shrub bog.

The inland poor fen in Hogsback Bog is considered significant from a statewide perspective (Figure 7). While it is small in size compared to other communities of this type in the state, this example is in excellent condition and is well buffered from human activities by the surrounding natural communities. The bog lake and dwarf shrub bog on the south lobe of the wetland are too small to be considered significant from a statewide perspective. However, their connection to the significant inland poor fen and surrounding wetland to the north via a narrow band of hemlock-hardwood swamp is ample justification for maintaining their natural hydrology and somehow ensuring their long term protection.

Table 5. Ecological communities in Hogsback Bog. Significant natural communities are bolded and in italics.

System	Subsystem	Community Type	Acres
Palustrine	Open Mineral Soil Wetlands	Shrub swamp	7
	Open Peatlands	Dwarf shrub bog	1
		Highbush blueberry bog thicket	<1
		Inland poor fen	***2***
	Forested Mineral Soil Wetlands	Hemlock-hardwood swamp	17
		Spruce-fir swamp	6
	Forested Peatlands	Black spruce-tamarack bog	2
Lacustrine	Natural Lake and Ponds	Bog Lake	3
Total Acres			38

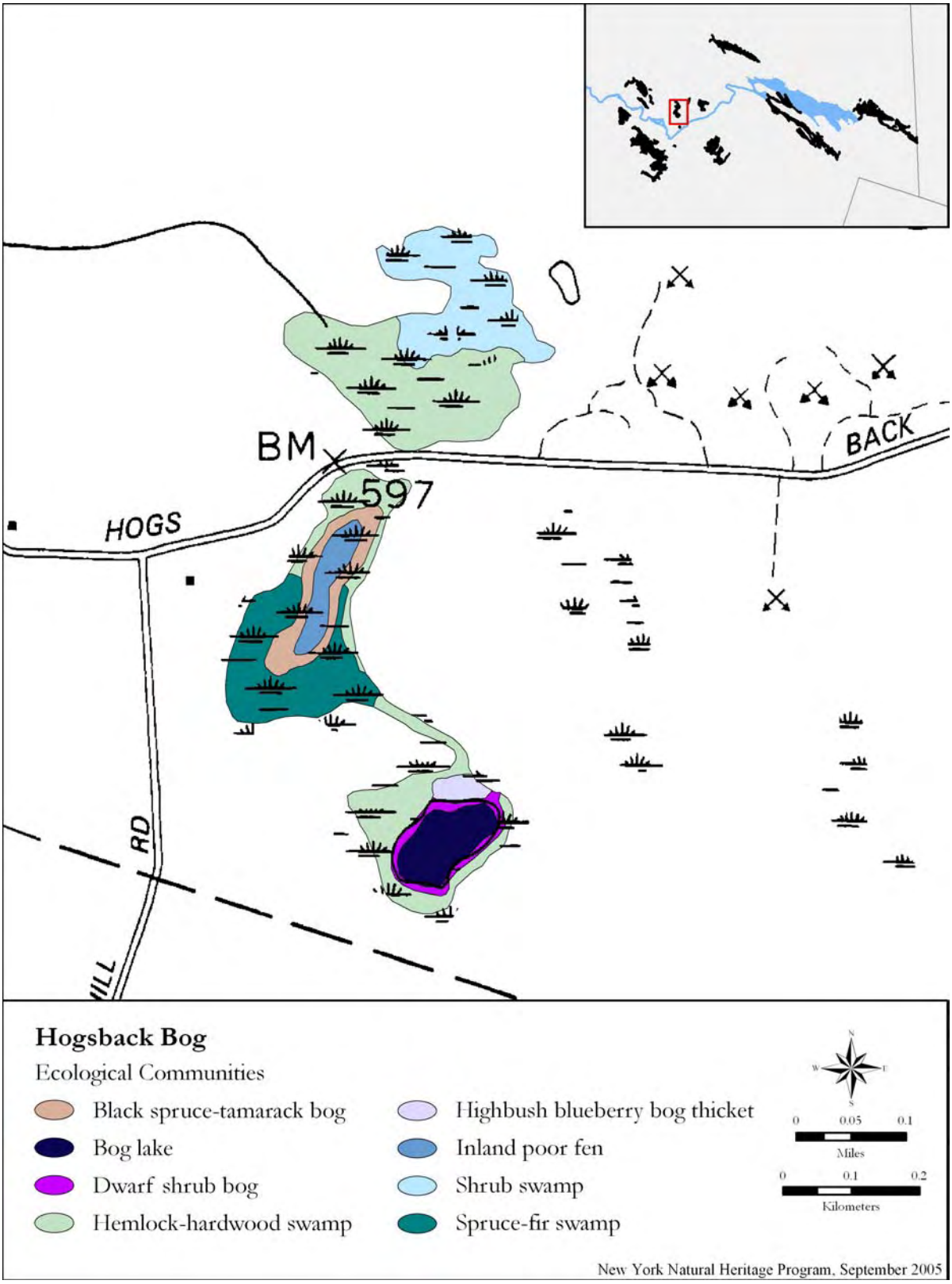

Figure 6. Ecological Communities in Hogsback Bog

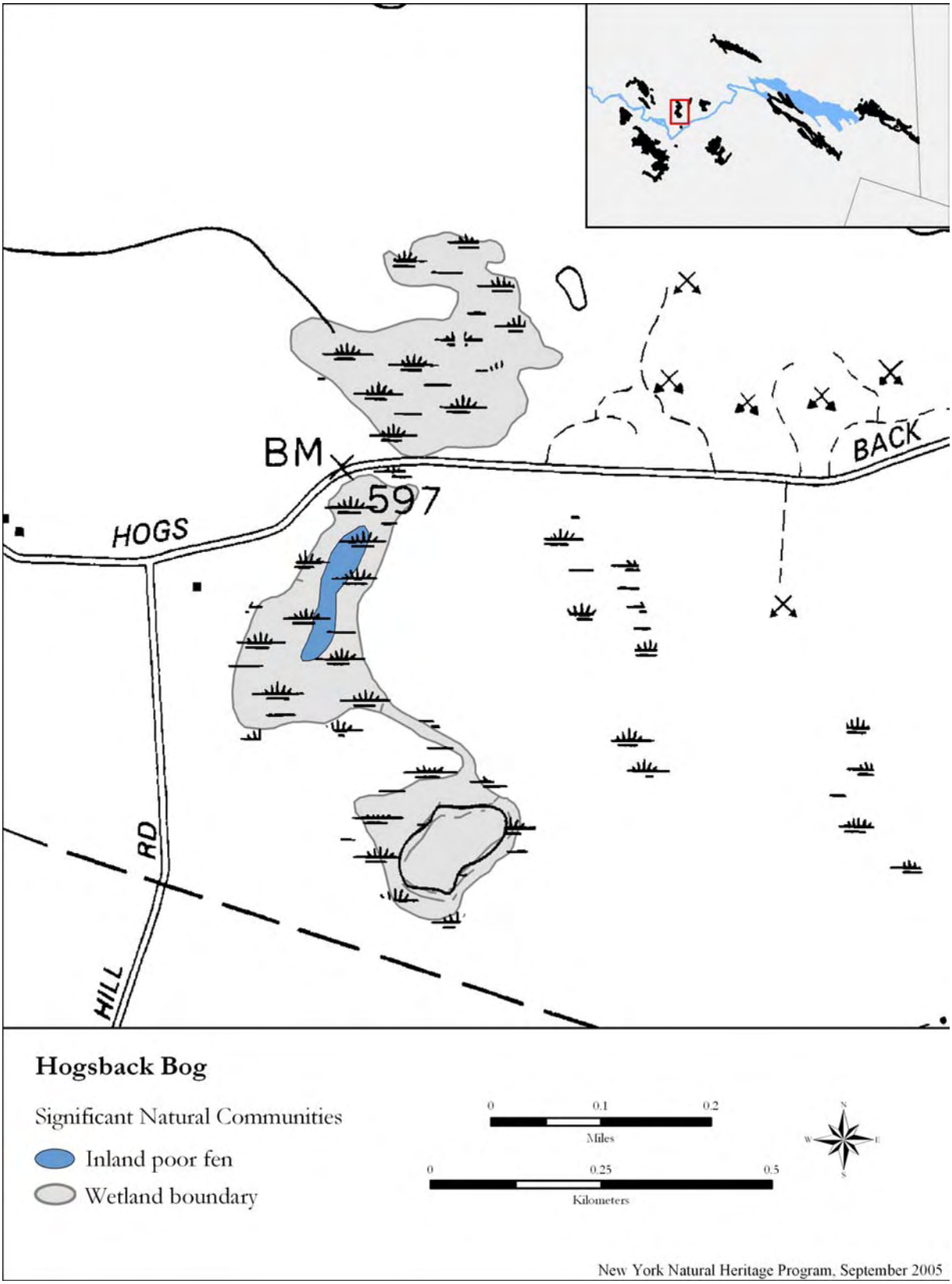

Figure 7. Significant natural communities in Hogsback Bog

Rare Plants

Pod grass (*Scheuchzeria palustris*) a state rare plant was discovered in Hogsback Bog while conducting a natural community inventory in the inland poor fen on June 21, 2005. Hundreds (250-500) of plants were found scattered throughout the fen, especially on the most unstable parts of the quaking bog. Scattered over an area of approximately 2 acres, this population is large compared to others in the state. Associated species at the site include various sedges and rushes (*Rhynchospora alba, Juncus canadensis, Carex exilis*), bog rosemary (*Andromeda polifolia*), leatherleaf (*Chamaedaphne calyculata*), pitcher plant (*Sarracenia purpurea*), sundews (*Drosera rotundifolia*, *Drosera intermedia*), orchids (*Pogonia ophioglossoides*, *Calopogon tuberosa*), and bogbean (*Menyanthes trifoliata*).

Table 6. Rare plants in Hogsback Bog.

Documented Rare Plants	Historical Rare Plants
Scheuchzeria palustris (pod grass)	

Rare Animals

A brief survey was made to Hogsback Bog for bog turtles and one rare dragonfly, the ebony boghaunter (*Williamsonia fletcheri*) during late May 2004. We concur with Peter Rosenbaum's earlier assessment that this wetland did not represent likely suitable habitat for bog turtles nor did it appear suitable for ebony boghaunter. The northern portion of the swamp includes a deciduous hardwood swamp which grades into a typical, northern quaking bog type habitat. A narrow pine-shrouded ridge separates this bog mat from a small, open, acidic bog pond with associated quaking mat. Shallow rivulets, sphagnum hummocks, and other microhabitat characteristics typically associated with occupied bog turtle habitat are lacking and shallow, sphagnum-filled pools that serve as larval habitat for boghaunters also were not apparent. Nevertheless, one or more members of the dragonfly genus *Somatochlora* (Family Cordulidae) that are considered rare by NY Natural Heritage can be associated with this habitat type. Peter Rosenbaum and three students visited this site on three occasions during 2005 to survey for dragonflies and damselflies, but no *Somatochlora* specimens or other rare dragonflies were collected as part of the surveys.

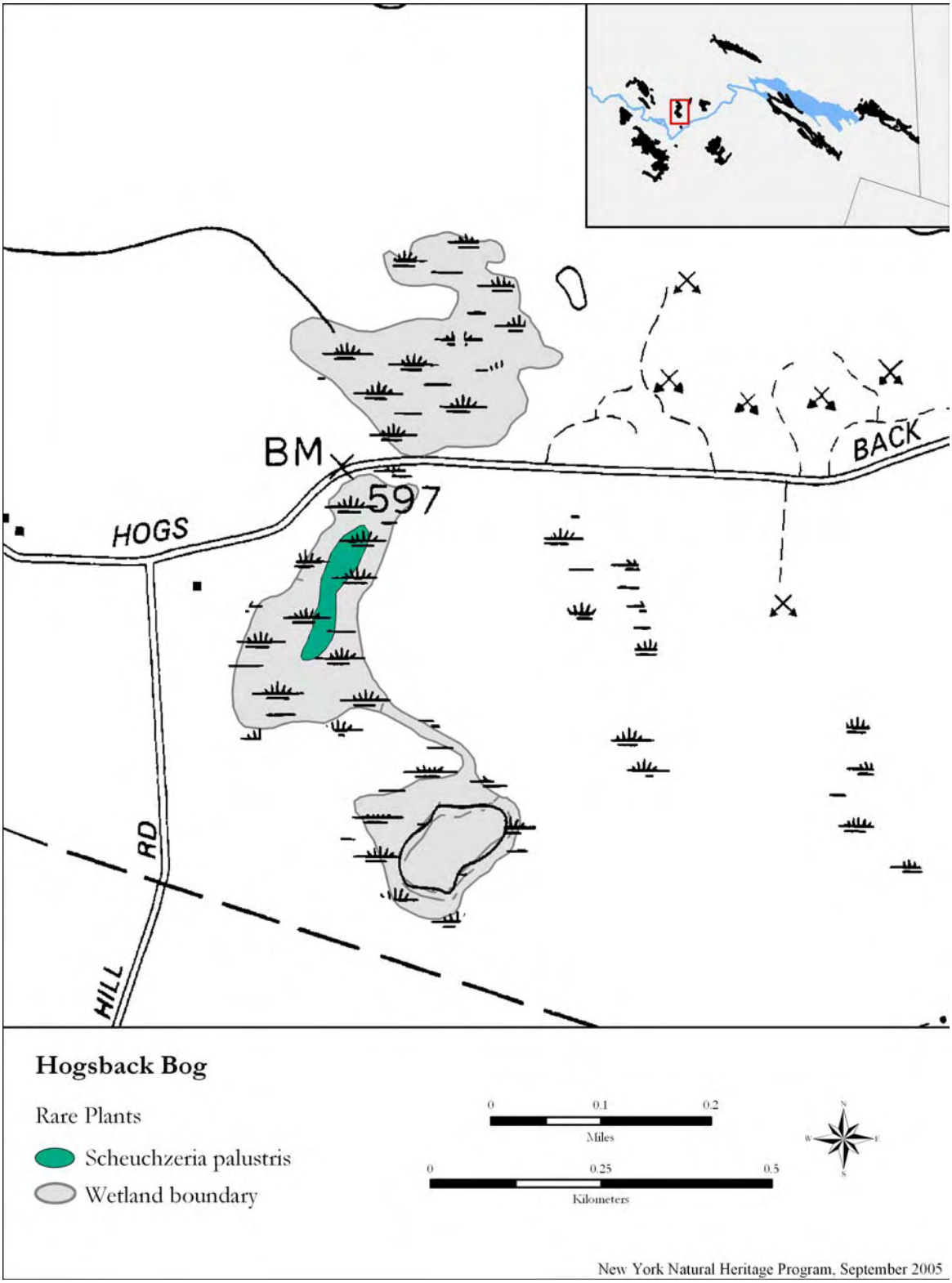

Figure 8. Rare plants in Hogsback Bog