

Ecological Communities of New York State

by

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Deep emergent marsh in the foreground and red maple-hardwood swamp in the background, at Lake Alice Wildlife Management Area, Clinton County.

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A spruce-northern hardwood forest bordering Jordan Lake, Kildare Forest, St. Lawrence County.

Back cover, bottom center:

An alvar grassland at Chaumont Barrens, Jefferson County.

Back cover, bottom right:

Calcareous pavement barrens near Three Mile Creek Road, Jefferson County.

All photographs by Carol Reschke.

INTRODUCTION

OBJECTIVES

The primary objective of this report is to classify and describe ecological communities representing the full array of biological diversity of New York State. An ecological community is a variable assemblage of interacting plant and animal populations that share a common environment. As part of the New York Natural Heritage Program inventory, this classification has been developed to help assess and protect the biological diversity of the state. The Natural Heritage Program inventory is a regularly updated database of information on rare animals, rare plants, and significant natural communities of New York State. This inventory also provides a ranking system for determining priorities for conservation and management of New York State's significant natural areas.

The Natural Heritage Program inventory uses a "coarse filter/fine filter" strategy to identify conservation priorities for protection of biological resources. Preservation of good examples of each of the natural communities in the state serves as a coarse filter that assures the protection of most of the species that make up the biological diversity of the state. The species that might not be protected in these representative communities, or the species that "fall through" this coarse filter because of their narrow or unusual habitat requirements, are rare species. Identifying and protecting viable populations of each of the rare species serves as the fine filter for "capturing" or protecting the state's biological diversity.

Developing and refining a classification of communities is an essential step in the Heritage inventory process. The inventory requires a classification of discrete community types because these types are used as mapping units, and because the types are assigned ranks that establish priorities for conducting the inventory. This classification represents the fifth revision of a draft classification that has been in use by the Natural Heritage Program since 1985.

APPLICATIONS

In addition to serving as the framework for the Natural Heritage Program inventory of significant natural communities in New York State, this community classification is designed to meet a variety of needs. The classification provides natural resource managers with a standard set of terms and concepts to describe wildlife habitats, and it also provides mapping units to use in plans for managing public and private natural areas such as forest preserves, wildlife management areas, parks, and nature preserves. The classification can be used to identify ecological communities for environmental

impact statements and other forms of environmental review. In combination with the Heritage ranking system, the classification can be used to establish priorities for land acquisition by public agencies and private conservation organizations. Programs for long-term monitoring of environmental change can use the classification to guide the selection of monitoring sites. The classification and community descriptions provide a general survey useful to students of the natural history of New York State.

COMMUNITY CONCEPTS

In this classification a community is defined as a variable assemblage of interacting plant and animal populations that share a common environment. Most communities occur repeatedly in the landscape. The plants and animals in a community occupy a habitat, often modifying the habitat. For example, the canopy trees in a hemlock-northern hardwood forest shade the ground and keep the forest floor cool and dark, a large deer population can modify the structure of a forest community by browsing the understory shrubs and saplings, and beavers can modify a stream corridor by damming the stream and flooding the surrounding habitats.

No two examples of a community are identical in composition or environment, however they are similar within a given range of variability. The range of variability of each community (or the percent similarity between different examples of a community) is not defined quantitatively in this classification. Some communities are narrowly defined. Different examples of a narrowly defined community, such as alpine krummholz, will be very similar. Other communities are more broadly defined, such as shrub swamp. The more broadly defined community types provide a catch-all category for communities that are quite variable.

Ecological communities form a complex mosaic in the landscape; they change through time, and they intergrade spatially and temporally. This classification is an attempt to establish a set of discrete categories into which units of the intergrading landscape mosaic can be sorted and organized. The classification is an artificial construct, and the community types are intended to be conceptually discrete, non-overlapping entities. For the purpose of organizing an inventory of ecological communities, artificial boundaries between communities have been drawn across the continuous ecological gradients that occur in the real landscape. For example, near the summits of the Adirondack Mountains there is a continuous change in communities along an elevation gradient. On many mountains

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at an elevation of 3000 feet there is a mountain fir forest, a forest dominated by balsam fir trees. At higher elevations the trees become stunted and deformed, and they form dense thickets; this community, at an elevation of 4000 feet, is alpine krummholz. On the summits of the highest peaks, at elevations above timberline (about 4900 feet), is an alpine meadow community. The change from mountain fir forest to alpine krummholz to alpine meadow is a gradual transition on the mountain slopes. In order to conduct an inventory and map occurrences, artificial boundaries between these communities are defined, with the recognition that in the landscape the transitions are often not so distinct.

Communities can be described at many scales, ranging from a fine scale "microcosm" (such as the plankton in a drop of pond water) to a large scale "biome" (such as the eastern deciduous forest). An important consideration in the development of this classification has been to distinguish communities at a scale that is appropriate for statewide inventory work, yet compatible with community classifications developed by other Heritage programs in the eastern U. S. To some extent the classification reflects the amount of information available to the Heritage Program. Therefore, communities that the Heritage Program has studied in detail (such as open uplands and open peatlands) may be divided more finely than communities we have studied only briefly (such as riverine and lacustrine communities).

ORGANIZATION

The classification is organized by "systems", and each system is composed of two to five "subsystems". Within each subsystem are many community types. System, subsystem, and community descriptions are included in the text. There are seven systems: marine, estuarine, riverine, lacustrine, palustrine, terrestrial, and subterranean. Marine and estuarine systems are divided into subtidal and intertidal subsystems. The palustrine system is divided into open mineral soil wetlands, forested mineral soil wetlands, open peatlands, and forested peatlands. The terrestrial system is divided into open uplands, barrens and woodlands, and forested

uplands. An additional subsystem, cultural, is included in each system. Definitions of the systems and subsystems are adapted from the *Heritage Operations Manual* (The Nature Conservancy 1982), the U.S. Fish and Wildlife Service wetland classification (Cowardin et al. 1979), and a U.S. Department of Agriculture ecological land classification (Driscoll et al. 1984).

The communities classified as cultural are created or maintained by human activities, or they are modified by human influence to such a degree that the physical conformation of the land or the biological composition of the resident community is significantly different from the character of the land or community prior to modern human influence. Most, if not all, "natural" communities are to some degree exposed to the influence of civilization in the form of acid rain deposition, air and groundwater pollution, logging, fire suppression and ignition, road construction, and so forth. There is a continuous gradient of human-influenced disturbances between "natural" and "cultural" communities. The decision to classify an intermediate community as cultural is based on its biological composition (such as presence of exotic species) and its lack of similarity to communities less disturbed by human activities. Rather than emphasizing land use in the classification of cultural communities, the intention is to emphasize biological composition and environmental features. The Heritage Program does very little field work on cultural communities, and occurrences are not mapped or documented in the Heritage database.

The communities in this classification are intended to include all the resident organisms, including everything from earthworms, bacteria, and fungi to shrubs and trees in a forest, or everything from plankton to fishes and aquatic macrophytes in aquatic systems. In each system, certain groups of organisms and environmental features are used as an index to habitat conditions. The primary group of organisms and the main environmental characteristics used to describe and distinguish communities within each system are listed below.

<u>System</u>	<u>Group of organisms</u>	<u>Environmental characteristics</u>
marine	fauna (fishes, invertebrates)	tidal regime, substrate
estuarine	vegetation	tidal regime, salinity, substrate
riverine	fauna (fishes)	watershed position, stream flow
lacustrine	fauna (fishes, invertebrates)	trophic state, stratification, morphometry, water chemistry
palustrine	vegetation	substrate, hydrologic regime
terrestrial	vegetation	substrate, disturbance regime
subterranean	fauna (bats, invertebrates)	hydrology, geological structure

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The communities in this classification are distinguished by physiognomy, composition of resident organisms, and ecological processes. The descriptions include dominant species (species with the greatest abundance or percent cover), codominant species (species with relatively high abundance or percent cover), and characteristic species (species that are commonly found in the community, although not necessarily abundant). The community descriptions are derived from a review of literature sources, species lists compiled from both qualitative and quantitative field surveys conducted by Heritage Program biologists, and in some cases, either from interviews with biologists studying communities or from reviewers' comments. The species lists are presented as a representative sample. An individual occurrence of a community may not include all the species listed in the description, and the description includes only a very small proportion of the all the species present in a community. Some descriptions also include a brief discussion of ecologically important environmental characteristics (geology, soils, hydrology) and disturbance patterns (e.g. flood regime, fire regime) that distinguish the community. For certain communities a more detailed description is provided than for other communities. In most cases, the communities with more detailed descriptions have been the focus of Heritage inventory work; in some cases these communities are not well-documented in the literature or are described from New York State for the first time. Comments in the descriptions about variability of communities and relationships between communities are qualitative observations; evaluation of these observations will require quantitative sampling and analysis.

Following each community description is a brief summary of the distribution of the community in New York State, and the state rank and estimated global rank currently assigned by the Heritage Program. The statewide distribution of each community is described in terms of "ecozones" or ecological zones of New York State as described by Dickinson (1979) and Will et al. (1979). A map of these ecozones is provided on the inside of the back cover. The ranks are based upon the estimated number of occurrences of each community type as well as the vulnerability of the community to human disturbance or destruction. An explanation of the Heritage ranks is provided in Appendix A. In addition to global and state ranks assigned to each community type, each occurrence of a community that is documented in the Heritage database is assigned an "element occurrence rank" (EO rank) that reflects the quality of the individual occurrence. These EO ranks range

from "A" for an outstanding or pristine example to "D" for a poor quality or degraded example. The Heritage Program documents as "significant" all occurrences of rare communities (with state ranks of S1 and S2) regardless of EO rank, and the highest quality occurrences (EO rank of "A") of more common communities (with state ranks S3, S4, and S5). For example, all known occurrences of alvar grassland (a rare community), and only the best occurrences, such as an old-growth forest, of beech-maple mesic forest (a common community) are documented as significant natural areas.

For many communities, examples are provided and sources of data are listed. Examples are selected from sites documented either in the Heritage database or in the listed sources. Each example is given as a site and county in which a good example of the community is present; a map of the counties of New York State is provided following the Index. A single site may include examples of several different communities. Sources are either literature cited in References, or unpublished data collected by the Natural Heritage Program (NHP) or the Significant Habitat Unit (both programs are housed in the N.Y.S. Department of Environmental Conservation's Bureau of Wildlife). These unpublished data sources are cited as either "NHP field surveys" or "Significant Habitat Unit files".

Community names simply provide a label for each community type; the names are not intended to identify all of the dominant or characteristic species, or all the significant environmental qualities. Number codes could be used instead of names, but codes are not as easy to remember nor as meaningful. In some cases the community name includes dominant species (such as black spruce-tamarack bog). Some names include physiographic provinces to which the community is more or less restricted (such as coastal plain pond shore). Some names include adjectives denoting floristic affinities of the characteristic species (such as alpine meadow or boreal heath barrens).

In a few cases the term "Appalachian" is used in this classification to refer to a community with floristic affinities to the so-called "Alleghenian floristic element" (Curtis 1959, Eaton and Schrot 1987), which refers to a group of species centered in the Cumberland and Great Smoky Mountains of the southern Appalachians. The term "Allegheny" is here reserved for the unglaciated portion of the Appalachian Plateau in Cattaraugus County in and around Allegheny State Park and the Allegheny River (note the two

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different spellings). This area is within the "Allegheny Hills" ecozone. The terms "Appalachian" and "Allegheny" are used by different authors to refer to the same geographic area. In this classification "Appalachian" is used in a broad sense to refer to the Appalachian highlands that extend from Quebec to Georgia. "Allegheny" is used in a narrow sense to refer to a specific portion of the Appalachian Plateau.

Plant nomenclature used in the community descriptions follows Mitchell (1986) for vascular plants; Andrus (1980) for *Sphagnum*, and Ketchledge (1980) for other mosses. Animal nomenclature follows C. L. Smith (1985) for fishes; American Ornithologist's Union (1983) for birds; Collins et al. (1982) for reptiles; Frost (1985) for amphibians; Honacki et al. (1982) for mammals; Miller and Brown (1981) for butterflies; and Hodges et al. (1983) for moths. Nomenclature for any other species in a community description is taken from one of the references listed under "Sources" for that community.

HOW TO USE THIS CLASSIFICATION

This classification is designed to be used by biologists to identify communities in the field. It can also be used to identify communities from written descriptions of a site, if enough information on composition and structure is provided in the description. The first step in identifying an unknown community is to determine the system and subsystem. A dichotomous key to systems and subsystems is provided in Appendix C, with instructions on how to use the key to determine system and subsystem. For an explanation of unfamiliar terms, a glossary is provided in Appendix B. Once the system and subsystem are known, then the descriptions in the appropriate section of the text can be reviewed. As a shortcut, you can review the communities listed in the Contents under the appropriate subsystem, and select a few communities that seem most closely related to the site you are trying to identify. The order of the communities in each subsystem reflects environmental and geographical gradients, so that similar

communities within a subsystem are usually grouped in the list. Finally, read the descriptions to determine which community type best fits the unknown community. In some cases a site will be equally similar to two different community types; these sites are best described as intermediate between the two most similar community types.

The classification can be used in combination with the Heritage ranking system to help make natural resource management decisions. As an example, consider the process of making decisions regarding wildlife management in a natural area. The interactions between wildlife and their habitat can have both positive and negative effects on communities. For example, beaver flooding may increase waterfowl habitat, while at the same time decreasing adjacent wetland or upland habitats for other species. Some types of rare peatlands are vulnerable to flooding by beavers. The costs and benefits of these kinds of modifications need to be weighed in making management decisions. The manager may wish to consider the rarity or significance of a community in the process of evaluating the effects of wildlife on an ecosystem.

This classification of ecological communities is flexible and open to future modifications. New communities can be added as they are discovered, and previously described or designated communities can be changed, divided, or combined as new information becomes available. This classification is our current working hypothesis; it will be refined as new data obtained from field surveys and literature review become available. The Heritage Program welcomes feedback from users of this classification; please send comments or data to the attention of the author at the following address:

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