

NATURAL LANDSCAPES OF MAINE:  
A CLASSIFICATION OF  
ECOSYSTEMS AND NATURAL COMMUNITIES

Provisional Edition  
April 1991

MAINE NATURAL HERITAGE PROGRAM

Office of Comprehensive Planning, DECD  
State House Station 130  
Augusta, Maine 04333  
207-289-6800

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## AUTHORS AND ACKNOWLEDGEMENTS

This classification of the natural communities of Maine is a revision by Susan C. Gawler (Maine Natural Heritage Program Ecologist) of previous classifications. No classification will ever be "right"; instead, classifications evolve with our understanding of the composition, and conservation, of natural communities. The most immediate predecessor to this classification was the Maine Ecosystem Classification of 1990 by Janet McMahon. A large part of that classification was derived from Heritage Program natural community classifications developed during the 1980s by Lissa Widoff and Tom Rawinski. A major improvement of the Maine Ecosystem Classification over previous attempts was its preliminary coverage of aquatic communities. The earlier classifications had included only communities which were dominated by vascular plants. McMahon's Ecosystem Classification thus built on earlier natural community classifications of Maine, but also incorporated the expertise of freshwater and marine biologists around the state. Carol Reschke's *Ecological Communities of New York State* and Liz Thompson's *Natural Communities of Vermont* (both available from those states' Natural Heritage Programs) were also particularly influential in the Maine Ecosystem Classification and in the present classification.

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## INTRODUCTION

This classification names and briefly describes the natural communities of Maine, and further describes how different communities occur together as larger-scale "ecosystems" over the Maine landscape. Its immediate purpose is to provide a framework by which the Maine Natural Heritage Program can identify and track natural communities as important components of the state's ecological diversity. The Maine Natural Heritage Program is a statewide inventory and data management system for rare plants, rare animals, and natural communities. Our primary objectives are to track the location and status for these features--the "Elements" of natural diversity, so that we can provide objective and current data for conservation planning, permit review, and land use planning by private and public agencies. The Program maintains "element" lists of natural communities, rare plants and rare animals.

**A natural community is defined here as an assemblage of interacting plants and animals and their common environment, recurring across the landscape, in which the effects of recent human intervention are minimal.** An oak-pine forest can be a natural community, as is a brackish tidal marsh. Natural communities are the "coarse filter" for capturing and protecting biological diversity; that is, protecting a community protects all of its component species-- even ones we may not know are there.

The concept of a community as used here differs from the definition found in most ecology textbooks. A "community", in the ecological sense, is usually described as a particular group of organisms which interact and share a common environment, but the physical environment is not part of the community itself. One can refer to a "plant community", a "bird community", a "soil fauna community", etc. A natural community, as defined by Natural Heritage Programs across the nation, includes all of the organisms (plant, animal, etc.) in a particular physical setting, as well as the physical setting itself. The physical characteristics and the biota unify the community and make it different from other communities. Natural communities are thus units that repeat across the landscape. Oak-pine forests on rocky hillsides in York County and in Androscoggin County should be recognizable as the same community type. Communities maintained by human activities (agricultural fields, lawns, roadsides, forest plantations, etc.) are not considered natural communities and hence are not included in this classification.

This classification has two major sections. Part I provides an overview by showing how natural communities are grouped into ecosystems; Part II lists and describes the natural communities themselves, and includes dichotomous keys to community identification.

The different levels-- communities and ecosystems-- incorporated into this classification acknowledge different levels of ecological complexity. Just as species are integrated into natural communities, so are communities aggregated into ecosystems, and ecosystems aggregated into landscapes. Most important, different conservation questions need to be viewed from different ecological scales. Understanding and tracking Maine's biological diversity, the major function of the Natural Heritage Program, involves following both individual species and closely associated groups of species (the natural community). On the other hand, conserving Maine's biological diversity often requires thinking on a larger scale, and conserving whole groups of communities, or ecosystems. We hope that including both ecosystem and community levels will make this classification useful to others working to understand and conserve Maine's biodiversity.

Since communities grade into each other in continuous variation, delimiting ecosystems involves drawing sometimes arbitrary "boundaries" around groups of communities. This classification adopts the convention (admittedly somewhat vague) that an ecosystem is a group of communities and their environment, occurring together over a particular portion of the landscape, and held together by some common physical or biotic feature. In the world of biology and ecology, "ecosystem" can actually have many different meanings. Ecosystems are defined at different scales, from "the ecosystem" of a rotting log in a forest to "the ecosystem" of the entire biosphere, depending on the context for the definition. Whatever the scale, an ecosystem includes

all of the biotic (living) components, the abiotic (non-living) components, and their interactions. Ecosystems can be described, with equal validity, either in terms of their processes or in terms of their constituents. The former regards an ecosystem as the flow of energy and nutrients into, through, and out of a system, with the biota and their habitat merely the conduits for that flow. The latter focuses on an ecosystem as an assemblage of species and their surroundings. Since the Maine Natural Heritage Program is primarily concerned with biological diversity, this approach is the more appropriate here.

No classification can provide a true representation of natural diversity. Plants, animals, and their habitats form a continuum across the landscape, and different natural communities often grade into each other. As you hike up a hillside, the beeches, birches and maples at lower elevations are gradually replaced by spruces and firs; you don't really step from a pure beech-birch-maple forest into a pure spruce-fir forest. Classifications of natural communities reflect our need to "pigeonhole" nature into units we can describe and begin to understand. This classification is constructed to serve a particular purpose: to help the Natural Heritage Program identify areas that are unusual either because they support an unusual assemblage of flora and fauna, or because they support a particularly good example of a more common community. The classification is designed to have ancillary uses as well: for land use planning at the local level; to natural resource managers in identifying and describing important habitats on managed lands; to conservation organizations in setting priorities for land protection; in identifying important habitats during the environmental review process; and as a general community survey for those interested in the natural history of Maine.

Natural communities are not equally common. Northern Hardwood Forests, for example, are found throughout most of the state, sometimes covering large areas. Pitch Pine - Scrub Oak Barrens, by contrast, occur in only a handful of locations in southern Maine, hence this community type is considered very rare in Maine. To reflect this varying abundance, this classification assigns an element rank to each natural community. Element ranks range from S1 (the rarest) to S5 (the most common), and also include categories such as "extirpated" or "uncertain status". (These same element ranks are applied to the plant species and animal species the Program tracks.) Element ranks are explained more fully in Appendix A. The Natural Heritage Program tracks the status of natural communities which it considers "rare": that is, examples of a community ranked S1, S2, or S3 or outstanding examples of more common communities. The Maine Natural Heritage Program is always interested in reports of rare natural communities.

The Natural Community Classification is dynamic, and intended to be periodically updated. Our understanding of associations of plants and animals shifts as we learn more about Maine's flora and fauna. We lack good descriptions of many communities. The coverage of aquatic communities (or any communities not dominated by vascular plants) is particularly sketchy. Also, as inventory work continues, our understanding of the relative rarity of the different community types may change. The Heritage Program welcomes information from field biologists and ecologists regarding natural communities. Please contact us (see address and phone on cover) if you:

- would like to report a rare natural community (including those ranked S1-S3 and outstanding examples of other community types),
- have information to improve our description or rank of particular community types, or
- would like the most recent update of the list and ranks of natural communities.

PART I

ECOSYSTEMS OF MAINE

## PART I ECOSYSTEMS OF MAINE

Natural diversity operates at many different scales. Natural communities are an intermediate-level scale. Ecosystems, as used here, are a larger-scale unit of natural diversity composed of different natural communities.

The 32 ecosystems are listed and then described starting on the following page. The ecosystem ranks accompanying the list are the standard Heritage Program ranks: "S1" is the rarest, "S5" the most common, "SU" is status unknown. (Ranks are explained more fully in Appendix A.) Ecosystems with similar settings (e.g. upland forests, peatlands) are grouped together. Each ecosystem description is followed by a list of the natural communities that may comprise the ecosystem. (Descriptions of those communities are found in Part II.) Note that any particular example of the ecosystem type will not necessarily contain all of the listed constituent communities. Also note that a particular community can occur in more than one ecosystem: for example, the Dwarf Shrub Bog Community will occur in most peatland ecosystems.

The code following each community name keys to the community descriptions; the letter indicates the major system of the community (Terrestrial, Palustrine, Lacustrine, Riverine, Estuarine, Marine, Subterranean). The "T-3" following Maritime Spruce-Fir Forest Community, for example, indicates that it will be found as #3 in the listing of Terrestrial communities.

This ecosystem classification, being a first attempt, can be expected to change as we learn more about exactly how communities are aggregated into ecosystems at the landscape level. If you identify a community in an ecosystem for which it's not listed, assume that the classification, not your identification, is in error-- and please let us know.

## LIST OF ECOSYSTEM TYPES

| #     | rank | name                                              |
|-------|------|---------------------------------------------------|
| ===== |      |                                                   |
| 1     | S4   | Maritime Forest Ecosystem                         |
| 2     | S5   | Spruce - Fir- Northern Hardwoods Forest Ecosystem |
| 3     | S4   | White Pine - Mixed Hardwoods Forest Ecosystem     |
| 4     | S3   | Oak - Hickory Forest Ecosystem                    |
| 5     | S4   | Basin Swamp Ecosystem                             |
| 6     | S1   | Pine Barrens Ecosystem                            |
| 7     | S2   | Alpine Ecosystem                                  |
| 8     | S4   | Rock Outcrop Ecosystem                            |
| 9     | S4   | Unpatterned Fen Ecosystem                         |
| 10    | S3   | Patterned (Ribbed) Fen Ecosystem                  |
| 11    | S3   | Coastal Plateau Bog Ecosystem                     |
| 12    | S4   | Domed Bog Ecosystem                               |
| 13    | S4   | Level Bog Ecosystem                               |
| 14    | S3   | Eccentric Bog Ecosystem                           |
| 15    | S4   | Kettlehole Bog-Pond Ecosystem                     |
| 16    | S5   | Lakeshore Ecosystem                               |
| 17    | SU   | Monomictic Oligotrophic Lake Ecosystem            |
| 18    | SU   | Dimictic Oligotrophic Lake Ecosystem              |
| 19    | SU   | Monomictic Mesotrophic Lake Ecosystem             |
| 20    | SU   | Dimictic Mesotrophic Lake Ecosystem               |
| 21    | S1   | Meromictic Lake Ecosystem                         |
| 22    | SU   | Eutrophic Pond Ecosystem                          |
| 23    | S1   | Alkaline Pond Ecosystem                           |
| 24    | SU   | Stream Ecosystem                                  |
| 25    | S4   | Streamshore Ecosystem                             |
| 26    | SU   | Main Channel River Ecosystem                      |
| 27    | SU   | Rivershore Ecosystem                              |
| 28    | S3   | Intertidal River Ecosystem                        |
| 29    | S3   | Coastal Dune-Marsh Ecosystem                      |
| 30    | S4   | Coastal Headland Ecosystem                        |
| 31    | SU   | Marine Intertidal Ecosystem                       |
| 32    | SU   | Marine Subtidal Ecosystem                         |
| ===== |      |                                                   |

## **ECOSYSTEM DESCRIPTIONS**

**ECOSYSTEMS #1 - #5** are forested ecosystems, excluding forested peatlands. Forests are defined as areas where the tree canopy covers at least 60%. The forest ecosystems here are defined by macroclimate and the dominant types of trees. Maine's diversity of forest types stems from its position in the transition zone between the Eastern Deciduous Forest to our south and the Boreal Forest to our north. With at least 90% of its land tree-covered, Maine's history and economy are largely based on its forests. Ecosystems #1 - #4, as defined, are dominated by terrestrial communities, although they may include palustrine communities (seepage forests or vernal pools, for example) or riverine communities (intermittent streams, for example). Ecosystem #5, Basin Swamp, is an ecosystem of wetland communities.

### **1. MARITIME FOREST ECOSYSTEM**

This ecosystem is the narrow belt of coniferous forest along the immediate coastline. The salt spray, frequent fogs, and temperature influence of the ocean make the maritime forests distinct from those only a few miles inland. Soils are generally thin, and trees often wind-flagged due to exposure. Where bedrock is at the surface, the typical spruce-fir forest may be replaced by a pine woodland.

**MARITIME SPRUCE-FIR FOREST COMMUNITY (T-3)**

**PITCH PINE WOODLAND COMMUNITY (T-19)**

**JACK PINE WOODLAND COMMUNITY (T-20)**

**EARLY SUCCESSIONAL FOREST COMMUNITY (T-9)**

### **2. SPRUCE - FIR - NORTHERN HARDWOODS FOREST ECOSYSTEM**

This forest ecosystem can be found over most of the northern half of the state, and is often referred to by foresters as the "Spruce - Fir - Northern Hardwoods" zone. Red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) are the most widespread conifers. Conifer-dominated and hardwood-dominated forests intergrade with one another: conifers are typically found in the lowlands or at the highest elevations, while northern hardwood forests are found at mid-elevation hillsides or along mid-elevation ridgelines. This ecosystem is almost entirely limited to terrestrial communities, although it may include vernal pools and intermittent streams.

**NORTHERN HARDWOOD FOREST COMMUNITY (T-12)**

**COVE FOREST COMMUNITY (T-11)**

**PINE - HEMLOCK/SPRUCE FOREST COMMUNITY (T-1)**

HEMLOCK SLOPE COMMUNITY (T-2)  
SPRUCE-FIR FLATS COMMUNITY (T-4)  
SPRUCE SLOPE FOREST COMMUNITY (T-5)  
SUBALPINE SPRUCE-FIR FOREST COMMUNITY (T-6)  
MIXED HARDWOOD-CONIFER FOREST COMMUNITY (T-8)  
COLD AIR TALUS WOODLAND COMMUNITY (T-13)  
OUTWASH SEEPAGE FOREST COMMUNITY (P-22)  
JACK PINE WOODLAND COMMUNITY (T-20)  
RED PINE WOODLAND COMMUNITY (T-18)  
SPRUCE WOODLAND COMMUNITY (T-17)  
NORTHERN WHITE CEDAR SEEPAGE FOREST COMMUNITY (P-21)  
EARLY SUCCESSIONAL FOREST COMMUNITY (T-9)  
VERNAL POOL COMMUNITY (P-27)  
INTERMITTENT STREAM COMMUNITY (R-1)

### **3. WHITE PINE - MIXED HARDWOODS FOREST ECOSYSTEM**

This ecosystem lies between the deciduous-dominated forests of southern Maine and the spruce-fir or northern hardwoods forests of northern Maine, a belt often referred to as "Transitional Forest". It is characterized by *Pinus strobus* and *Tsuga canadensis* as the most widespread conifers; important hardwood species include *Quercus rubra*, *Fagus grandifolia*, and *Acer saccharum*. This ecosystem is almost entirely limited to terrestrial communities, although it may include vernal pools and intermittent streams.

MIXED HARDWOOD-CONIFER FOREST COMMUNITY (T-8)  
PINE - HEMLOCK/SPRUCE FOREST COMMUNITY (T-1)  
HEMLOCK SLOPE COMMUNITY (T-2)  
OAK-PINE FOREST COMMUNITY (T-7)

**PITCH PINE WOODLAND COMMUNITY (T-19)**

**RED PINE WOODLAND COMMUNITY (T-18)**

**OUTWASH SEEPAGE FOREST COMMUNITY (P-22)**

**EARLY SUCCESSIONAL FOREST COMMUNITY (T-9)**

**VERNAL POOL COMMUNITY (P-27)**

**INTERMITTENT STREAM COMMUNITY (R-1)**

**CAVE COMMUNITY (S-1)**

#### **4. OAK - HICKORY FOREST ECOSYSTEM**

Forested areas in extreme southern Maine (York County), an area also known as the "Central Hardwoods - Hemlock - White Pine zone". These forests are typified by so-called "central hardwoods" (*Quercus velutina*, *Quercus alba*, *Carya ovata*, *Carya cordiformis*) and associated species, species common to our south but with a restricted distribution in Maine. The particular community(ies) in any area will depend upon microclimate, aspect, slope position, soil type, etc. More exposed habitats may have woodlands dominated by oaks mixed with other species; more protected habitats will have continuous forest cover. This ecosystem is almost entirely limited to terrestrial communities, although it may include vernal pools and intermittent streams.

**OAK-PINE WOODLAND COMMUNITY (T-16)**

**OAK-PINE FOREST COMMUNITY (T-7)**

**OAK-HICKORY FOREST COMMUNITY (T-10)**

**OUTWASH SEEPAGE FOREST COMMUNITY (P-22)**

**EARLY SUCCESSIONAL FOREST COMMUNITY (T-9)**

**COASTAL PLAIN POCKET SWAMP COMMUNITY (P-2)**

**VERNAL POOL COMMUNITY (P-27)**

**INTERMITTENT STREAM COMMUNITY (R-1)**

**CAVE COMMUNITY (S-1)**

## **5. BASIN SWAMP ECOSYSTEM**

Topographic basins with only a small to mid-sized stream as an outlet, mostly to entirely forested, and with minimal peat accumulation. (Swamps that occur immediately associated with a lake or larger stream are included under lakeshore and streamshore ecosystems; forested basins with closed drainage and peat accumulation are included under "level bog".) First-order or second-order streams may drain the swamp. Soils are hydric and usually saturated. Pockets without trees (shrub swamp or short graminoid marsh) may occur within the basin swamp. Which communities predominate in any particular basin will depend on geographic location, substrate pH, and probably other factors.

**RED MAPLE SWAMP COMMUNITY (P-4)**

**COASTAL PLAIN POCKET SWAMP COMMUNITY (P-2)**

**SPRUCE - FIR SWAMP COMMUNITY (P-7)**

**NORTHERN WHITE CEDAR SEEPAGE FOREST COMMUNITY (P-21)**

**ATLANTIC WHITE CEDAR SWAMP COMMUNITY (P-5)**

**NORTHERN WHITE CEDAR SWAMP COMMUNITY (P-6)**

**CATTAIL MARSH COMMUNITY (P-18)**

**SHRUB SWAMP COMMUNITY (P-17)**

**SEDGE MEADOW COMMUNITY (P-19)**

**ECOSYSTEMS #6 - #8** include upland areas where tree cover is sparse or absent. Most communities in these ecosystems are terrestrial, but the ecosystems may include small pockets of palustrine communities.

#### **6. PINE BARRENS ECOSYSTEM**

Sandy outwash areas (deltas, moraines, eskers), with nutrient-poor, excessively well drained soils, flat to undulating topography, and a patchy canopy dominated by pine (generally a single species, either pitch pine, jack pine, or red pine). Historically, at least, pine barrens burned frequently due to the dry conditions and flammability of the vegetation; species able to withstand fire or regenerate quickly after a fire (as well as being tolerant of low nutrient conditions and dry soil) are therefore typical. More recently, many barrens have been maintained in an early successional stage (represented below by the sandplain grassland community) through biennial burning for blueberry production. The actual vegetation of a pine barren depend on how recently or frequently it was burned. Many pine barrens have a layer of heath shrubs (< 0.5 m tall) below the canopy, with occasional grassy openings among the shrubs. The overstory dominant of Maine pine barrens range from pitch pine in the southwestern Maine barrens, to red or white pine in the eastern Maine blueberry barrens.

**PITCH PINE - SCRUB OAK BARREN COMMUNITY (T-23)**

**PITCH PINE - HEATH BARREN COMMUNITY (T-24)**

**SANDPLAIN GRASSLAND COMMUNITY (T-38)**

**INLAND SAND BARREN COMMUNITY (T-36)**

**RED/WHITE PINE BARREN COMMUNITY (T-21)**

#### **7. ALPINE ECOSYSTEM**

Areas above treeline, where elevation and exposure create extremely harsh conditions; restricted in Maine to mountains above 3500' (although not all mountains above 3500' have alpine vegetation). Alpine ecosystems have low and often sparse vegetation due to the harsh environment. Certain tree species may be present, but grow only as krummholz, not erect.

**ALPINE RIDGE COMMUNITY (T-41)**

**SNOWBANK COMMUNITY (T-43)**

**ALPINE CLIFF COMMUNITY (T-42)**

**KRUMMHOLZ COMMUNITY (T-40)**

**ALPINE BOG-MEADOW COMMUNITY (P-10)**

**TARN COMMUNITY (L-1)**

**8. ROCK OUTCROP ECOSYSTEM**

Areas (not including alpine areas) where bedrock, with thin soil pockets in places, makes up the ground surface and vegetation is consequently sparse, with few if any trees. Vegetation is dominated by low shrubs and herbs which can tolerate the exposed, usually dry, and low nutrient conditions. Scattered trees (i.e., canopy cover totalling less than 30%) may be present, but will often be stunted or wind-flagged. Species composition will vary depending on the nature of the bedrock; the distinction made here is between circumneutral to calcareous rock and acidic rock. Rock outcrop ecosystems generally grade into woodlands (rocky areas with tree canopies of 30 - 60%) or forests (tree canopies covering > 60%).

**ACIDIC SUMMIT COMMUNITY (T-51)**

**SERPENTINE OUTCROP COMMUNITY (T-48)**

**ACIDIC CLIFF COMMUNITY (T-52)**

**ACIDIC TALUS COMMUNITY (T-15)**

**CIRCUMNEUTRAL SUMMIT COMMUNITY (T-49)**

**CIRCUMNEUTRAL CLIFF COMMUNITY (T-50)**

**CIRCUMNEUTRAL TALUS COMMUNITY (T-14)**

**CAVE COMMUNITY (S-1)**

**ECOSYSTEMS #9 - #15** are peatland ecosystems in closed or open basins. Peatlands also occur associated with lake or stream shores; these are included in the Lakeshore Ecosystem and Streamshore Ecosystem, respectively.

Different researchers have classified Maine peatlands in different ways: by basin morphology, by vegetation, by hydrology, or by a combination of those factors. No classification is "right" or "wrong"; their utility depends on their purpose. A classification developed to evaluate peatlands for mining potential would clearly use different criteria than one used to evaluate peatland biota or to elucidate developmental processes in peatlands. The classification used here, which includes both morphological and vegetational criteria, recognizes that peatland conservation should address both whole systems and individual associations as collections of species. Thus, while a kettlehole bog and a domed bog may have nearly identical species complements, they are very different landscape units. Peatland complexes containing more than one of the above ecosystems also exist. These are treated in this classification as a collection of ecosystem units.

## **9. UNPATTERNED FEN ECOSYSTEM**

Fens are peatlands in which groundwater or water from adjacent uplands moves through the area. As a result, plants are exposed to more nutrients, and the vegetation is typically different and more diverse than that of bogs. Peat is moderately- to well-decomposed and of variable thickness. The vegetation consists predominantly of sedges, grasses, reeds, and sphagnum. Bog communities, dominated by heath shrubs, may be present; but though fen and bog vegetation may co-occur, in a fen ecosystem the former is more extensive.

**ACIDIC FEN COMMUNITY (P-14)**

**CIRCUMNEUTRAL FEN COMMUNITY (P-15)**

**DWARF SHRUB BOG COMMUNITY (P-11)**

**MOSS LAWN BOG COMMUNITY (P-12)**

**FORESTED BOG COMMUNITY (P-8)**

**PEATLAND LAGG COMMUNITY (P-9)**

**ATLANTIC WHITE CEDAR SWAMP COMMUNITY (P-5)**

**NORTHERN WHITE CEDAR SWAMP COMMUNITY (P-6)**

**PEATLAND OUTLET STREAM COMMUNITY (R-2)**

## **10. PATTERNED (RIBBED) FEN ECOSYSTEM**

Patterned fens are floristically similar to unpatterned fens, but are typically found on gentle slopes and feature low, parallel to anastomosing, peat ridges (strings) alternating with wet hollows or shallow pools (flarks). The strings and flarks are oriented across the major slope of the peatland and at right angles to the direction of water movement. Groundwater chemistry will determine whether acidic fen communities or circumneutral fen communities

predominate. The ribbing may occupy only a portion of the peatland area; other portions may support dwarf shrub or forested bog vegetation. Ribbed fens are restricted to the northwestern portion of the state.

**ACIDIC FEN COMMUNITY (P-14)**

**CIRCUMNEUTRAL FEN COMMUNITY (P-15)**

**MOSS LAWN BOG COMMUNITY (P-12)**

**DWARF SHRUB BOG COMMUNITY (P-13)**

**FORESTED BOG COMMUNITY (P-8)**

**PEATLAND LAGG COMMUNITY (P-9)**

**NORTHERN WHITE CEDAR SWAMP COMMUNITY (P-6)**

**PEATLAND OUTLET STREAM COMMUNITY (R-2)**

#### **11. COASTAL PLATEAU BOG ECOSYSTEM**

Peatlands in east coastal Maine in which the surface is raised above the surrounding terrain, with the bog perimeter sloping sharply to mineral soil. The raised surface is flat or undulating, generally with few to no trees, and usually features extensive lawns of *Scirpus cespitosus*. *Empetrum nigrum* and *Rubus chamaemorus* are also characteristic. Some coastal plateau bogs support the rare crowberry blue butterfly (*Lycaeides argyrognomon empetri*).

**PLATEAU BOG LAWN COMMUNITY (P-13)**

**DWARF SHRUB BOG COMMUNITY (P-11)**

**MOSS LAWN BOG COMMUNITY (P-12)**

**PEATLAND LAGG COMMUNITY (P-9)**

#### **12. DOMED BOG ECOSYSTEM**

Also called raised bogs, these are large inland peatlands, usually more than 500 m in diameter, with convex surfaces that rise several meters above the surrounding terrain. At least in the center, peat accumulation is sufficient to maintain a perched water table. Consequently, most water available for plant growth comes from precipitation and is nutrient poor. Most domed bogs show a vegetation zonation reflecting the nutrient gradient, where more nutrient-demanding (minerotrophic) vegetation occurs around the perimeter of the peatland (where water from surrounding uplands or draining from the center of the peatland

flows) and low-nutrient vegetation occupies the raised portions of the bog. The peatland surface is characterized by hummocks and hollows. Patterned domed bogs have small, usually crescent-shaped pools near the highest point; unpatterned domed bogs lack pools.

**ACIDIC FEN COMMUNITY (P-14)**

**CIRCUMNEUTRAL FEN COMMUNITY (P-15)**

**DWARF SHRUB BOG COMMUNITY (P-11)**

**MOSS LAWN BOG COMMUNITY (P-12)**

**FORESTED BOG COMMUNITY (P-8)**

**PEATLAND LAGG COMMUNITY (P-9)**

**NORTHERN WHITE CEDAR SWAMP COMMUNITY (P-6)**

**PEATLAND OUTLET STREAM COMMUNITY (R-2)**

**BOG POND COMMUNITY (L-3)**

### **13. LEVEL BOG ECOSYSTEM**

Flat peatlands in basins with mostly closed drainage, receiving water from precipitation and runoff from the immediate surroundings. Some level bogs are somewhat raised (though not domed), in which case vegetation is almost entirely ombrotrophic (dwarf shrub heath or forested bog). Other level bogs are not at all raised; in this case, vegetation is transitional (in nutrient status) between that of ombrotrophic bogs and minerotrophic fens. In all cases, *Sphagnum* dominates the ground surface and is the main peat constituent. The surface of the bog is flat and featureless. These bogs are often treed with *Picea mariana* and *Larix laricina*; coniferous swamp may form the margin. This ecosystem differs from a Basin Swamp Ecosystem in the accumulation of peat.

**ACIDIC FEN COMMUNITY (P-14)**

**DWARF SHRUB BOG COMMUNITY (P-11)**

**FORESTED BOG COMMUNITY (P-8)**

**PEATLAND LAGG COMMUNITY (P-9)**

**ATLANTIC WHITE CEDAR SWAMP COMMUNITY (P-5)**

**NORTHERN WHITE CEDAR SWAMP COMMUNITY (P-6)**

**SPRUCE - FIR SWAMP COMMUNITY (P-7)**

**BOG POND COMMUNITY (L-3)**

**14. ECCENTRIC BOG ECOSYSTEM**

Gently sloping raised bogs on the sides of shallow valleys. The slope of the bog is patterned, with ridges of dwarf shrub bog (sometimes semi-forested) alternating with troughs containing bog pools and/or moss lawns. Ridges and troughs run perpendicular to the direction of water flow. The upslope end is typically dryish (for a bog) and dominated by ombrotrophic vegetation; moisture and mineral availability increase downslope, and consequently the lowest areas have fen vegetation. In Maine, eccentric bogs appear to be restricted to the east central region, roughly from Lincoln north to Ashland and east to the Canadian border.

**ACIDIC FEN COMMUNITY (P-14)**

**CIRCUMNEUTRAL FEN COMMUNITY (P-15)**

**DWARF SHRUB BOG COMMUNITY (P-11)**

**FORESTED BOG COMMUNITY (P-8)**

**PEATLAND LAGG COMMUNITY (P-9)**

**BOG POND COMMUNITY (L-3)**

**15. KETTLEHOLE BOG-POND ECOSYSTEM**

Kettlehole bogs are flat peatlands in "kettles" (circular or elliptical depressions, usually deeper than they are wide, formed in morainal, glaciofluvial, or coastal plain deposits by the melting of buried ice blocks). The centers of these bowl-shaped basins may be a floating peatland mat or open water ringed by peatland. Where the surface of the floating mat is sufficiently elevated (by peat accumulation) to be free from contact with the mineral-enriched pond water, vegetation typical of nutrient-poor conditions develops. In the southernmost part of the state, kettlehole vegetation may include species of more southern affinity such as *Chamaecyparis thyoides*, *Clethra alnifolia*, and *Peltandra virginica*.

**FLOATING KETTLEHOLE BOG COMMUNITY (P-10)**

**DWARF SHRUB BOG COMMUNITY (P-11)**

**FORESTED BOG COMMUNITY (P-8)**

**PEATLAND LAGG COMMUNITY (P-9)**

**BOG POND COMMUNITY (L-3)**

**ECOSYSTEMS #16 - #23** include lakes, ponds, and their shores. Lake and pond ecosystems in this classification are limited to lacustrine communities. Shores are treated as a separate ecosystem, which includes both terrestrial and palustrine communities.

Littoral communities are classified primarily by two factors: by "turnover" (i.e., how often the water mixes top to bottom), and by nutrient status. Monomictic lakes turn over once a year; dimictic lakes, twice. Oligotrophic lakes have few nutrients available in the water; mesotrophic lakes have a moderate amount; and eutrophic ponds (there are no natural eutrophic lakes in Maine) have a heavy nutrient load. More detailed descriptions of these lake types can be found in the community descriptions.

## **16. LAKESHORE ECOSYSTEM**

The lakeshore ecosystem is the group of communities surrounding and directly influenced by the open-water portion of a lake or pond. It includes palustrine communities such as lakeside marshes and fens, as well as terrestrial communities (such as lakeshore cobble beaches) where the soils are not saturated over most of the growing season but which are disturbed by ice-scour, flooding, or waves. It does not include areas with non-persistent emergent vegetation (pickerelweed, etc.) growing in shallow water: such areas are considered lacustrine. Terrestrial forests bordering lakes are included under forested upland ecosystems.

**ACIDIC SHORELINE SHRUB THICKET COMMUNITY (T-29)**

**ACIDIC SHORELINE OUTCROP COMMUNITY (T-25)**

**CIRCUMNEUTRAL SHORELINE OUTCROP COMMUNITY (T-26)**

**LAKESHORE COBBLE BEACH COMMUNITY (T-33)**

**LAKESHORE SAND BEACH COMMUNITY (T-32)**

**OUTWASH PLAIN POND SHORE COMMUNITY (P-24)**

**ALLUVIAL TALL MEADOW COMMUNITY (T-27)**

**SHRUB SWAMP COMMUNITY (P-17)**

**SEDGE MEADOW COMMUNITY (P-19)**

**GRAMINOID SWALE COMMUNITY (P-20)**

**CATTAIL MARSH COMMUNITY (P-18)**

**ACIDIC FEN COMMUNITY (P-14)**

**CIRCUMNEUTRAL FEN COMMUNITY (P-15)**

**17. MONOMICTIC OLIGOTROPHIC LAKE ECOSYSTEM**

Low-productivity lakes which turn over only once a year, and typically are shallow.

**MONOMICTIC OLIGOTROPHIC LAKE COMMUNITY (L-5)**

**RUSH BED COMMUNITY (L-10)**

**LACUSTRINE EMERGENT COMMUNITY (L-11)**

**LACUSTRINE SHALLOW BOTTOM COMMUNITY (L-12)**

**18. DIMICTIC OLIGOTROPHIC LAKE ECOSYSTEM**

Low-productivity lakes which turn over twice a year, typically deeper than monomictic lakes.

**DIMICTIC OLIGOTROPHIC LAKE COMMUNITY (L-8)**

**RUSH BED COMMUNITY (L-10)**

**LACUSTRINE EMERGENT COMMUNITY (L-11)**

**LACUSTRINE SHALLOW BOTTOM COMMUNITY (L-12)**

**19. MONOMICTIC MESOTROPHIC LAKE ECOSYSTEM**

Moderate productivity, somewhat shallow lakes which turn over only once a year.

**MONOMICTIC MESOTROPHIC LAKE COMMUNITY (L-6)**

**RUSH BED COMMUNITY (L-10)**

**LACUSTRINE EMERGENT COMMUNITY (L-11)**

**LACUSTRINE SHALLOW BOTTOM COMMUNITY (L-12)**

**20. DIMICTIC MESOTROPHIC LAKE ECOSYSTEM**

Moderate productivity, fairly deep lakes which turn over twice a year.

**DIMICTIC MESOTROPHIC LAKE COMMUNITY (L-9)**

**RUSH BED COMMUNITY (L-10)**

**LACUSTRINE EMERGENT COMMUNITY (L-11)**

**LACUSTRINE SHALLOW BOTTOM COMMUNITY (L-12)**

**21. MEROMICTIC LAKE ECOSYSTEM**

Small, deep, permanently stratified lakes.

**MEROMICTIC LAKE COMMUNITY (L-7)**

**22. EUTROPHIC POND ECOSYSTEM**

Shallow, nutrient-rich ponds with abundant aquatic plants and algae.

**EUTROPHIC POND COMMUNITY (L-2)**

**LACUSTRINE EMERGENT COMMUNITY (L-11)**

**23. ALKALINE POND ECOSYSTEM**

Hardwater ponds of the limestone belt in eastern Aroostook County.

**ALKALINE POND COMMUNITY (L-4)**

**ECOSYSTEMS #24 - #27** include rivers, streams, and their shores. Stream and river ecosystems in this classification are limited to riverine communities. Shores are treated as separate ecosystems, which includes both terrestrial and palustrine communities.

#### **24. STREAM ECOSYSTEM**

Open-water portions of first through fourth order streams.

**ROCKY HEADWATER STREAM COMMUNITY (R-3)**

**MARSH HEADWATER STREAM COMMUNITY (R-5)**

**MIDREACH STREAM COMMUNITY (R-4)**

**DEADWATER COMMUNITY (R-6)**

#### **25. STREAMSHORE ECOSYSTEM**

The streamshore ecosystem is the group of communities bordering and directly influenced by the open-water portion of a stream (first through fourth order). Most communities are palustrine; streams are generally too small to exert much of an effect (through disturbance) on adjacent terrestrial areas. Terrestrial forests bordering streams are included under forested upland ecosystems.

**ACIDIC SHORELINE SHRUB THICKET COMMUNITY (T-29)**

**HARDWOOD FLOODPLAIN FOREST COMMUNITY (P-1)**

**BLACK WILLOW - ALDER SWAMP COMMUNITY (P-3)**

**BEAVER FLOWAGE COMMUNITY (P-16)**

**SHRUB SWAMP COMMUNITY (P-17)**

**SEDGE MEADOW COMMUNITY (P-19)**

**GRAMINOID SWALE COMMUNITY (P-20)**

**CATTAIL MARSH COMMUNITY (P-18)**

**RIVERINE EMERGENT COMMUNITY (R-9)**

**ACIDIC FEN COMMUNITY (P-14)**

**CIRCUMNEUTRAL FEN COMMUNITY (P-15)**

## **26. MAIN CHANNEL RIVER ECOSYSTEM**

Large, mostly quiet, open-water sections of rivers, fifth order or higher. Main channel rivers may have meanders and alternating areas of erosion and deposition, depending on the channel morphology. Riffles may be present, but are usually separated by stretches of flatwater. We need more data on the relationships between river biota and substrate, gradient, and insolation.

**MAIN CHANNEL RIVER COMMUNITY (R-7)**

**BACKWATER SLOUGH COMMUNITY (R-8)**

## **27. RIVERSHORE ECOSYSTEM**

The rivershore ecosystem is the group of communities bordering and directly influenced by the open-water portion of river (as defined above). It includes palustrine communities such as riverside seeps or floodplain forests, as well as terrestrial communities (such as the river beach community) where the soils are not saturated over most of the growing season but which are disturbed by ice-scour or flooding. Terrestrial forests bordering rivers are included under forested upland ecosystems.

**ALLUVIAL TALL MEADOW COMMUNITY (T-27)**

**ACIDIC SHORELINE OUTCROP COMMUNITY (T-25)**

**CIRCUMNEUTRAL SHORELINE OUTCROP COMMUNITY (T-26)**

**RIVER BEACH COMMUNITY (T-31)**

**RIVERSIDE SEEP COMMUNITY (P-23)**

**ACIDIC SHORELINE SHRUB THICKET COMMUNITY (T-29)**

**CIRCUMNEUTRAL SHORELINE SHRUB THICKET COMMUNITY (T-28)**

**HIGH-ENERGY RIVERBANK COMMUNITY (T-30)**

**GRAMINOID SWALE COMMUNITY (P-20)**

**HARDWOOD FLOODPLAIN FOREST COMMUNITY (P-1)**

**ECOSYSTEMS #28 - #32** include all areas immediately associated with tidal waters, i.e., estuaries and coastal shores. Consequently, most communities within these ecosystems are estuarine or marine communities.

#### **28. INTERTIDAL RIVER ECOSYSTEM**

Intertidal portions of rivershores, from the head of tide to the mouth of the river. Salinity can vary greatly depending on season, weather, and other factors, but generally increases downriver, with portions near the head of tide almost completely freshwater. Saltmarshes are restricted to the higher salinity areas.

**FRESHWATER TIDAL MARSH COMMUNITY (E-6)**

**BRACKISH TIDAL MARSH COMMUNITY (E-7)**

**SALT HAY SALTMARSH COMMUNITY (E-4)**

**CORDGRASS SALTMARSH COMMUNITY (E-3)**

**SUBTIDAL ESTUARY COMMUNITY (E-5)**

#### **29. COASTAL DUNE-MARSH ECOSYSTEM**

Low-lying coastal areas with sand beaches, dunes, and (in places) saltmarshes behind the dunes. This ecosystem is bounded landward by terrestrial ecosystems (either forests or cultural ecosystems) and oceanward by the high tide line of the open shore. Coastal dune-marsh ecosystems are most common along the southwestern coast; they become uncommon east of Penobscot Bay.

**SAND DUNE COMMUNITY (T-35)**

**BEACH STRAND COMMUNITY (T-34)**

**COASTAL PLAIN POCKET SWAMP COMMUNITY (P-2)**

**PITCH PINE DUNE SEMI-FOREST COMMUNITY (T-22)**

**SALT HAY SALTMARSH COMMUNITY (E-4)**

**TIDAL CREEK COMMUNITY (E-2)**

**BRACKISH POND COMMUNITY (E-1)**

### **30. COASTAL HEADLAND ECOSYSTEM**

Moderate- to high-relief coastlines of bedrock or consolidated marine sediments. This ecosystem is bounded landward by upland forest (or cultural ecosystems) and seaward by the high tide line. It includes communities which are directly affected by the proximity of the ocean through salt spray and storm tides; these are characterized by low vegetation that can withstand wind, sun, and salt. Constituent communities and species vary geographically.

**MARITIME SHRUBLAND COMMUNITY (T-40)**

**OPEN HEADLAND COMMUNITY (T-41)**

**MARITIME SLOPE BOG COMMUNITY (P-11)**

**CORDGRASS SALTMARSH COMMUNITY (T-3)**

### **31. MARINE INTERTIDAL ECOSYSTEM**

Intertidal areas along the outer coastline (i.e., where the seawater is not appreciably diluted by freshwater). Vascular plants are generally absent. Macroscopic and microscopic algae are the primary producers; nutrients are also carried in the seawater. Biotic communities are broken down here by substrate; wave energy and other factors may also be important.

**SAND BEACH COMMUNITY (M-4)**

**GRAVEL-COBBLE BEACH COMMUNITY (M-5)**

**INTERTIDAL BEDROCK-BOULDER COMMUNITY (M-1)**

### **32. MARINE SUBTIDAL ECOSYSTEM**

Nearshore areas continuously covered by seawater. As with the intertidal areas, vascular plants are generally absent. Macroscopic algae may be locally abundant. The breakdown here is by substrate; other factors such as temperature, shoreline configuration, etc., may also be important. More information is needed on the species associated with these ecosystems.

**SALT POND COMMUNITY (M-6)**

**MUD BOTTOM COMMUNITY (M-7)**

**SAND BOTTOM COMMUNITY (M-8)**

**COBBLE BOTTOM COMMUNITY (M-9)**

**ROCK BOTTOM COMMUNITY (M-10)**

PART II

NATURAL COMMUNITIES OF MAINE

## PART II NATURAL COMMUNITIES OF MAINE

### HOW TO USE THE COMMUNITY CLASSIFICATION

Like most other natural community classifications, these natural communities are organized according to broad groupings, or "Systems". The seven Systems are: Terrestrial (uplands), Palustrine (wetlands), Lacustrine (lakes, not including the shores), Riverine (non-tidal rivers, not including the shores), Estuarine (tidal rivers and associated habitats), Marine (saltwater), and Subterranean. The "System" is a particular characteristic of a community, and is not related to the higher-level "ecosystem" groupings. For example, all Hemlock Slope Communities are Terrestrial communities, even though individual ones may occur in a Northern Hardwoods Forest Ecosystem or a White Pine - Mixed Hardwoods Forest Ecosystem.

This section begins with a listing of all the natural community types in this classification. Each community type is given an "Element Rank", reflecting its status in Maine: "S1" communities are the rarest, "S5" communities the most common. (See Appendix A for an explanation of the Natural Heritage Program's Element Ranking system, and Appendix B for a list of natural communities arranged by rank.) The code preceding each community name keys to the community descriptions; the letter indicates the major system of the community (Terrestrial, Palustrine, Lacustrine, Riverine, Estuarine, Marine, Subterranean). The "T-3" following Maritime Spruce-Fir Forest Community, for example, indicates that it will be found as #3 in the listing of Terrestrial communities.

Following the list of communities is the body of the classification. This is divided into seven sections, one for each of the major systems. Each section begins with a key to the constituent communities; the key is followed by descriptions of each community.

To identify an unknown community, first determine to which system the community belongs (see page 24 for system descriptions). Next, turn to the section for the appropriate system. Use the dichotomous key to determine the community types, and confirm your identification by checking the description. Most people will find it much easier to work through the key, and then refer to the descriptions, than to wade through all the descriptions looking for the right one. If you encounter ambiguities in the key, compare the descriptions of the possible communities to see which best fits your unknown. Bear in mind that some areas will be intermediate between two community types; also remember that many descriptions are as yet incomplete. (The Natural Heritage Program welcomes data on the structure and composition of natural communities regardless of whether or not you can pigeonhole them into this classification.)

The descriptions list dominant or characteristic plants or animals found within each community type, or physical features that define the community type. Species considered rare in Maine are indicated with an asterisk. (Along with rare natural communities, we'd appreciate reports of any rare plant occurrences you find.) The descriptions are not complete species lists or detailed descriptions, and are intended merely to assist users of the classification in recognizing examples of each community type. More detailed information for most rare community types is available from the Heritage Program.

Scientific names follow J. T. Kartesz & R. Kartesz's *A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland* (University of North Carolina Press, Chapel Hill: 1980).

## Major Systems of Natural Communities

The natural communities of Maine are described in seven sections corresponding to the seven major systems of communities. (Note that **system** and **ecosystem**, as used in this classification, are completely independent terms. Ecosystem types can transcend the system boundaries.) The first step in identifying a community is determining to which **system** it belongs. When you've determined the system, turn to the appropriate section. Each section begins with a dichotomous key, followed by descriptions of each community. Definitions of the major systems are derived from the Natural Heritage Program's operations manual and the U.S. Fish and Wildlife Service's wetlands classification.

**p. 28 TERRESTRIAL SYSTEM (Uplands)**

Upland communities lacking perennial standing or flowing water, hydric soils or predominantly hydrophytic vegetation. If your feet are dry, you're probably in the terrestrial system.

**p. 42 PALUSTRINE SYSTEM (Wetlands)**

Non-tidal wetlands characterized by persistent emergent vegetation (i.e., remaining standing through the winter), predominantly hydrophytic species, and hydric soils. These include wetlands intermittently flooded but with hydric soils, permanently saturated by seepage, or permanently flooded.

**p. 52 LACUSTRINE SYSTEM (Lakes and Ponds)**

Open-water portions of lakes or ponds. Lacustrine communities may include non-persistent submerged or floating aquatic plants; communities around lake perimeters with persistent emergent vegetation are considered palustrine.

**p. 56 RIVERINE SYSTEM (Rivers and Streams)**

Open-water habitats contained within a channel in which water flows. Riverine communities may also include non-persistent submerged or floating aquatic plants. The riverine system extends upstream to the point of stream origin and downstream to the head of tide. Rivershore communities which are above the water level for most of the year, or with persistent emergent vegetation, are not riverine; they may be either terrestrial or palustrine.

**p. 58 ESTUARINE SYSTEM (Estuaries)**

Intertidal and subtidal areas associated with coastal rivers or embayments, extending from the head of tide downstream to the seaward limit of freshwater influence (generally the mouth of the bay or river). Estuary waters are classified according to salinity (in parts per thousand, ppt) as saltwater or polysaline (18-30 ppt), brackish or mesosaline (0.5 - 18 ppt), and freshwater (< 0.5 ppt).

(Note that the head-of tide division between the Riverine and Estuarine systems differs from that used in some other classifications: estuaries are more technically defined as extending upriver only to where ocean-derived salts measure less than 0.5 ppt at average annual low flow. This classification adopts the head-of-tide cutoff because this is more easily identifiable in the field.)

**p. 61 MARINE SYSTEM (Saltwater)**

Intertidal and subtidal nearshore habitats along open coastlines, or in shallow embayments where the waters are not diluted by freshwater. Salinity generally exceeds 30 ppt. Marine communities as used here extend from mean high water to the seaward limit of the photic zone. Rooted vascular plants are virtually absent; macroscopic and microscopic algae ("seaweeds", among others) are the primary producers. Marine communities are strongly influenced by the ebb and flow of the tides, and by the oceanic winds and waves; they are typically higher-energy habitats than those of the Estuarine system.

**p. 63 SUBTERRANEAN SYSTEM (Caves)**

The subterranean system includes all habitats beneath the ground surface.

## LIST AND RANKS OF NATURAL COMMUNITY TYPES

# rank

### TERRESTRIAL COMMUNITIES

#### Forests

|      |    |                                                                            |
|------|----|----------------------------------------------------------------------------|
| T-1  | S4 | Pine - Hemlock/Spruce Forest Community                                     |
| T-2  | S4 | Hemlock Slope Community                                                    |
| T-3  | S4 | Maritime Spruce-Fir Forest                                                 |
| T-4  | S5 | Spruce-Fir Flats Community                                                 |
| T-5  | S4 | Spruce Slope Forest Community                                              |
| T-6  | S3 | Subalpine Spruce-Fir Forest Community                                      |
| T-7  | S4 | Oak-Pine Forest Community                                                  |
| T-8  | S5 | <del>Transitional</del> <sup>MIXED</sup> Hardwood-Conifer Forest Community |
| T-9  | S5 | Early Successional Forest Community                                        |
| T-10 | S2 | Oak-Hickory Forest Community                                               |
| T-11 | S2 | Cove Forest Community                                                      |
| T-12 | S5 | Northern Hardwood Forest Community                                         |

#### Woodlands

|      |    |                                   |
|------|----|-----------------------------------|
| T-13 | S2 | Cold Air Talus Woodland Community |
| T-14 | S1 | Circumneutral Talus Community     |
| T-15 | S3 | Acidic Talus Community            |
| T-16 | S4 | Oak-Pine Woodland Community       |
| T-17 | SU | Spruce Woodland Community         |
| T-18 | S3 | Red Pine Woodland Community       |
| T-19 | S3 | Pitch Pine Woodland Community     |
| T-20 | S3 | Jack Pine Woodland Community      |

#### Barrens

|      |    |                                          |
|------|----|------------------------------------------|
| T-21 | S4 | Red/White Pine Barrens Community         |
| T-22 | S1 | Pitch Pine Dune Semi-Forest Community    |
| T-23 | S1 | Pitch Pine - Scrub Oak Barrens Community |
| T-24 | S1 | Pitch Pine-Heath Barrens Community       |

### **Open Uplands**

|      |    |                                                 |
|------|----|-------------------------------------------------|
| T-25 | S4 | Acidic Shoreline Outcrop Community              |
| T-26 | S3 | Circumneutral Shoreline Outcrop Community       |
| T-27 | S2 | Tall Meadow Community                           |
| T-28 | S2 | Circumneutral Shoreline Shrub Thicket Community |
| T-29 | S4 | Acidic Shoreline Shrub Thicket Community        |
| T-30 | S4 | High-energy Riverbank Community                 |
| T-31 | S3 | River Beach Community                           |
| T-32 | SU | Lakeshore Sand Beach Community                  |
| T-33 | SU | Lakeshore Cobble Beach Community                |
| T-34 | S4 | Beach Strand Community                          |
| T-35 | S2 | Sand Dune Community                             |
| T-36 | S2 | Inland Sand Barren Community                    |
| T-37 | S1 | Sandplain Grassland Community                   |
| T-38 | S4 | Maritime Shrubland Community                    |
| T-39 | S4 | Open Headland Community                         |
| T-40 | S3 | Krummholz Community                             |
| T-41 | S2 | Alpine Ridge Community                          |
| T-42 | S1 | Alpine Cliff Community                          |
| T-43 | S1 | Snowbank Community                              |
| T-44 | S1 | Serpentine Outcrop Community                    |
| T-45 | S1 | Circumneutral Summit Community                  |
| T-46 | S1 | Circumneutral Cliff Community                   |
| T-47 | S4 | Acidic Summit Community                         |
| T-48 | S4 | Acidic Cliff Community                          |

### **PALUSTRINE COMMUNITIES**

#### **Basin Swamps**

|     |    |                                      |
|-----|----|--------------------------------------|
| P-1 | S3 | Hardwood Floodplain Forest Community |
| P-2 | S2 | Coastal Plain Pocket Swamp Community |
| P-3 | SU | Black Willow - Alder Swamp Community |
| P-4 | S5 | Red Maple Swamp Community            |
| P-5 | S2 | Atlantic White Cedar Swamp Community |
| P-6 | S4 | Northern White Cedar Swamp Community |
| P-7 | S4 | Spruce-Fir Swamp Community           |

### **Peatland Communities**

|      |    |                                   |
|------|----|-----------------------------------|
| P-8  | S4 | Forested Bog Community            |
| P-9  | S5 | Peatland Lagg Community           |
| P-10 | S2 | Alpine Bog-Meadow Community       |
| P-11 | S2 | Maritime Slope Bog Community      |
| P-12 | S4 | Floating Kettlehole Bog Community |
| P-13 | S4 | Dwarf Shrub Bog Community         |
| P-14 | S4 | Moss Lawn Bog Community           |
| P-15 | S3 | Plateau Bog Lawn Community        |
| P-16 | S4 | Acidic Fen Community              |
| P-17 | S2 | Circumneutral Fen Community       |

### **Marshes**

|      |    |                           |
|------|----|---------------------------|
| P-18 | S5 | Beaver Flowage Community  |
| P-19 | S5 | Shrub Swamp Community     |
| P-20 | S5 | Cattail Marsh Community   |
| P-21 | S3 | Sedge Meadow Community    |
| P-22 | S4 | Graminoid Swale Community |

### **Seepage Wetlands**

|      |    |                                                                                                                                                  |
|------|----|--------------------------------------------------------------------------------------------------------------------------------------------------|
| P-23 | S3 | Northern White Cedar Seepage Forest Community                                                                                                    |
| P-24 | SU | Outwash Seepage Forest Community<br>(Spruce - Fir Swamp Community: see Basin Swamps)<br>(Coastal Plain Pocket Swamp Community: see Basin Swamps) |
| P-25 | S3 | Riverside Seep Community                                                                                                                         |
| P-26 | S1 | Outwash Plain Pondshore Community                                                                                                                |
| P-27 | SU | Vernal Pool Community                                                                                                                            |

### **LACUSTRINE COMMUNITIES**

|      |    |                                        |
|------|----|----------------------------------------|
| L-1  | S2 | Tarn Community                         |
| L-2  | SU | Eutrophic Pond Community               |
| L-3  | S4 | Bog Pond Community                     |
| L-4  | S1 | Alkaline Pond Community                |
| L-5  | SU | Monomictic Oligotrophic Lake Community |
| L-6  | SU | Monomictic Mesotrophic Lake Community  |
| L-7  | S1 | Meromictic Lake Community              |
| L-8  | SU | Dimictic Oligotrophic Lake Community   |
| L-9  | SU | Dimictic Mesotrophic Lake Community    |
| L-10 | S5 | Rush Bed Community                     |

- |      |    |                                     |
|------|----|-------------------------------------|
| L-11 | S5 | Lacustrine Emergent Community       |
| L-12 | S4 | Lacustrine Shallow Bottom Community |

### RIVERINE COMMUNITIES

- |     |    |                                  |
|-----|----|----------------------------------|
| R-1 | SU | Intermittent Stream Community    |
| R-2 | SU | Peatland Outlet Stream Community |
| R-3 | SU | Rocky Headwater Stream Community |
| R-4 | SU | Midreach Stream Community        |
| R-5 | SU | Marsh Headwater Stream Community |
| R-6 | SU | Deadwater Community              |
| R-7 | SU | Main Channel River Community     |
| R-8 | SU | Backwater Slough Community       |
| R-9 | SU | Riverine Emergent Community      |

### ESTUARINE COMMUNITIES

- |     |    |                                  |
|-----|----|----------------------------------|
| E-1 | S3 | Brackish Pond Community          |
| E-2 | SU | Tidal Creek Community            |
| E-3 | S3 | Cordgrass Saltmarsh Community    |
| E-4 | S3 | Salt Hay Saltmarsh Community     |
| E-5 | SU | Subtidal Estuary Community       |
| E-6 | S2 | Freshwater Tidal Marsh Community |
| E-7 | S3 | Brackish Tidal Marsh Community   |

### MARINE COMMUNITIES

- |      |    |                                       |
|------|----|---------------------------------------|
| M-1  | SU | Intertidal Bedrock-Boulder Community  |
| M-2  | SU | Intertidal Mud Flat Community         |
| M-3  | SU | Intertidal Sand-Gravel Flat Community |
| M-4  | SU | Sand Beach Community                  |
| M-5  | SU | Gravel-Cobble Beach Community         |
| M-6  | SU | Salt Pond Community                   |
| M-7  | SU | Mud Bottom Community                  |
| M-8  | SU | Sand Bottom Community                 |
| M-9  | SU | Cobble Bottom Community               |
| M-10 | SU | Rock Bottom Community                 |

### SUBTERRANEAN COMMUNITIES

- |     |    |                |
|-----|----|----------------|
| S-1 | SU | Cave Community |
|-----|----|----------------|

## KEY TO TERRESTRIAL COMMUNITIES

1. Forested or partly-forested areas: trees forming a full or intermittent canopy (one-quarter to almost all of the sky obscured as you look up).....2
1. Open areas: trees absent or if present very scattered, not forming a canopy.....20
2. Partially forested (barrens and woodlands): canopy intermittent (one-quarter to two-thirds of the sky obscured).....3
2. Forests: closed canopy (more than two-thirds of the sky obscured), except in occasional gaps from treefalls or blowdowns.....4
3. Woodlands: areas with little or no soil; trees growing on bedrock or among boulders.....18
3. Barrens: Partially forested with stunted trees on sand or glacial outwash deposits, flat or with gently rolling topography.....25

## FORESTS

4. Conifers (gymnosperms) strongly dominant.....5  
4. Hardwoods (angiosperms) dominant, or sometimes co-dominant with conifers.....12

5. *Pinus resinosa* dominant; canopy sparse to almost closed; usually on very dry soils or ledge  
.....(18) **RED PINE WOODLAND COMMUNITY**

5. *Pinus resinosa* not dominant.....6

6. *Pinus strobus* and/or *Tsuga canadensis* as the dominant conifers.....7  
6. *Abies balsamea* and/or *Picea* spp. as the dominant conifers (if *Pinus rigida* is dominant, go to couplet #26; if *Thuja occidentalis* is dominant, go to the Key to Palustrine Communities).....9

7. Canopy with > 50% *Tsuga canadensis*; typically in cool, moist microsites  
.....(2) **HEMLOCK SLOPE COMMUNITY**

7. Canopy with > 50% *Pinus strobus*; microclimate typically drier.....8

8. Early-successional forest; young (< 50 yrs) *Pinus strobus* the only major conifers, and open-grown trees often present; *Populus* spp. and/or *Betula* spp. may also be present  
.....(9) **EARLY SUCCESSIONAL FOREST COMMUNITY**

8. *Pinus strobus* mixed with *Tsuga canadensis* or *Picea rubens*, or if the only conifer, obviously older; *Populus* and *Betula* virtually absent  
.....(1) **PINE - HEMLOCK/SPRUCE FOREST COMMUNITY**

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.....(8) **MIXED HARDWOOD-CONIFER FOREST COMMUNITY**
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40. Shifting, windblown sand dominates ground surface; shrubs absent or very infrequent; *Andropogon scoparius* and occasional *Betula populifolia* the most common plants  
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40. Vegetation cover more extensive; shrubs (usually *Vaccinium angustifolium*) and graminoids dominating ground surface  
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|     |                                                                                                                                                                                                                                                                                           |    |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
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| 49. | Acidic talus; calciphiles absent                                                                                                                                                                                                                                                          |    |

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50. Outcrops/summits of serpentine; serpentine indicators such as *Adiantum pedatum* ssp. *calderi* or *Asplenium viride* may be present; very rare

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51. Rocks acidic; calciphiles absent.....53

52. Summits or outcrops, typically dry

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52. Cliffs, often with local seepy spots

.....(46) CIRCUMNEUTRAL CLIFF COMMUNITY

53. Summits or outcrops, typically dry

.....(47) ACIDIC SUMMIT COMMUNITY

53. Cliffs, often with local seepy spots

.....(48) ACIDIC CLIFF COMMUNITY

## TERRESTRIAL COMMUNITIES -- DESCRIPTIONS

### FORESTS

#### (1) PINE - HEMLOCK/SPRUCE FOREST COMMUNITY

Coniferous forest found on somewhat sheltered, usually sloping (moderately to steeply) sites and dry to mesic soils, often sandy or bouldery. *Pinus strobus* is the canopy dominant, with some proportion of *Tsuga canadensis* (in southern-central Maine) or *Picea rubens* and *Abies balsamea* (in central-northern Maine). With the dense canopy, understory vegetation is limited. Shrubs are absent or sparse; herbaceous cover may be sparse to moderate depending on the amount of light penetrating the canopy. Common herb species include *Aralia nudicaulis*, *Trientalis borealis*, *Gaultheria procumbens*, *Clintonia borealis*, and *Maianthemum canadense*. This community appears to be most common in central and western Maine. It is similar to an oak-pine forest, but occurs in more mesic microsites and lacks any major representation of oak in the canopy. The ground layer is also more depauperate. It may also be similar to a hemlock slope forest, but is usually less protected and therefore somewhat drier, and consequently contains more pine.

#### (2) HEMLOCK SLOPE FOREST COMMUNITY

Cool microsites (gorges, steep slopes, brooksides) within northern hardwood or mixed conifer-hardwood forests throughout Maine, strongly dominated by *Tsuga canadensis*. Smaller amounts of northern hardwoods or white pine may be present. The understory and ground layers are very depauperate due to dense shade; characteristic species include *Mitchella repens* and *Gaultheria procumbens*.

#### (3) MARITIME SPRUCE-FIR FOREST COMMUNITY

Forests of exposed maritime locations dominated by *Picea rubens*, *Abies balsamea*, and *Picea glauca*. Soils often have a thick organic mat over a thin mineral layer. Cool temperatures and frequent fogs create comparatively mesic conditions; arboreal lichens are abundant. On coastal islands and outer peninsulas, where salt spray is a factor, trees may be contorted or short. Included in this community, in recently disturbed areas, may be patches of early-successional forest of stunted *Betula papyrifera*, *Alnus* spp., and *Sorbus americana*.

#### (4) SPRUCE-FIR FLATS COMMUNITY

Forests of moist, flat, low to mid elevation sites, dominated by *Picea rubens* and *Abies balsamea*. Common associates include *Picea glauca*, *Picea mariana*, *Betula papyrifera*, and *Betula alleghaniensis*. Soils are typically poorly drained, but not saturated or peaty. On better drained sites, *Pinus strobus* may be a codominant. The shrub layer is sparse or patchy. Characteristic shrubs are *Kalmia angustifolia*, *Aralia nudicaulis*, *Vaccinium angustifolium*, and *Vaccinium myrtilloides*. Ground cover typically consists of a thick carpet of mosses (especially feather mosses) and herbs. Characteristic herbs are *Maianthemum canadense*, *Cornus canadensis*, *Coptis groenlandica*, *Clintonia borealis*, and *Gaultheria hispidula*.

#### (5) SPRUCE SLOPE FOREST COMMUNITY

Forests of gently sloping, middle to upper slopes dominated by *Picea rubens*, *Abies balsamea*, and, on more exposed sites, *Betula papyrifera* or *Betula cordifolia*. Soils are typically well drained and moderately fertile, and consequently produce more marketable timber than other spruce-fir forests. Exposed locations may experience frequent blowdowns.

#### (6) SUBALPINE SPRUCE-FIR FOREST COMMUNITY

Low-diversity coniferous forest of high elevations, generally above 900 m. Occurs both on level ridgetops and on steep, stony, upper slopes. The dominant tree is *Abies balsamea*. Common associates are *Picea rubens*, *Betula cordifolia*, and *Sorbus americana*. Wind damage is common and often widespread, resulting in a patchy but dense shrub layer of young *Sorbus americana*, *Viburnum*

*alnifolium* and *Rubus* spp. The "fir-wave" forests in Baxter State Park are one particular manifestation of this community type.

(7) **OAK-PINE FOREST COMMUNITY**

Forests of sandy soils or rocky slopes in central and southern Maine. Soils are moderately to very xeric. The most common canopy dominants are *Quercus rubra* and *Pinus strobus*; *Quercus alba* and *Pinus rigida* may be present in the canopy in some locales. *Fagus grandifolia* is a common associate. The shrub layer is primarily ericads.

(8) **MIXED HARDWOOD-CONIFER FOREST COMMUNITY**

A mixed forest community which is geographically and ecologically transitional between northern hardwood forests, spruce-fir forests, and oak-pine forests, found on flat to rolling terrain and some lower mountain slopes in central and northern Maine. Soils are acidic and moderately well drained, but not strongly xeric. Dominant canopy species vary from site to site; they include *Pinus strobus*, *Tsuga canadensis*, *Fagus grandifolia*, *Betula alleghaniensis*, *Picea rubens*, *P. glauca*, and *Abies balsamea*. *Quercus rubra* may be an important canopy species in central Maine. Common associates include *Fraxinus americana*, *Acer rubrum*, and *Betula papyrifera*. *Acer pensylvanicum*, *Viburnum recognitum*, *V. cassinoides*, *V. acerifolium*, and *Corylus cornuta* are dominant understory species; *Acer spicatum* may be a subcanopy tree in northern Maine. Characteristic species of the groundlayer are *Cornus canadensis*, *Maianthemum canadense*, *Aralia nudicaulis*, *Aster macrophyllus*, *Coptis groenlandica*, *Lycopodium lucidulum*, *L. obscurum*, *Cypripedium acaule*, and *Trientalis borealis*. Northern and southern variants of this community may occur (e.g. spruce and fir more important in northern Maine; pine and hemlock more important in central Maine), but need documentation.

(9) **EARLY SUCCESSIONAL FOREST COMMUNITY**

A mixed or hardwood-dominated forest associated with recent disturbance (blowdowns, fire, recently abandoned lands). Two or more of the following usually dominate: *Populus tremuloides*, *Populus grandidentata*, *Pinus strobus*, *Betula papyrifera*, *Betula populifolia*, and/or *Acer rubrum*. All are wind-dispersed, shade-intolerant species adapted to establishment in recently disturbed areas. *Acer spicatum* and *Prunus pensylvanica* are common associates in parts of the state. Canopy species generally fail to reproduce in their own shade; saplings of more shade-tolerant species are common in older successional forests. Different types of successional forests occur in Maine (e.g. birch-aspen dominated, white pine dominated), but are not separated as distinct communities here.

(10) **OAK-HICKORY FOREST COMMUNITY**

Semi-open to closed canopy forests of well-drained ridgetops and south- to west-facing slopes in southern Maine, dominated by *Quercus alba*, *Quercus prinus*\*, and/or *Carya ovata*. On ridgetops where little moisture is available, soil formation is poor or limited to a thick organic mat, and the canopy is generally somewhat open. *Quercus prinus*\* is characteristic of these conditions; *Pinus rigida* may be a common associate in coastal areas. *Betula lenta*, *Tilia americana* and *Quercus rubra* are common associates in more mesic settings. This community often includes understory species which are common south of Maine, but rare or unusual here, such as *Cornus florida*\*, *Kalmia latifolia*\*, *Sassafras albidum*\*, *Chimaphila maculata*\*, and *Smilax rotundifolia*.

(11) **COVE FOREST COMMUNITY**

Rich northern hardwood forest of sheltered, low to moderate elevation sites, primarily on broad coves and slopes above them. Steep slopes above or bedrock enriched with calcium result in soils enriched in nutrients and organic matter. Soils are usually mesic, with supplemental water from runoff and seeps; they may be well developed, or in rarer cases confined to pockets among talus. *Acer saccharum* is usually the dominant canopy tree. Indicators may include *Tilia americana* in the canopy and *Caulophyllum thalictroides*, *Carex platyphylla*, and *Carex plantaginea* in the herb layer. The rich soils support a variety of rare species, including *Panax quinquefolius*\*, *Impatiens pallida*\*, and *Dryopteris goldiana*\*.

(12) NORTHERN HARDWOOD FOREST COMMUNITY

Forests dominated by *Acer saccharum*, *Fagus grandifolia*, and *Betula allegheniensis* in various mixtures, mostly on cool, mid-elevation ridges and slopes. *Tsuga canadensis*, *Pinus strobus*, and *Picea rubens* are common associates and *Acer pensylvanicum* is often a prominent understory species. *Quercus rubra* may be a codominant in the south-central part of the state. The canopy is often dense, resulting in a sparse shrub layer. Characteristic shrubs are *Viburnum alnifolium*, *Viburnum acerifolium*, and *Rubus* spp. Characteristic herbs are *Medeola virginiana*, *Maianthemum canadense*, *Lycopodium lucidulum*, *Dryopteris intermedia*, *Trientalis borealis*, *Uvularia sessilifolia*, *Mitchella repens*, *Tiarella cordifolia*, *Streptopus roseus*, and *Trillium erectum*. Northern Hardwood Forests on richer soils may have a more diverse herbaceous flora, including *Viola rotundifolia*, *Dicentra cucullaria* (or, very rarely, *Dicentra canadensis*), *Circaea quadrisulcata*, or *Adiantum pedatum*, among others.

WOODLANDS

(13) COLD AIR TALUS COMMUNITY

A rare community found on talus slopes (usually steep, though sometimes approaching level) where cold air collects: ice blocks may persist into the summer in rock crevices. The cool microclimate fosters a subalpine assemblage characterized by *Ledum groenlandicum*, *Picea mariana*, *Empetrum nigrum*, and foliose lichens. In some cases, vegetation forms a peaty duff over the talus.

(14) CIRCUMNEUTRAL TALUS COMMUNITY

Sparsely vegetated slopes of loose circumneutral or (rarely) calcareous boulders, occurring as talus from cliffs above or, less commonly, as boulder fields on more level terrain. Typical plants include *Rhus radicans*, *Clematis occidentalis*, and *Asplenium platyneuron*; small birches may be scattered among the rocks. *Geranium robertianum*, *Hepatica americana*, and *Adiantum pedatum* may occur on circumneutral talus.

(15) ACIDIC TALUS COMMUNITY

Loose granitic, mafic, or high-grade metamorphic rocks that have accumulated as talus slopes at the base of cliffs, or been deposited as boulder fields on more level terrain. Vegetation is restricted to isolated soil pockets. Open areas may be dominated by vines, usually including *Rhus radicans*. *Epilobium hornemannii* is a rare species associated with this community. Partially forested areas, or talus woodlands, are often dominated by *Betula cordifolia* and lesser amounts of *Picea rubens*. *Ribes glandulosum*, *Sorbus americana*, and *Polypodium virginianum* are frequent associates.

(16) OAK-PINE WOODLAND COMMUNITY

Woodlands of knolls and hilltops where soils are excessively well-drained and bedrock outcrops are abundant. Widely spaced, somewhat stunted *Quercus rubra* and *Pinus strobus* are canopy dominants. *Juniperus communis* and various ericads are characteristic shrubs. The groundlayer is dominated by graminoids, especially *Carex lucorum* (= *C. pensylvanica*) and *Deschampsia flexuosa*. Oak-pine woodlands are not simply young oak-pine forests, but are edaphically constrained-- there's insufficient soil to support a dense forest. However, as one moves downslope, into areas of greater soil accumulation, oak-pine woodlands frequently grade into oak-pine forest.

(17) SPRUCE WOODLAND COMMUNITY

Semi-open forest on bare rock or very thin soil over rock, dominated by red or black spruce (*Picea rubens* or *Picea mariana*). The understory is predominantly scattered heath shrubs. Little data exist on this community; known examples are in central-northern Maine.

(18) RED PINE WOODLAND COMMUNITY

Semi-open to almost closed forest of *Pinus resinosa* on esker slopes, rocky soils or rock outcrops, mostly in northern or western Maine. *Pinus strobus* is a common associate. Soils are nutrient-poor and excessively well-drained. Shrubs, when present, are typically ericads.

**(19) PITCH PINE WOODLAND COMMUNITY**

Semi-open forest of *Pinus rigida* on ledges or rock outcrops, mostly in the coastal zone west of Acadia. Soils are nutrient-poor and excessively well-drained. Characteristic ground-layer species include *Vaccinium angustifolium* and, in some locations, *Corema conradii*, as well as several types of lichens. *Quercus rubra* may be a canopy associate.

**(20) JACK PINE WOODLAND COMMUNITY**

Semi-open forest of *Pinus banksiana* on rock outcrops, mostly along the eastern coast or along lakeshores in central-northern Maine. Soils are nutrient-poor and excessively well-drained. The canopy trees are generally stunted. The shrub layer, often well developed, includes *Kalmia angustifolia*, *Chamaedaphne calyculata*, and *Vaccinium angustifolium*. *Pteridium aquilinum* is the dominant herbaceous species. Maritime jack pine woodlands are often associated with coastal plateau bogs and coastal headlands. Lakeshore jack pine woodlands may include small areas of sand beach as well as rock outcrops.

**BARRENS**

**(21) RED/WHITE PINE BARRENS COMMUNITY**

Semi-open or mostly open sandy plains dominated by *Vaccinium angustifolium* and other ericads, with scattered *Pinus resinosa*, *Pinus strobus*, *Betula populifolia*, and *Populus tremuloides*. *Pinus banksiana* may be an occasional associate. Like most barren communities, this one is fire-dependent; most known examples are being managed for blueberries.

**(22) PITCH PINE DUNE SEMI-FOREST COMMUNITY**

Stunted forests of pitch pine (*Pinus rigida*) on stabilized, older (e.g. parabolic) dunes. These are usually in association with open dunes. The density of the pines and composition of the understory can vary with successional age: from semi-open canopy with *Cladina* lichens and *Hudsonia tomentosa* or dune shrubs in between, to nearly closed canopy in which pitch pine is mixed with other species such as *Acer rubrum*, *Quercus rubra*, *Betula papyrifera*, etc.

**(23) PITCH PINE - SCRUB OAK BARREN COMMUNITY**

Patchy, partly open (or in spots closed-canopy) semi-forests on well drained sandy soils of glacial outwash plains or moraines. *Pinus rigida* is the dominant canopy species. The shrub layer is well developed with *Quercus ilicifolia* either in scattered clumps or forming an almost continuous cover, and sometimes with a lower layer of ericads such as *Vaccinium angustifolium* and *Gaylussacia baccata*. Other characteristic species are *Kalmia angustifolia*, *Pteridium aquilinum*, and *Gaultheria procumbens*. Rare habitat-specific lepidoptera species may be present. Graminoid openings featuring *Carex lucorum* (= *C. pensylvanica*), *Andropogon scoparius*, *Potentilla tridentata*, and other herbs and low shrubs occur as small pockets within the barrens, and may include *Lycopodium sabinaefolium*\* and *Hieracium venosum*\*. In the absence of fire, over several decades, this community may develop into an oak-pine forest.

**(24) PITCH PINE - HEATH BARREN COMMUNITY**

Similar to the above, but lacking *Quercus ilicifolia* in the shrub layer and consequently with more heath shrubs and a more park-like appearance. Rare lepidoptera may be present, but fewer species than in the barrens with scrub oak.

## OPEN UPLANDS

### (25) ACIDIC SHORELINE OUTCROP COMMUNITY

Low or steep acidic bedrock outcrops in the flood-washed zone of the immediate river's edge, or extending into the river channel. Limited alluvial soil accumulates in the rock crevices. Typical plants are *Campanula rotundifolia*, *Aquilegia canadensis*, *Solidago* spp., and *Poa compressa*.

### (26) CIRCUMNEUTRAL SHORELINE OUTCROP COMMUNITY

Low or steep circumneutral to calcareous rock outcrops with alluvial soil in the rock crevices. Typical plants include *Erigeron hyssopifolius*, *Hedyotis longifolia*, and occasionally *Viola novae-angliae* or *Carex eburnea*. Along the St. John River this community features rarities such as *Anemone multifida* and *Oxytropis campestris* ssp. *johannensis*.

### (27) TALL MEADOW COMMUNITY

Prairie-like community of tall grasses and forbs; usually on sand or sand/gravel deposits along rivershores (and possibly lakeshores), and maintained by recurrent disturbance. Typical plants include *Calamagrostis canadensis*, *Aster umbellatus*, *Eupatorium maculatum*, and *Solidago* spp. The presence of low shrubs (*Alnus* and *Salix* spp., typically less than 1 m tall) among the herbaceous vegetation suggests that these areas would succeed to shrub thickets in the absence of disturbance. In most known examples, annual flooding and ice-scour are the disturbance agents; however, one example maintained by frequent fire is known. The substrate remains moist during the growing season, but soils are not hydric. Graminoid Swale communities, which these may resemble, are palustrine communities, distinguished by having hydric soils and a greater predominance of *Carex* spp. and *Scirpus* spp.

### (28) CIRCUMNEUTRAL SHORELINE SHRUB THICKET COMMUNITY

Semi-open to mostly closed shrub cover (e.g. *Alnus* spp., *Salix* spp., *Cornus sericea*) on rivershores, typically in areas experiencing occasional ice disturbance. Soils are variously textured but are not seepy or hydric (c.f. the palustrine Shrub Swamp community). Herb diversity may be high, especially in openings among the shrubs, with calciphiles well represented. Along the St. John River, this community can include *Pedicularis furbishiae* and *Castilleja septentrionalis*.

### (29) ACIDIC SHORELINE SHRUB THICKET COMMUNITY

Semi-open to mostly closed shrub cover (e.g. *Alnus* spp., *Salix* spp., *Gaylussacia baccata*, *Vaccinium corymbosum*, *Lyonia ligustrina*) on rivershores and lakeshores, typically in areas with occasional ice disturbance. Soils are variously textured but are not seepy or hydric (c.f. the palustrine Riverside Seep and Shrub Swamp communities). Tall ericaceous shrubs, absent from circumneutral shrub thickets, are good indicators of this community. The herb layer, when present, lacks calciphytic indicator species. More data are needed to adequately describe this community.

### (30) HIGH-ENERGY RIVERBANK COMMUNITY

Moderate to steeply sloping riverbanks regularly scoured by high velocity floodwaters and sparsely vegetated with disturbance colonizers. Species composition may vary with substrate (cobbles, gravel, loam, etc.) Riverbanks are higher elevation and steeper than river beaches, but vegetational differences between the two communities need documentation.

### (31) RIVER BEACH COMMUNITY

Sparsely vegetated areas on sandy or gravelly river deposits. Herbs dominate, though low shrubs may also be present. Vegetation density generally reflects how frequently (or recently) the area is scoured; the higher parts of the beach generally have denser vegetation than the lower parts. On northern Maine rivers rare plants such as *Astragalus alpinus*, *Oxytropis campestris* ssp. *johannensis*, and

*Tanacetum bipinnatum* ssp. *huronense*\* may be common, while in southern Maine the best-known areas are dominated by *Hudsonia tomentosa*. Variants of this community based on substrate size and/or floristic differences need documentation; there may indeed be more than one type of river beach community in Maine.

(32) **LAKESHORE SAND BEACH COMMUNITY**

Low sandy lakeshores characterized by *Cyperus* spp. and often *Potentilla anserina*. More data needed.

(33) **LAKESHORE COBBLE BEACH COMMUNITY**

Cobble or shingle shores, typically in exposed locations with heavy wave action. Vegetation is sparse. Characteristic plants are *Apocynum cannabinum*, *Melilotus alba*, and *Stachys palustris*.

(34) **BEACH STRAND COMMUNITY**

Sparsely vegetated areas above the high-tide line on sand or gravel beaches. Plants adapted to withstand the effects of salt spray and drying winds are typical, and include annuals such as *Arenaria peploides*, *Cakile edentata*, *Lathyrus japonicus*, and others. This narrow, linear community is usually bordered landward by either sand dunes or upland forest vegetation.

(35) **SAND DUNE COMMUNITY**

Fore and back dunes associated with sand beaches. Characteristic species are *Ammophila breviligulata*, *Solidago sempervirens*, and *Lathyrus japonicus*. *Rosa rugosa* and *Myrica pensylvanica* occur on older dunes. *Hudsonia ericoides* and *Prunus maritima* are local associates.

(36) **INLAND SAND BARREN COMMUNITY**

Areas where soil is almost pure sand and where land use patterns have resulted in xeric sandbarren associations nearly devoid of trees. The sand may have formed low dunes, or may be a flat plain. Characteristic species are *Andropogon scoparius* and scattered *Betula populifolia* and *Pinus strobus*. *Lycopodium sabinaefolium*\* may also occur in these areas.

(37) **SANDPLAIN GRASSLAND COMMUNITY**

Open grassland and shrubland on excessively well drained soils of outwash deposits. These ecosystems occur in fire-prone areas and, in the absence of fire, would eventually be replaced by pitch pine barrens or pine-heath woodland. *Andropogon scoparius*, *Carex lucorum*, and *Liatris borealis* may be characteristic. Several rare bird species nest in these grasslands, including grasshopper sparrow (*Ammodramus savannarum*), horned lark (*Eremophila alpestris*), vesper sparrow (*Pooecetes gramineus*), and upland sandpiper (*Bartramia longicauda*).

(38) **MARITIME SHRUBLAND COMMUNITY**

Shrub-dominated communities of seaside bluffs and islands exposed to onshore winds and salt spray. *Myrica pensylvanica*, *Rosa* spp., and *Rhus radicans* are the common shrubs. On the far eastern coast, Maritime Slope Bogs (considered palustrine-- see P-11) may be found in similar settings; they are dominated by low shrubs growing in *Sphagnum*.

(39) **OPEN HEADLAND COMMUNITY**

Sparsely vegetated expanses of bedrock along coastlines. These areas are above the high tide line but are exposed to salt spray and storm tides. Typical plants include *Solidago sempervirens* and *Plantago maritima*; along the coast east of Acadia rarer species such as *Iris setosa*\*, *Sedum rosea*\*, *Euphrasia randii*\*, and *Lomatogonium rotatum*\* are also characteristic. *Empetrum nigrum* may form low mats where a thin layer of organic soil has accumulated.

(40) **KRUMMHOLZ COMMUNITY**

Dense mass of mostly coniferous shrub-like trees at high elevations above treeline. Thin cryic soils and constant exposure to wind cause stunted and flagged growth. Trees are mostly less than 5' tall. *Abies balsamea* is dominant; *Picea mariana* and *Betula cordifolia* are common associates.

(41) **ALPINE RIDGE COMMUNITY**

Exposed, windswept mountain summits, ridges, and tablelands dominated by bedrock; in some areas (e.g. the tableland of Katahdin), the rock has become fragmented into scree due to repeated freezing and thawing. Vegetation is mostly confined to protected microsites among the rocks, and is dominated by *Vaccinium uliginosum*, *Juncus trifidus*, and *Cetraria islandica*. Associated species vary according to exposure: somewhat protected sites also feature *Carex bigelowii*, while the most exposed areas are characterized by *Diapensia lapponica*, *Potentilla tridentata*, and *Minuartia groenlandica*. *Betula glandulosa*, *Salix herbacea*, and *Hierochloa alpina* may also be found in this community, as can (in the more exposed areas) *Solidago cutleri* and *Agrostis mertensii*.

(42) **ALPINE CLIFF COMMUNITY**

Vertical to nearly vertical cliffs above treeline, usually with local rivulets. Vegetation is sparse but includes alpine or subalpine species such as *Saxifraga foliolosa*, *Polygonum viviparum*, *Castilleja septentrionalis*, and *Arnica mollis*.

(43) **SNOWBANK COMMUNITY**

Protected areas on headwalls of montane cirques where snow lingers through early summer. *Cassiope hypnoides*, *Phyllodoce caerulea*, and *Loiseleuria procumbens* are characteristic. This community is restricted in Maine to Mt. Katahdin.

(44) **SERPENTINE OUTCROP COMMUNITY**

Bedrock outcrops of ultramafic rocks such as serpentine and dunite. Serpentine areas in Maine are very rare and mostly limited in extent. Species diversity is low. Magnesium-tolerant plants such as *Adiantum pedatum* ssp. *calderi*, *Asplenium viride*, or *Cerastium arvense* are characteristic.

(45) **CIRCUMNEUTRAL SUMMIT COMMUNITY**

Outcrops of limestone, dolomite, and other bedrock in which weathering produces circumneutral to calcareous substrates. These outcrops are typically dry and sparsely vegetated. Characteristic species include *Potentilla fruticosa* and *Aster ptarmicoides*. Calcareous outcrops may support *Polygala senega* or *Carex eburnea*. Rare species of circumneutral outcrops in southern Maine include *Ranunculus fascicularis* and *Asplenium platyneuron*. Differences in vegetation related to rock type, exposure, and moisture need more study.

(46) **CIRCUMNEUTRAL CLIFF COMMUNITY**

Nearly vertical to vertical outcrops of limestone, dolomite, schist, or other circumneutral to calcareous rocks. Associated plants include *Primula mistassinica*, *Saxifraga aizoides*, *Woodsia glabella*, and *Erigeron hyssopifolius*; or on more circumneutral cliffs, *Cryptogramma stelleri*, *Draba lanceolata*, and *Minuartia rubella*. *Carex scirpoidea* and *Scirpus cespitosus* may occur at higher elevations. The effects of substrate, moisture, and exposure on cliff vegetation needs more study.

(47) **ACIDIC SUMMIT COMMUNITY**

Bedrock outcrops, ledges, and summits (also known as "balds") of igneous and high-grade metamorphic rocks. Substrate pH varies according to rock type. Vegetation is typically sparse or patchy. On cool northern or high elevation outcrops, *Potentilla tridentata*, *Deschampsia flexuosa*, and *Oryzopsis pungens* are characteristic herbs. Low elevation and southern outcrops are characterized by *Vaccinium angustifolium*, *Gaylussacia baccata*, *Arctostaphylos uva-ursi*, *Carex lucorum*, and various lichens. *Abies balsamea*, *Picea rubens*, *Betula cordifolia*, and *Sorbus americana* may occur where soil has accumulated.

(48) ACIDIC CLIFF COMMUNITY

Nearly vertical to vertical outcrops of non-calcareous, resistant rocks often moistened by runoff from higher elevations. Soil development is minimal and vegetation sparse. Species characteristic of shaded, lower elevation cliffs include *Polypodium virginianum* and *Dryopteris marginalis*. At higher elevations, *Potentilla tridentata* and *Alnus viridis* are typical. *Dryopteris fragrans*\* is characteristic of cool acidic cliffs.

## KEY TO PALUSTRINE COMMUNITIES

1. Basin wetlands: areas which remain wet because of water collecting in a topographic depression such as a lake basin, stream basin, kettlehole, etc.; (most wetlands, including all peatlands, are of this type).....2
1. Seepage wetlands: areas on slopes where the soils remain saturated due to groundwater discharge; seepage waters often visible at soil surface.....~~28~~ 30
2. Forested wetlands (tree canopy cover > 60%).....3
2. Non-forested wetlands.....12

### FORESTED WETLANDS

3. Small, shallow depressions in upland forests, isolated from other surface water, which flood in the Spring and sometimes Fall but typically dry out in summer  
~~27~~.....(25) **VERNAL POOL COMMUNITY**
3. Not as above; more extensive.....4
4. Hardwoods (angiosperms) dominant.....5
4. Softwoods (gymnosperms) dominant.....8
5. Forests of floodplains of larger streams and rivers; *Acer saccharinum* common, often dominant; soils alluvial; soil surface may be dry during much of the growing season; *Matteucia struthiopteris* may be common in the herb layer  
~~.....(1)~~ **HARDWOOD FLOODPLAIN FOREST COMMUNITY**
5. Forests of smaller stream basins, lake basins, or catch basins; accumulations of alluvium minimal; soil surface typically remains wet throughout the growing season; *Acer saccharinum* not dominant (though *Acer rubrum* often is).....6
6. *Nyssa sylvatica* present, *Acer rubrum* typically dominant; *Chamaecyparis thyoides* may be present; swamps in small basins or saddles in extreme southern Maine  
~~.....(2)~~ **COASTAL PLAIN POCKET SWAMP COMMUNITY**
6. *Nyssa* not present.....7
7. *Salix nigra* and *Alnus incana* spp. *rugosa* dominant; somewhat linear swamps of small watercourses and swales in southern Maine  
~~.....(3)~~ **BLACK WILLOW - ALDER SWAMP COMMUNITY**
7. *Acer rubrum* dominant or co-dominant with *Fraxinus pensylvanica* (or, less commonly, *Fraxinus nigra*); often-extensive swamps of poorly drained stream basins and lake basins throughout the state  
~~.....(4)~~ **RED MAPLE SWAMP COMMUNITY**
8. *Chamaecyparis thyoides* dominant (or at least common).....9
8. *Chamaecyparis thyoides* absent or very uncommon.....10

9. In small catch basins or saddles; *Nyssa sylvatica* usually present; evergreen ericaceous shrubs mostly absent; peat accumulation minimal  
.....(2) **COASTAL PLAIN POCKET SWAMP COMMUNITY**
9. In larger basins, often associated with peatlands (bogs); evergreen ericaceous shrubs often present  
.....(5) **ATLANTIC WHITE CEDAR SWAMP COMMUNITY**
10. *Thuja occidentalis* dominant, growing on peat of various depths  
.....(6) **NORTHERN WHITE CEDAR SWAMP COMMUNITY**
10. *Thuja occidentalis* not dominant (though may be present).....11
11. *Picea rubens* and/or *Abies balsamea* dominant; forests along small streams or in stagnant basins; peat accumulation minimal though living *Sphagnum* often present  
.....(7) **SPRUCE - FIR SWAMP COMMUNITY**
11. *Picea mariana* and/or *Larix laricina* dominant, usually growing in deep *Sphagnum*; may occur as part of a larger peatland  
.....(8) **FORESTED BOG COMMUNITY**
12. Sandy pondshore community without standing water for most of the year, remaining moist through groundwater discharge; vegetation a mixture of low herbs, shrubs absent or unimportant; *Gratiola aurea*, *Cladium mariscoides*, *Rhexia virginica* characteristic species; southern Maine  
.....(24) **OUTWASH PLAIN POND SHORE COMMUNITY**
12. Community not as above.....13
13. Peatland communities: substrate undecayed to partly decayed *Sphagnum*.....14
13. Marsh communities: substrate mineral soil or well-decomposed peat.....22 24

#### OPEN PEATLAND COMMUNITIES

14. Peatlands above treeline, either in small wet basins or, less commonly, over gently sloping rock; vegetation dominated by *Eriophorum spissum*, *Kalmia polifolia*, *Vaccinium oxycoccos*, *Vaccinium uliginosum*  
.....(10) **ALPINE BOG COMMUNITY**
14. Peatlands of lower elevations.....15
15. Bog vegetation blanketing bedrock slopes of outer peninsulas and islands of extreme eastern Maine; peat shallow, and may dry out during summer; vegetation dominated by dwarf shrubs (ericads and often *Empetrum nigrum*); very rare  
.....(11) **MARITIME SLOPE BOG COMMUNITY**
15. Peatlands not like the above (most peatlands).....16

16. Low ericaceous shrubs (*Chamaedaphne* typically dominant) and *Sphagnum* forming a floating mat in a kettlehole; typically a mosaic of shrub-dominated areas and areas with only *Sphagnum*, *Vaccinium macrocarpon* or *V. oxycoccus*, and scattered herbs; *Carex* spp. may be present but are nowhere near dominant  
.....(12) **FLOATING KETTLEHOLE BOG COMMUNITY**
16. Vegetation not as above.....17
17. Shrubs (low or tall) dominant .....18
17. Sedges or bryophytes dominant.....21
18. Shrubs mostly > 1.5 m tall; deciduous; community around the perimeter of a peatland; standing water often present  
.....(9) **PEATLAND LAGG COMMUNITY**
18. Shrubs shorter, growing in *Sphagnum*, not restricted to peatland perimeter.....19
19. Dominant shrub species *Potentilla fruticosa*; sedges often co-dominant; community of circumneutral or high-nutrient conditions  
.....(17) **CIRCUMNEUTRAL FEN COMMUNITY**
19. Dominant shrub not *Potentilla fruticosa* (though sedges may be co-dominant).....20
20. Sedges co-dominant with the shrubs, and typically include *Carex oligosperma*, *Carex paupercula*, or *Carex rostrata*; shrubs almost entirely limited to *Andromeda glaucophylla*, *Chamaedaphne calyculata*, or *Myrica gale*  
.....(16) **ACIDIC FEN COMMUNITY**
20. *Carex* spp. far from co-dominant; community dominated by dwarf evergreen shrubs *Ledum groenlandicum*, *Kalmia polifolia*, and/or *Kalmia angustifolia* (*Chamaedaphne* may also be present); *Eriophorum spissum* a common sedge  
.....(13) **DWARF SHRUB BOG COMMUNITY**
21. Bryophytes dominant; highly saturated areas, often with standing water  
.....(14) **MOSS LAWN BOG COMMUNITY**
21. Sedges dominant.....22
22. Community of coastal plateau bogs dominated by *Scirpus cespitosus*; not in contact with groundwater  
.....(15) **PLATEAU BOG LAWN COMMUNITY**
22. *Scirpus cespitosus* not the dominant sedge; peatland communities in contact with nutrient-rich groundwater (fens).....23

23. Groundwater calcium-enriched, as evidenced by presence of calciphiles such as *Parnassia glauca*, *Lobelia kalmii*, *Scirpus hudsonianus*, *Juncus stygius*, *Carex diandra*, *Carex livida*, *Potentilla fruticosa*; may occur in association with larger peatland or along a low-energy streamside or lakeside (but for riverside "fens" without peat accumulation, see Riverside Seep Community)  
.....(17) **CIRCUMNEUTRAL FEN COMMUNITY**
23. Groundwater acidic; calciphytic indicator species absent; *Carex oligosperma* and *C. paupercula* commonly present; may occur in association with larger peatland or along a streamside or lakeside  
.....(16) **ACIDIC FEN COMMUNITY**
24. Tidal marshes.....**SEE KEY TO ESTUARINE COMMUNITIES**
24. Non-tidal marshes.....25
25. Communities with standing water throughout the year, with emergents such as *Scirpus validus*, *S. acutus*, *S. americanus*, *Pontederia cordata*, etc., which die back below the water at the end of the growing season: non-persistent vegetation  
.....**SEE KEYS TO LACUSTRINE OR RIVERINE COMMUNITIES**
25. Communities with persistent emergent vegetation.....26

## MARSHES

26. Marshes in temporary impoundments created by beaver dams  
.....(16) **BEAVER FLOWAGE COMMUNITY**
26. Permanent marshes, not entirely dependent on beaver dams.....27
27. Shrubs dominant  
.....(17) **SHRUB SWAMP COMMUNITY**
27. Graminoids dominant.....28
28. *Typha* dominant  
.....(18) **CATTAIL MARSH COMMUNITY**
28. Sedges or grasses dominant; low shrubs may also be present.....29
29. *Carex stricta* dominant; marshes with accumulations of sedge peat; often along streams or lake edges  
.....(19) **SEDGE MEADOW COMMUNITY**
29. *Carex stricta* absent, or if present not nearly the major dominant; *Calamagrostis canadensis* and *Scirpus* spp. often dominant or codominant; *Dulichium arundinaceum* may be locally dominant; marshes on mineral soil with no or minimal peat accumulation, often along rivers  
.....(20) **GRAMINOID SWALE COMMUNITY**

## SEEPAGE WETLANDS

- 30. Forested.....31
- 30. Not forested.....35
  
- 31. *Salix nigra* dominant or co-dominant with *Alnus incana* ssp. *rugosa*; southern  
Maine  
.....(3) **BLACK WILLOW - ALDER SWAMP COMMUNITY**
- 31. *Salix nigra* absent or uncommon.....32
  
- 32. *Nyssa sylvatica* present; small swamps on gentle slopes, extreme southern  
Maine  
.....(2) **COASTAL PLAIN POCKET SWAMP COMMUNITY**
- 32. *Nyssa sylvatica* not present.....33
  
- 33. *Thuja occidentalis* dominant  
.....(21) **NORTHERN WHITE CEDAR SEEPAGE FOREST  
COMMUNITY**
- 33. *Picea rubens* and/or *Abies balsamea* (occasionally *Acer rubrum*) dominant.....34
  
- 34. Seepage forests on the steep sides of glacial deposits  
.....(22) **OUTWASH SEEPAGE FOREST COMMUNITY**
- 34. Seepage forests on gentle slopes, usually bordering a small stream or grading  
into a basin swamp  
.....(7) **SPRUCE - FIR SWAMP COMMUNITY**
  
- 35. Community of seepy glacial deposits along rivershores; dominants may be  
shrubs or herbs, depending on disturbance history  
.....(23) **RIVERSIDE SEEP COMMUNITY**
- 35. Herb-dominated community of sandy seepy pondshores  
.....(24) **OUTWASH PLAIN POND SHORE COMMUNITY**

## PALUSTRINE COMMUNITIES -- DESCRIPTIONS

### (1) HARDWOOD FLOODPLAIN FOREST COMMUNITY

Hardwood forests that occur on mineral soils in river floodplains. Characteristic trees are *Acer saccharinum*, *Acer rubrum*, *Fraxinus nigra*, and *Fraxinus pennsylvanica*. *Ulmus americana* was formerly a dominant but is now less common. *Quercus macrocarpa* may be characteristic in central Maine; *Juglans cinerea*, *Nyssa sylvatica* and *Salix nigra* in southern Maine. Most floodplain forests are annually flooded in the spring; some flood again in the fall. The higher areas of some floodplain forests may be flooded only irregularly. *Matteucia struthiopteris* is a good herbaceous indicator species; other characteristic herbs include *Onoclea sensibilis*, *Impatiens capensis*. Spring ephemerals such as *Sanguinaria canadensis*, *Erythronium americanum*, *Anemone quinquefolia*, and others may be abundant. Richer floodplains may have *Allium tricoccum*, *Caulophyllum thalictroides*, or other species that require fertile soils. Variations in this community based on the proximity of the water table to the ground surface need documentation.

### (2) COASTAL PLAIN POCKET SWAMP COMMUNITY

Relatively small swamps in catch basins or sloping saddles among low hills of the coastal plain of extreme southern Maine. (This community may very rarely occur among sand dunes as well, in which case it's been referred to as a coastal interdunal swamp.) *Nyssa sylvatica* is characteristic, though not necessarily dominant; *Acer rubrum* and *Tsuga canadensis* (and occasionally *Chamaecyparis thyoides*) are common to dominant. This community occurs both in small basins, with standing water, and on gentle slopes where groundwater seepage maintains saturated conditions. Peat accumulation is minimal, although living *Sphagnum* may be present. *Ilex verticillata* is a common shrub; *Lindera benzoin* may also be found in the shrub layer. More data on the composition and distribution of this community are needed.

### (3) BLACK WILLOW - ALDER SWAMP COMMUNITY

Swamps of small, sometimes ephemeral watercourses and swales, dominated by *Salix nigra* and *Alnus incana* ssp. *rugosa*. Soils are sandy to clayey, and sometimes seepy. *Acer rubrum* is a common associate. This community is restricted to the southern half of the state.

### (4) RED MAPLE SWAMP COMMUNITY

Hardwood swamps that occur in poorly drained basins throughout Maine, usually on inorganic soils. They often occur in association with lakes or peatlands. These swamps are usually flooded in spring; small pools and streams may persist throughout the growing season. Dominant canopy trees are *Acer rubrum*, *Fraxinus pennsylvanica*, *Fraxinus nigra*, and occasionally *Ulmus americana*. The shrub layer is typically well developed and includes *Ilex verticillata*, *Nemopanthus mucronata*, *Cornus sericea*, *Viburnum cassinoides*, *Viburnum recognitum*, and *Vaccinium corymbosum*. The herbaceous layer is often dominated by ferns, including *Osmunda cinnamomea*, *Osmunda regalis*, *Osmunda claytoniana*, and *Onoclea sensibilis*. Other characteristic herbs include *Symplocarpus foetidus*, *Impatiens capensis*, and *Thalictrum polygamum*. This community differs from hardwood floodplain forests in the absence of *Acer saccharinum* and in its location in stream and lake basins rather than along rivers. Red maple swamps usually remain wetter throughout the growing season than floodplain forests.

### (5) ATLANTIC WHITE CEDAR SWAMP COMMUNITY

Forested wetland communities dominated by *Chamaecyparis thyoides* in poorly drained depressions underlain by mineral soil. Shallow *Sphagnum* usually forms the ground layer; commonly associated species include low heath shrubs, *Acer rubrum*, *Vaccinium corymbosum*, *Ilex verticillata*, and in southernmost Maine *Clethra alnifolia* and *Ilex laevigata*. Atlantic White Cedar swamps are limited to the coastal plain of southern Maine, extending at most 50 km inland.

Atlantic White Cedar may also occur as a component of the Forested Bog community, in which case it grows in deep peat rather than mineral soil.

(6) NORTHERN WHITE CEDAR SWAMP COMMUNITY

Forests dominated by *Thuja occidentalis* in poorly drained basins, often around the perimeter of small ponds or open peatlands. Substrate is peat of varying depths (hence this community is sometimes called a cedar "bog"). *Thuja* may form nearly pure stands, or it may be variously mixed with other trees including *Acer rubrum*, *Tsuga canadensis*, *Abies balsamea*, *Larix laricina* and *Picea mariana*. The shrub layer is generally sparse. The groundlayer typically features a high diversity of bryophytes and boreal herbs. *Thuja* swamps typically occur in more alkaline settings than other conifer swamps; particularly high-pH ("rich") areas, also called "forested fens", include rare or unusual calciphilic orchids such as *Cypripedium reginae*, *Cypripedium calceolus*, or *Amerorchis rotundifolia*. This community might be confused with a Northern White Cedar Seepage Swamp; the latter occurs on gentle slopes and does not have peaty soils. Vegetational differences between the two communities need documentation.

(7) SPRUCE-FIR SWAMP COMMUNITY

Forests dominated by *Picea rubens* and/or *Abies balsamea* in stagnant basins or bordering small streams. Alluvial deposits are minor. *Acer rubrum*, *Thuja occidentalis*, *Picea mariana*, or *Larix laricina* are common associates. The shrub layer is usually sparse. *Osmunda cinnamomea* is a frequent dominant in the herb layer. Spruce-fir swamps are distinguished from spruce-fir flats, an upland community, by their hydric soils, lower elevation, and greater importance of *Sphagnum* in the ground layer. This definition of Spruce-Fir Swamp includes both "basin swamps", with somewhat stagnant standing water, and "seepage swamps" on gentle slopes, where soils remain saturated through groundwater seepage. (Most known seepage spruce-fir swamps grade into basin spruce-fir swamps.) With more data on vegetational differences (if any) between basin spruce-fir swamps and seepage spruce-fir swamps, separation as distinct communities may be justified.

(8) FORESTED BOG COMMUNITY

Forested *Sphagnum* peatland communities dominated by dense, though sometimes patchy, *Picea mariana* and *Larix laricina*. In rare cases, *Chamaecyparis thyoides*, *Pinus banksiana*, or *Pinus rigida* may be dominant tree species. Low heath shrubs occupy gaps between the trees. Along with the *Sphagnum* spp., *Carex trisperma* dominates the ground layer. Because of the paucity of available nutrients, the trees are slow-growing and generally under 40' tall. This community often grades into more open peatland communities such as the Dwarf Shrub Bog community.

(9) PEATLAND LAGG COMMUNITY

Peatland community dominated by tall shrubs occupying the very wet peatland perimeter (the lagg). Conditions are more minerotrophic than in the interior of most peatlands due to runoff from adjacent uplands. Dominant species include *Alnus rugosa*, *Salix* spp., *Myrica gale*, and sometimes *Vaccinium corymbosum*. In cooler regions, *Nemopanthus mucronata* is also common. This community is best developed around raised peatlands. In extreme southern Maine *Clethra alnifolia* and/or *Ilex laevigata* may occur in this community. Differences between this community and the shrub swamp community (other than the presence/absence of a sphagnum substrate) need study.

(10) ALPINE BOG-MEADOW COMMUNITY

High elevation bogs or wet meadows in small basins or gently sloping terrain. Most are fed by fog, precipitation, and water draining from alpine ridges; less common are meadow-like areas are fed by alpine springs. Vegetation is dominated by low shrubs (*Kalmia polifolia*, *Chamaedaphne calyculata*, *Ledum groenlandicum*) and graminoids (*Eriophorum spissum*, *Carex bigelowii*, and/or *Scirpus cespitosus*) growing in *Sphagnum*. *Rubus chamaemorus* or *Gecaulon lividum*, rare in Maine, may occur in this community. (Some examples of this community may be considered

terrestrial since peats are shallow and may dry out during the growing season.) Further work is needed to determine whether the "bog" and "meadow" variants should be treated as distinct communities.

**(11) MARITIME SLOPE BOG COMMUNITY**

Bogs on sloping bedrock of outer peninsulas and islands of extreme eastern Maine. Frequent fog and relatively high precipitation allow peatland development in these conditions, even though the setting is not a true basin as are most peatlands. The peats are typically shallow and often do not remain saturated throughout the year (hence this community is sometimes considered terrestrial rather than palustrine). *Empetrum nigrum* and *Rubus chamaemorus* are typical.

**(12) FLOATING KETTLEHOLE BOG COMMUNITY**

*Sphagnum*- and low shrub-dominated vegetation around the edges of, or sometimes filling, kettlehole ponds; the vegetation is more or less floating on the pond surface. *Chamaedaphne calyculata* is usually the dominant shrub. This community is typically a mosaic of shrubby areas and areas with only *Sphagnum*, *Vaccinium macrocarpon* or *V. oxycoccos*, and low herbs. Conditions are more minerotrophic than in the Dwarf Shrub Bog Community (because much of the vegetation is in contact with the pondwater), but less so than in Acid Fens. *Carex* spp., while often present, are not as dominant as they are in fens. This community displays regional variation which needs more study: in southern Maine examples of this community, one may find rare or unusual species such as *Peltandra virginica* and *Woodwardia virginica*.

**(13) DWARF SHRUB BOG COMMUNITY**

Peatland community characteristic of ombrotrophic parts of *Sphagnum* bogs throughout Maine, usually in raised peatlands where it may cover large expanses. The dominant species are low heath (ericaceous) shrubs such as *Ledum groenlandicum*, *Kalmia angustifolia*, *Kalmia polifolia*, *Andromeda glaucophylla*, and *Chamaedaphne calyculata* growing in deep *Sphagnum*. *Eriophorum spissum* is the most frequent sedge. Variations in floristic composition relate to peatland morphology and development. The vegetation frequently forms a hummock-and-hollow topography, with the drier hummocks supporting *Polytrichum* mosses and *Cladonia* lichens. Scattered, mostly stunted *Picea mariana* and *Larix laricina* are usually present. Other characteristic species include the insectivores *Sarracenia purpurea*, *Drosera rotundifolia*, and *Drosera intermedia*.

**(14) MOSS LAWN BOG COMMUNITY**

Saturated, often ponded, portions of raised bogs where bryophytes (*Sphagnum*, other mosses, and certain liverworts such as *Cladopodiella fluitans*) are the dominant cover. Herbs and low shrubs are sparse or absent.

**(15) PLATEAU BOG LAWN COMMUNITY**

Peatland community found on the raised, flat to undulating centers of coastal plateau peatlands, dominated by *Scirpus cespitosus* in *Sphagnum*. *Empetrum nigrum* may occur in patches.

**(16) ACIDIC FEN COMMUNITY**

Graminoid- and shrub- dominated *Sphagnum* peatland community with groundwater at or just above the surface. Nutrients are supplied by acidic groundwater seepage; the volume and chemistry of the water in contact with the vegetation affects floristic composition. Acidic fens, also called "poor fens", are less nutrient-rich than circumneutral fens; pH is generally well below 6.0. Characteristic sedges include *Carex oligosperma*, *Carex paupercula*, *Carex pauciflora*, *Carex limosa*, *Eriophorum angustifolium* and *Rhynchospora alba*. *Menyanthes trifoliata*, *Andromeda glaucophylla*, and *Scheuchzeria palustris* are also characteristic. *Chamaedaphne calyculata* may be a common shrub; in alluvial fens, *Myrica gale* is also common. Acidic fen communities dominate most ribbed or patterned fen ecosystems, but are also common in any part of a peatland in contact

with moving water, such as around the margins of inland raised bogs, and in some alluvial marshes. Vegetational variations related to these different settings need documentation.

**(17) CIRCUMNEUTRAL FEN COMMUNITY**

Circumneutral fens (sometimes called "rich fens") are physiognomically similar to acidic fens, but the calcium-enriched groundwater allows a different floristic composition which can often include rare species. (These fens are sometimes called "calcareous fens", but very few in Maine have a pH much above 7.) *Scirpus hudsonianus*, *Juncus stygius*, *Carex diandra*, *Carex livida*, and *Potentilla fruticosa* are among the characteristic species. Circumneutral fen communities occur both in ribbed and unpatterned fen ecosystems, occur as part of a large peatland complex, and occasionally occur in an alluvial marsh complex. As defined here, circumneutral fens do not include forested areas; circumneutral forested peatlands are Northern White Cedar Swamp communities.

**(18) BEAVER FLOWAGE COMMUNITY**

Temporary marshes and impoundments created by beaver dams. The vegetation will vary depending on the topography of the basin. Impoundments may have floating-leaved and emergent aquatics; there may be standing dead trees if the site was forested prior to flooding. Graminoid wet meadows are also common. Beaver flowages can mimic other wetlands but are not as permanent.

**(19) SHRUB SWAMP COMMUNITY**

Communities of tall, often dense shrubs on the flat borders of water bodies or open wetlands, in mineral soil or muck. This community appears to be quite variable in Maine; more data are needed on species assemblages. Species that are characteristic (in various combinations) include *Alnus incana* ssp. *rugosa*, *Salix* spp., *Cornus sericea*, *Cornus amomum*, and *Myrica gale*. In southern Maine, *Vaccinium corymbosum* and *Cephalanthus occidentalis* may be common associates; circumneutral settings in southern Maine may support *Lindera benzoin* or *Saxifraga pennsylvanica*.

**(20) CATTAIL MARSH COMMUNITY**

Wetlands in protected parts of open basins (usually lakes or slow streams) with large areas dominated by *Typha latifolia*. Other tall herbs may be present in varying amounts. Soils are mineral or muck, not peat. Water depths are mostly over 6"; there is standing water for most or all of the year. These marshes can be important breeding areas for bitterns, Sora or Virginia rails, and other waterbirds.

**(21) SEDGE MEADOW COMMUNITY**

A sedge-dominated marsh occurring on peat or muck soils that are permanently saturated and usually seasonally flooded. Dense, large tussocks of *Carex stricta* dominate most of the community; *Calamagrostis canadensis* and *Scirpus* spp. are common associates. In lower areas near open water, *Scirpus cyperinus*, *Scirpus atrovirens*, and *Dulichium arundinaceum* may be dominant. Sedge meadows typically occur along slow streams and near the inlets and outlets of lakes and ponds. This community may be covered with water during flooding, but there may be little or no open water when water levels are low. Sedge meadows may contain as much as 25% shrub, a community sometimes referred to as "shrub meadow". Rare animals associated with sedge meadows include the Yellow Rail (*Coturnicops noveboracensis*), the mayfly *Siphonisca aerodromia*, and the Dorcas Copper butterfly (*Lycaena dorcas claytoni*).

**(22) GRAMINOID SWALE COMMUNITY**

Community dominated by graminoids on permanently saturated, mineral soils with little accumulation of peat. The community may include areas with tall graminoids and/or areas with short graminoids. In the tall-graminoid areas, *Calamagrostis canadensis* is a common dominant; *Scirpus rubrotinctus*, *S. cyperinus*, and *Carex lacustris* are common sedges. *Iris versicolor*, *Veratrum*

*viride*, and *Caltha palustris* are frequent minor associates. Short-graminoid areas are dominated by *Dulichium arundinaceum*. These swales, which are flooded during times of high water but near or above the water level for most of the growing season, typically occur along river or stream channels where disturbance is sufficient to prevent peat accumulation. The short-graminoid areas are usually closer to the channel than the tall-graminoid areas. This community differs from a Sedge Meadow in the lesser importance of *Carex stricta* here and in the mineral, rather than sedge peat, substrate. It differs from the Tall Meadow community (terrestrial) in the permanently saturated soils and in the greater abundance of sedges.

**(23) NORTHERN WHITE CEDAR SEEPAGE FOREST COMMUNITY**

Forests dominated by *Thuja occidentalis*, sometimes with admixtures of *Picea rubens* or *Abies balsamea*, on gentle slopes with seepage of cold, minerotrophic groundwater. Seepage water may be visible at the ground surface as rivulets or small, spring-fed brooks. Calcium-rich soils will be strongly dominated by *Thuja occidentalis*. Shrubs are usually sparse. The ground layer may be herbs and/or *Sphagnum*; typical species include *Thelypteris palustris*, *Mitella nuda*, *Dryopteris phegopteris*, and *Viola renifolia*. This community is prime habitat for *Calypso bulbosa*, which may occur on drier hummocks. Northern White Cedar Seepage Forests occur in different topographic settings than Northern White Cedar Swamps; vegetational differences are less clear and need documentation.

**(24) OUTWASH SEEPAGE FOREST COMMUNITY**

Seepage forests on the steep sides of some glacial deposits (e.g. outwash plains and eskers), where water emerges after being diverted by clay lenses in the sand and gravel. Dominant trees are *Picea rubens*, *Abies balsamea*, and/or *Acer rubrum*. Common shrubs include *Alnus incana* ssp. *rugosa*, *Viburnum cassinoides*, and, in northern Maine, *Acer spicatum*. Known locations are in Washington County, York County, and perhaps along some northern rivershores, but more data are needed to adequately describe this community.

**(25) RIVERSIDE SEEP COMMUNITY**

On the shores of larger rivers, where flood scouring maintains semi-open groundwater discharge sites. All of the known examples are in circumneutral substrates such as newly weathering glacial till. The seepage creates a fen-like environment that can support a number of rare plant species. *Tofieldia glutinosa*, *Parnassia glauca*, and *Carex hassei* are characteristic species; rare species along the St. John and Aroostook rivers include *Primula mistassinica*, *Pedicularis furbishiae*, and *Arnica mollis*.

**(26) OUTWASH PLAIN POND SHORE COMMUNITY**

Herb-dominated communities on the sandy shores of shallow ponds in outwash plains of (mostly) southern Maine. The water level may drop considerably or fluctuate over the course of the growing season, but substrates generally remain moist due to groundwater recharge. Typical plants include rushes (*Juncus* spp.), *Dulichium arundinaceum*, *Fimbristylis autumnalis*, *Gratiola aurea*, *Scirpus americanus*, *Scirpus purshianus*, *Cladium mariscoides* and *Rhexia virginica*. Rare plants which may be associated with this community include *Lindernia anagallidea*, *Hemicarpha micrantha*, and *Utricularia resupinata*. For pond-bottom or lake-bottom vegetation which is under water for most of the growing season, see the Lacustrine Shallow Bottom Community.

**(27) VERNAL POOL COMMUNITY**

Small, shallow wetland depressions in upland forests, isolated from other surface water, which flood in the spring and sometimes in the fall but typically dry out in summer. These areas might properly be considered as an inclusion in the upland forest community; however, they are tracked as a separate community type here because of their importance as breeding grounds for amphibians (*Rana sylvatica*, *Bufo americanus*) and certain invertebrates. Vegetation needs further study.

## KEY TO LACUSTRINE COMMUNITIES

1. High-elevation ponds (above treeline) with clear, cold, fairly acidic waters; typically deeply bowl-shaped and with little vegetation  
       .....(1) **TARN COMMUNITY**
1. Communities without the above characteristics.....2
2. Small, highly productive ponds with warm water and abundant algae; *Lemna* often covering much of surface  
       .....(2) **EUTROPHIC POND COMMUNITY**
2. Communities without the above characteristics.....3
3. Small ponds with highly acidic, dark colored (tannic) water; associated with peatlands  
       .....(3) **BOG POND COMMUNITY**
3. Communities without the above characteristics.....4
4. Highly alkaline (> 50 ppm) lakes, often with *Chara* spp., *Potamogeton filiformis*, or *Potamogeton vaginatus* as indicator species; rare  
       .....(4) **ALKALINE POND COMMUNITY**
4. Communities without the above characteristics; most Maine lakes and ponds.....5
5. Communities dominated by emergent vegetation.....6
5. Open water dominant.....7
6. *Scirpus* spp. (bulrushes) dominant  
       .....(10) **RUSH BED COMMUNITY**
6. Other emergents dominant, usually including some broad-leaved species (e.g. *Pontederia cordata*)  
       .....(11) **LACUSTRINE EMERGENT COMMUNITY**
7. Benthic community of shallow sandy to muddy bottoms, dominated by small rosette plants such as *Eriocaulon septangulare*  
       .....(12) **SHALLOW LAKE BOTTOM COMMUNITY**
7. Limnetic communities.....8
8. Monomictic, shallow lakes (maximum depth < 7 m).....9
8. Deeper lakes (maximum depth > 10 m).....10

9. Waters clear, bottom usually visible, sandy; floating plants rarely abundant  
.....(5) **MONOMICTIC OLIGOTROPHIC LAKE COMMUNITY**
9. Waters clear to cloudy, submersed and floating macrophytes may be common; bottom typically with some organic sediments (muck)  
.....(6) **MONOMICTIC MESOTROPHIC LAKE COMMUNITY**
10. Small, deep kettlehole lakes, permanently stratified; biotically depauperate; only one Maine example known  
.....(7) **MEROMICTIC LAKE COMMUNITY**
10. Dimictic lakes.....11
11. Waters usually clear, aquatic plants and algae sparse or absent; Secchi disk readings typically 4-8 m  
.....(8) **DIMICTIC OLIGOTROPHIC LAKE COMMUNITY**
11. Waters generally cloudy by midsummer; aquatic plants and algae often common; Secchi disk readings typically 2-4 m  
.....(9) **DIMICTIC MESOTROPHIC LAKE COMMUNITY**

## LACUSTRINE COMMUNITIES -- DESCRIPTIONS

Note: These communities are mostly called "lake communities" (except for those characteristic of small ponds), but most can apply to both lakes and ponds, as those terms are used in the vernacular. The descriptions are skeletal only. Additional data on invertebrate, fish, and algal species (as well as on plant species) would be greatly appreciated.

Except for alkaline (hardwater) lakes, which are rare in Maine, these lake communities are distinguished by trophic status and turnover characteristics. Other variants (e.g. pH-based) may also exist, but need to be documented. Cultural inputs to most of these lake types can result in increased productivity and greater abundance of plants and algae.

### (1) TARN COMMUNITY

High elevation ponds, generally above treeline, with clear, cold, fairly acidic waters in a small, deep basin. Aquatic plants and algae are sparse. *Salvelinus alpinus* is a characteristic fish.

### (2) EUTROPHIC POND COMMUNITY

Shallow, warm-water, nutrient-rich ponds with abundant macrophytes and algae. Typical plants include *Potamogeton* spp., *Lemna* spp., *Nuphar variegatum*, and *Ceratophyllum* spp. Naturally eutrophic ponds in Maine are generally small; the eutrophication of larger lakes is due mostly to cultural inputs.

### (3) BOG POND COMMUNITY

Shallow, unstratified, low productivity (monomictic dystrophic) lakes darkly colored with tannic and humic acids. The acidic conditions slow decay, resulting in accumulation of muck on the lake bottom. Plant and animal species richness is low; the dominant organisms may include floating plants such as *Nymphaea odorata*, *Nuphar variegatum*, and *Brasenia schreberi*. (These plants are associated with other lake communities as well, however.) These acidic lakes are typically associated with peatlands.

### (4) ALKALINE POND COMMUNITY

"Hardwater" lakes or ponds with alkalinities ( $\text{CaCO}_3$ ) greater than 50 ppm. These are rare in Maine, being more or less restricted to the limestone belt in southern Aroostook County. The alkaline waters may support distinctive flora including *Chara* spp. and the pondweeds *Potamogeton filiformis* and *P. vaginatus*. This community includes so-called marl ponds (only two of which are currently known in Maine), where carbonate ions precipitate, forming a calcium-rich marl deposit.

### (5) MONOMICTIC OLIGOTROPHIC LAKE COMMUNITY

Open water and benthic community of shallow, low-productivity lakes that are typically unstratified. These lakes are characterized by high transparency and few floating plants and algae. Macrophyte species may include *Utricularia purpurea*, *Potamogeton epihydrus*, *Myriophyllum tenellum*, and *Nuphar variegatum*.

### (6) MONOMICTIC MESOTROPHIC LAKE COMMUNITY

Open water and benthic community of shallow (less than 5 m maximum depth), medium-productivity lakes that are typically unstratified. Rooted aquatic plants and algae are present in moderate numbers. Typical macrophytes include *Potamogeton* spp., *Polygonum amphibium*, *Nymphaea odorata*, *Nuphar variegatum*, and *Brasenia schreberi*. Mean summer Secchi disk readings are usually between 3.5 and 6 m.

(7) **MEROMICTIC LAKE COMMUNITY**

Small, deep lakes in which the waters are so protected from winds that they do not mix, and become permanently chemically stratified. The one known example in Maine is a kettlehole. The bottom is anoxic, with high levels of dissolved salts, and as a result biotically depauperate.

(8) **DIMICTIC OLIGOTROPHIC LAKE COMMUNITY**

Open water and benthic community of low-productivity lakes that turn over twice a year. These are typically deep (maximum depth greater than 12 m). Waters are clear, with mean summer Secchi disk readings usually greater than 6.5 m. Aquatic plants and algae are absent or sparse; as a result, the sediments are low in organic matter. Oxygen levels are typically high. Shallow spots may have bottom vegetation similar to that of monomictic oligotrophic lakes.

(9) **DIMICTIC MESOTROPHIC LAKE COMMUNITY**

Open water and benthic community of medium-productivity lakes that turn over twice a year; most have a maximum depth of more than twelve meters. Water transparency varies seasonally; mean summer Secchi disk readings are usually between 3.5 and 6 m. Sediments are higher in organic matter than in oligotrophic lakes. Plant species composition is similar to that of monomictic mesotrophic lakes.

(10) **RUSH BED COMMUNITY**

Wetlands usually found near inlets and outlets of larger lakes, dominated by tall bulrushes (including *Scirpus validus*, *Scirpus americanus*, and/or *Scirpus acutus*). Other emergents may occur in lesser amounts (see the Lacustrine Emergent community). Water depths are mostly over 6'; there is standing water for most or all of the year.

(11) **LACUSTRINE EMERGENT COMMUNITY**

A community dominated by non-persistent emergents, and often with floating macrophytes along protected portions of lakeshores with standing water throughout the year. The vegetation is a mixture of broad-leaved emergents, rushes, and floating plants. Characteristic emergent species include *Pontederia cordata*, *Sparganium eurycarpum*, *Zizania aquatica*, *Nymphaea odorata*, *Nuphar variegatum*, and *Bidens* spp. Submersed species may include *Potamogeton* spp., *Ceratophyllum demersum*, *Utricularia vulgaris*, etc. This community is generally associated with other alluvial marsh communities. Except for its inclusion in the lacustrine rather than the riverine system, this community appears to be essentially the same as the Riverine Emergent Community.

(12) **LACUSTRINE SHALLOW BOTTOM COMMUNITY**

Sandy (or somewhat muddy) shallows of lakes and ponds, where sufficient light penetrates to allow growth of aquatic bed vegetation. The community is dominated by small rosette-forming plants such as *Eriocaulon septangulare*, *Lobelia dortmanna*, and *Isoetes* spp. Plants are occasionally exposed at very low water levels. *Heteranthera dubia*\*, *Subularia aquatica*\* and *Littorella americana*\* have been found associated with this community.

## KEY TO RIVERINE COMMUNITIES

1. Small, first-order channels with water only in the spring or after heavy rain  
       .....(1) **INTERMITTENT STREAM COMMUNITY**
1. Communities of small to large channels with continuously flowing water.....2
2. Dark-colored, highly acidic streams draining peatlands; biota depauperate  
       .....(2) **PEATLAND OUTLET STREAM COMMUNITY**
2. Waters not both dark-colored and highly acidic.....3
3. Emergent or submersed vegetation absent or uncommon (except for a few species such as *Fontinalis* spp. or *Podostemon ceratophyllum* which can grow attached to rocks in fast water); waters usually of medium to high velocity.....4
3. Macrophytes (emergent or submersed) common; waters of low velocity.....28
4. High-gradient streams; flatwater section, if present, confined to pools between sections of riffles.....5
4. Lower-gradient rivers or streams, predominantly flatwater.....6
5. Small (first- or second-order) streams with rocky beds; erosion mostly headward  
       .....(3) **ROCKY HEADWATER STREAM COMMUNITY**
5. Larger (third- or fourth-order) streams; substrates various; erosion mostly lateral  
       .....(4) **MIDREACH STREAM COMMUNITY**
6. Small marshy brooks (1st or 2nd order) flowing slowly through wetlands  
       .....(5) **MARSH HEADWATER STREAM COMMUNITY**
6. Larger streams or rivers.....7
7. Wide, midreach sections (usually third- or fourth-order) with extensive flatwater, where water is slowed or still due to natural dams or channel constriction  
       .....(6) **DEADWATER COMMUNITY**
7. Main channel of rivers (generally fifth-order or greater); flatwater sections may be interrupted by occasional riffles, falls, or rapids  
       .....(7) **MAIN CHANNEL RIVER COMMUNITY**
8. Emergent and submerged vegetation in stagnant backwaters partially cut off from the main channel; algae typically abundant  
       .....(8) **BACKWATER SLOUGH COMMUNITY**
8. Emergent (and sometimes submerged) vegetation growing along shores of main channel  
       .....(9) **RIVERINE EMERGENT COMMUNITY**

## RIVERINE COMMUNITIES -- DESCRIPTIONS

Note: These descriptions are skeletal only. Any information on associated biota, or suggestions for reorganizations, would be greatly appreciated. Also note that a river or stream will have more than one of these communities along its length; even within the same stretch of the river, open-water communities are distinguished from those with emergent or floating plants.

(1) **INTERMITTENT STREAM COMMUNITY**

Small, ephemeral streams with moderate to steep gradients, where water flows only in the spring or after a heavy rain.

(2) **PEATLAND OUTLET STREAM COMMUNITY**

Small, cold, strongly colored streams that are high in tannic and humic acids. The biota of these streams is depauperate. More data are needed.

(3) **ROCKY HEADWATER STREAM COMMUNITY**

Small first- and second-order rocky streams with moderate to steep gradients and cold water. Most of the erosion is headward, and deposition is minimal. Gorges and waterfalls may be present where the streambed lies over bedrock.

(4) **MIDREACH STREAM COMMUNITY**

Third- and fourth-order streams with a well-defined pattern of pools and riffles. Most of the erosion is lateral. Small waterfalls and springs may be present. Variants based on substrate need documentation.

(5) **MARSH HEADWATER STREAM COMMUNITY**

Small, slow, first- and second-order marshy brooks with low gradients and cool to cold water, flowing through wetlands. The substrate is gravel or sand, with silt or peat/muck deposits along the shore.

(6) **DEADWATER COMMUNITY**

Wide, flatwater sections of headwater and midreach streams where natural dams or constrictions in the river channel have caused partial impoundments. Waters are very slow, bottoms are sandy to silty, and oxygen levels are comparatively low.

(7) **MAIN CHANNEL RIVER COMMUNITY**

Large, usually quiet, open-water sections of major rivers, fifth-order or higher, extending downstream to the upper limit of the head of tide. Main channel rivers may have meanders and/or alternating sections of erosion and deposition, depending on channel morphology. Riffles, if present, are typically separated by stretches of flatwater. Substrate varies from gravels and sands to silt, depending on hydrology and geomorphology. Main channel river segments can be important habitats for anadromous fish. Variants of this community based on substrate need documentation.

(8) **BACKWATER SLOUGH COMMUNITY**

The aquatic community of sloughs or bogs in embayments and old meanders partially cut off from the main river channel. Waters are quiet, often stagnant, and aquatic vegetation is typically abundant.

(9) **RIVERINE EMERGENT COMMUNITY**

A community of non-persistent emergents, and/or submerged or floating macrophytes, growing along protected rivershores where there is standing water throughout the year. Vegetation is a mixture of broad-leaved emergents, rushes, and floating plants. Characteristic species include *Pontederia cordata*, *Sparganium eurycarpum*, *Zizania aquatica*, *Ceratophyllum demersum*, *Nymphaea odorata*, *Nuphar variegatum*, and *Bidens* spp. Except for its inclusion in the riverine rather than the lacustrine system, this community appears to be essentially the same as the Lacustrine Emergent Community.

## KEY TO ESTUARINE COMMUNITIES

1. Communities associated with saltmarshes (intertidal areas where peat accumulates and where *Spartina alterniflora* or *Spartina patens* dominates over large areas).....2
1. Other estuarine communities.....5
2. Ponds or creeks, lacking persistent emergent vegetation.....3
2. Communities dominated by persistent emergent vegetation.....4
3. Permanent creek draining the marsh  
       .....(2) **TIDAL CREEK COMMUNITY**
3. Small ponds formed by beach ridges at the seaward end of saltmarshes  
       .....(1) **BRACKISH POND COMMUNITY**
4. Saltmarsh with at least half of the vegetation dominated by cordgrass (*Spartina alterniflora*); vegetation in banded patterns; small to medium sized marshes in estuary pockets or along eroding banks  
       .....(3) **CORDGRASS SALTMARSH COMMUNITY**
4. Saltmarsh with at least half of the vegetation dominated by salt hay, *Spartina patens*; *Spartina alterniflora* mostly confined to creek borders; vegetation in mosaic patterns; medium sized to very large marshes behind barrier beaches or along the outer reaches of estuaries  
       .....(4) **SALT HAY SALTMARSH COMMUNITY**
5. Subtidal  
       .....(5) **SUBTIDAL ESTUARY COMMUNITY**
5. Intertidal to barely supratidal.....6
6. At heads of estuaries; water usually fresh (salinity < 0.5 ppt); obligate freshwater plants (*Iris versicolor*, *Acorus calamus*, *Nuphar variegatum*) usually present  
       .....(6) **FRESHWATER TIDAL MARSH COMMUNITY**
6. Water brackish; freshwater indicator plants absent  
       .....(7) **BRACKISH TIDAL MARSH COMMUNITY**

## ESTUARINE COMMUNITIES -- DESCRIPTIONS

### (1) BRACKISH POND COMMUNITY

Small ponds formed where beach ridges form natural dams at the heads of saltmarshes. Salinity is between 0.5 and 18 ppt. Data on flora and fauna are needed.

### (2) TIDAL CREEK COMMUNITY

The aquatic community of a permanent, usually sinuous creek that drains a saltmarsh. The water is brackish to saline. The creek bottom is permanently flooded. The vertical banks, exposed at low tide, are regularly eroded and slump into the creek bed. Faunal data are needed.

### (3) CORDGRASS SALTMARSH COMMUNITY

Small, geologically young (five years to a few hundred years) saltmarshes found in pockets along larger rivers (some "fluvio-major" saltmarshes) or along eroding coastal banks ("bluff-fringing" marshes and "transitional" marshes). Peat is typically a superficial layer over late-glacial silts and clays. At least 50% of the marsh is *Spartina alterniflora* dominated (low marsh); vegetation forms banded, rather than mosaic, patterns. These marshes tend to be geologically unstable. Species richness is lower than in salt hay saltmarshes.

### (4) SALT HAY SALTMARSH COMMUNITY

Large saltmarshes associated with beach-dune systems ("back-barrier" marshes) or the outer reaches of estuaries ("fluvio-minor" and some "fluvio-major" marshes) that are several hundred to thousands of years old. Peat is typically several meters thick. Vegetation is a mixture of various species associations forming a mosaic pattern; *Spartina patens* is usually an important species. High-marsh meadow (i.e., vegetation dominated by graminoids other than *Spartina alterniflora*) covers at least 50% of the marsh. Low-marsh vegetation (dominated by *Spartina alterniflora*) commonly lines the tidal creeks draining the marsh. These saltmarshes typically have higher species richness than cordgrass saltmarshes.

### (5) SUBTIDAL ESTUARY COMMUNITY

Subtidal portions of an estuary, generally with no emergent vegetation. Areas less than 2 m deep at low tide may support submerged or floating plants; deeper areas lack vascular plants entirely. Along with the salinity gradient from the head of tide to the river's mouth, there is a vertical salinity gradient-- a layer of fresh water overlying a "wedge" of brackish to saline water. Point-to-point salinities are constantly varying as the wedge of brackish water rises and falls with the tides. Characteristic fishes include striped bass (*Morone saxatilis*), American shad (*Alosa sapidissima*), and alewife (*Alosa pseudoharengus*).

### (6) FRESHWATER TIDAL MARSH COMMUNITY

Intertidal marshes at the heads of estuaries, upstream of the limit of brackish water. There may be up to three somewhat distinct vegetation zones: expansive mudflats dominated by low, rosette-forming plants (*Eriocaulon parkeri*, *Limosella australis*, *Crassula aquatica*) at the lowest intertidal level, marshes dominated by tall graminoids (*Typha angustifolia* and *Scirpus pungens*, among others) at mid-tidal elevations, and muddy rocky shores, sparsely vegetated with low herbs (*Bidens* spp., *Samolus parviflorus*, *Lobelia cardinalis*), at the highest intertidal elevations. *Zizania aquatica* may be locally common.

(7) **BRACKISH TIDAL MARSH COMMUNITY**

Intertidal reaches in coastal impoundments, or between saltmarshes and freshwater marshes in larger tidal rivers, where salinity is generally 0.5 - 18 ppt. As with the freshwater tidal marshes, there may be up to three somewhat distinct vegetation zones: broad mudflats dominated by low, rosette-forming plants at the lowest intertidal level, marshes dominated by tall graminoids at mid-tidal elevations, and muddy gravel or rock shores, sparsely vegetated with low herbs, at the highest intertidal elevations. Some of the characteristic mudflat species are considered rare in Maine, including *Lilaeopsis chinensis*, *Sagittaria calycina* var. *spongiosa*, and *Limosella subulata*. *Zizania aquatica*, *Scirpus* spp., *Sagittaria latifolia*, and *Sium suave* are typical tall marsh species. The upper shore zone frequently supports rare plant species, such as *Cardamine longii* and *Samolus parviflorus*, along with more common herbs such as *Bidens* spp. Brackish tidal marshes are distinguished from freshwater tidal marshes by the absence of obligate freshwater species such as *Nuphar variegatum*, *Iris versicolor*, and *Acorus calamus*. The downstream limit of this community is usually marked by the dominance of *Spartina alterniflora* along tidal creeks or riverbanks.

## KEY TO MARINE COMMUNITIES

|    |                                                                                                                                             |   |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1. | Intertidal communities.....                                                                                                                 | 2 |
| 1. | Subtidal communities.....                                                                                                                   | 6 |
| 2. | Substrate bedrock or boulders<br>.....(1) <b>INTERTIDAL BEDROCK/BOULDER COMMUNITY</b>                                                       |   |
| 2. | Substrate mud, sand, gravel, or cobbles.....                                                                                                | 3 |
| 3. | Low-energy flats protected from wave exposure.....                                                                                          | 4 |
| 3. | Higher-energy beaches, exposed to incoming waves.....                                                                                       | 5 |
| 4. | Substrate fine-grained, primarily mud, silt, or clay with lesser amounts of sand or gravel<br>.....(2) <b>INTERTIDAL MUD FLAT COMMUNITY</b> |   |
| 4. | Substrate primarily sand or gravel<br>.....(3) <b>INTERTIDAL SAND-GRAVEL FLAT COMMUNITY</b>                                                 |   |
| 5. | Substrate sand<br>.....(4) <b>SAND BEACH COMMUNITY</b>                                                                                      |   |
| 5. | Substrate gravel or cobble<br>.....(5) <b>GRAVEL-COBBLE BEACH COMMUNITY</b>                                                                 |   |
| 6. | Coastal pond behind a natural constriction, water euhaline (salinity > 30 ppt); rare<br>.....(6) <b>SALT POND COMMUNITY</b>                 |   |
| 6. | Subtidal areas with normal water circulation.....                                                                                           | 7 |
| 7. | Fine-textured bottoms, mostly mud<br>.....(7) <b>MUD BOTTOM COMMUNITY</b>                                                                   |   |
| 7. | Substrate coarser-textured.....                                                                                                             | 8 |
| 8. | Substrate mostly sand<br>.....(8) <b>SAND BOTTOM COMMUNITY</b>                                                                              |   |
| 8. | Substrate coarser-textured.....                                                                                                             | 9 |
| 9. | Substrate mostly cobbles<br>.....(9) <b>COBBLE BOTTOM COMMUNITY</b>                                                                         |   |
| 9. | Substrate ledge or boulders<br>.....(10) <b>ROCK BOTTOM COMMUNITY</b>                                                                       |   |

## MARINE COMMUNITIES -- DESCRIPTIONS

### (1) INTERTIDAL BEDROCK-BOULDER COMMUNITY

Bedrock ledges or fields of large boulders along exposed shorelines, often dominated by dense growths of attached seaweeds. Wave action influences zonation: in high-energy areas, four distinct zones (the splash zone, barnacle zone, rockweed zone, and *Chondrus* zone) are typically present. Low-energy areas, protected from wave action, typically lack zonation, and may have a layer of silt coating the rocks and seaweeds. High-energy ledges are typically more diverse than low-energy ledges. Characteristic invertebrate species of intertidal ledges include *Anurida maritima* in the splash zone, and *Balanus balanoides*, *Littorina saxatilis*, *L. obtusata*, *L. littorina*, *Thais latillus*, *Acmaea testudinalis*, and *Mytilus edulis* in the intertidal. Typical large seaweeds (algae) include *Fucus* spp., *Ascophyllum nodosum*, *Laminaria* spp., *Alaria* spp., and *Chondrus crispus*. Tide pools and pockets of finer sediments, which may have distinctive fauna, are common in boulder fields.

### (2) INTERTIDAL MUD FLAT COMMUNITY

Fine-grained flats found in coves, inlets, and other protected, low-energy coastal sites. The relatively stable sediments include various proportions of silt, clay, sand, and organic material. These communities are generally very productive, and invertebrate species diversity is higher than in other intertidal habitats. Characteristic species include the gastropods *Hydrobia truncata* and *Macoma baltica*, polychaetes *Streblospio benedictii* and *Nereis virens*, and from Casco Bay eastward the amphipod *Corophium volutator*. Under certain conditions (warm temperatures and minimal wave action), dense mussel (*Mytilus edulis*) populations may develop; these are sometimes called "mussel bars". Other invertebrates associated with the mussels include *Polydora ligna*, *Eleone loga*, *Harmothoe* spp., and *Carcinus maenas*.

### (3) INTERTIDAL SAND-GRAVEL FLAT COMMUNITY

Flats that form in areas with minimal wave exposure, composed primarily of sand and gravel. They generally have a slight slope and rippled surface. Species richness is relatively high, but productivity is considerably lower than the intertidal mudflats. *Mya arenaria* and the polychaetes *Nereis virens*, *Pygospio elegans*, and *Scolecopoides viridis* are characteristic invertebrates.

### (4) SAND BEACH COMMUNITY

Beaches consisting entirely of sand and exposed to high wave energy. They extend from the mean low water mark to the wrack line. Well sorted, constantly shifting sand results in a depauperate biota in the intertidal zone. A variety of polychaetes, including *Scoloplos* spp., *Nephtys caeca*, *Paraonis fulgens*, and *Ophelia bicornis*, and the amphipod *Psammonyx nobilis* are characteristic.

### (5) GRAVEL-COBBLE BEACH COMMUNITY

Beaches dominated by gravel or cobbles, formed as offshore or shoreline glacial deposits (till or outwash) are reworked and transported by high-energy waves. Beach faces are usually narrow and steep. Species richness is relatively low due to wave action, although higher than on sand beaches. *Balanus balanoides*, *Littorina littorea*, and *Mytilus edulis* are typical, along with the amphipods *Orchestia platensis* and *Hyale nilssoni*.

### (6) SALT POND COMMUNITY

Subtidal coastal ponds with euhaline (>30 ppt) water, flushed daily by the tide. These typically occur behind a natural constriction such as a reversing falls. Invertebrates associated with relatively warm water ("Virginian" species) may be typical.

(7) MUD BOTTOM COMMUNITY

Fine-textured bottoms commonly found in shallow, relatively protected bays and inlets. Diagnostic species include the bivalves *Nucula annulata* and *Thyasira* spp., polychaetes *Nephtys incisa* and *Sternapsis scutata*, and amphipods in the genus *Haploops*. Mud bottoms, or mud-sand bottoms, sometimes develop "eelgrass meadows", dense underwater beds of *Zostera marina*.

(8) SAND BOTTOM COMMUNITY

Mixed sand and shell bottoms, sometimes with smaller amounts of gravel or mud. The sand dollar *Echinarachnius parma* and amphipod *Unciola irrorata* are characteristic.

(9) COBBLE BOTTOM COMMUNITY

A scoured substratum consisting largely of cobbles, occurring in channels with relatively high currents. *Homarus americanus*, in the early benthic phase, are characteristic of this community.

(10) ROCK BOTTOM COMMUNITY

Rocky subtidal areas (ledge or boulders) characterized by coralline algae, both encrusting and erect, the sea urchin *Strongylocentrotus droebachiensis*, and crustaceans *Balanus crenatus*, *Unciola irrorata*, and *Homarus americanus*. Kelp beds (*Laminaria* and *Alaria* spp.) typically occur where sea urchin populations are low.

=====

## SUBTERRANEAN COMMUNITIES -- DESCRIPTIONS

The subterranean system includes all underground habitats. Other classifications have distinguished cave communities (non-aquatic), cave pool communities, and artificial cave (e.g. abandoned mine) communities; however, given the almost complete lack of knowledge about cave biota in Maine, we include only one community at present. With more data, we may eventually be able to describe several different cave communities.

(1) CAVE COMMUNITY

The biotic community of a cave, including animals of cave pools and cave surfaces. Caves experience more stable temperatures than above-ground habitats. Caves in talus slopes or very protected locales may have ice persisting well into the summer (see Cold Air Talus Slope Community); these are sometimes called "ice caves". Known characteristic animals include bats (*Myotis lucifugus* and *M. septentrionalis*) and other small mammals. Luminous moss (*Shistostega pennata*) may sometimes be found near the mouth of a cave where sufficient light penetrates.

## APPENDICES

## APPENDIX A

### ELEMENT RANKS

Native plants, animals, and natural communities constitute the "Elements of Natural Diversity" in Maine. The Natural Heritage Program uses Element Ranks to indicate the biological status, or relative degree of rarity, of each of these features, and tracks the locations and status of rare elements.

The Natural Heritage Program's Element Ranks are based primarily on the known and expected number of occurrences for each element in Maine. Other considerations include the number of occurrences that are protected, the number that are not protected, and the ecological fragility of each element, that is, how sensitive the element is to human-caused disturbance. Each rank code begins with an "S" to indicate that this is its state (as opposed to national or global) rank; a species or natural community could, for example, be rare in Maine but common in another part of North America.

The Element Rank is an objective reflection of a species' or a community's known distribution and abundance in Maine. Because continuing inventories bring new knowledge about Maine's natural diversity, element ranks sometimes change as our understanding of particular elements becomes more complete. Element ranks are useful in decision making and land use planning. For example, Natural Heritage Program data and element ranks served as the basis for the "official" state lists of threatened and endangered wildlife and plants.

- S1 Critically imperiled in Maine because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the state.
- S2 Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
- S3 Rare in Maine (on the order of 20-100 occurrences).
- S4 Apparently secure in Maine.
- S5 Demonstrably secure in Maine.
- SH Occurred historically in Maine with the expectation that it may be rediscovered.
- SU Possibly in peril in Maine, but status uncertain; need more information.
- SX Apparently extirpated in Maine.

erratum:

for "calcareous", read "circumneutral"

## APPENDIX B

### NATURAL COMMUNITIES SORTED BY RANK

|      |     |                                              |
|------|-----|----------------------------------------------|
| T-14 | S 1 | Calcareous Talus Community                   |
| T-22 | S 1 | Pitch Pine Dune Semi-Forest Community        |
| T-23 | S 1 | Pitch Pine - Scrub Oak Barrens Community     |
| T-24 | S 1 | Pitch Pine-Heath Barrens Community           |
| T-37 | S 1 | Sandplain Grassland Community                |
| T-42 | S 1 | Alpine Cliff Community                       |
| T-43 | S 1 | Snowbank Community                           |
| T-45 | S 1 | Serpentine Outcrop Community                 |
| T-46 | S 1 | Calcareous Summit Community                  |
| T-47 | S 1 | Calcareous Cliff Community                   |
| P-26 | S 1 | Outwash Plain Pondshore Community            |
| L-4  | S 1 | Alkaline Pond Community                      |
| L-7  | S 1 | Meromictic Lake Community                    |
|      |     |                                              |
| T-10 | S 2 | Oak-Hickory Forest Community                 |
| T-11 | S 2 | Cove Forest Community                        |
| T-13 | S 2 | Cold Air Talus Woodland Community            |
| T-27 | S 2 | Tall Meadow Community                        |
| T-28 | S 2 | Calcareous Shoreline Shrub Thicket Community |
| T-35 | S 2 | Sand Dune Community                          |
| T-36 | S 2 | Inland Sand Barren Community                 |
| T-41 | S 2 | Alpine Ridge Community                       |
| P-2  | S 2 | Coastal Plain Pocket Swamp Community         |
| P-5  | S 2 | Atlantic White Cedar Swamp Community         |
| P-10 | S 2 | Alpine Bog-Meadow Community                  |
| P-11 | S 2 | Maritime Slope Bog Community                 |
| P-17 | S 2 | Calcareous Fen Community                     |
| L-1  | S 2 | Tarn Community                               |
| E-6  | S 2 | Freshwater Tidal Marsh Community             |
|      |     |                                              |
| T-6  | S 3 | Subalpine Spruce-Fir Forest Community        |
| T-15 | S 3 | Acidic Talus Community                       |
| T-18 | S 3 | Red Pine Woodland Community                  |
| T-19 | S 3 | Pitch Pine Woodland Community                |
| T-20 | S 3 | Jack Pine Woodland Community                 |
| T-26 | S 3 | Calcareous Shoreline Outcrop Community       |
| T-31 | S 3 | River Beach Community                        |
| T-40 | S 3 | Krummholz Community                          |

|      |     |                                               |
|------|-----|-----------------------------------------------|
| P-1  | S 3 | Hardwood Floodplain Forest Community          |
| P-15 | S 3 | Plateau Bog Lawn Community                    |
| P-21 | S 3 | Sedge Meadow Community                        |
| P-23 | S 3 | Northern White Cedar Seepage Forest Community |
| P-25 | S 3 | Riverside Seep Community                      |
| E-1  | S 3 | Brackish Pond Community                       |
| E-3  | S 3 | Cordgrass Saltmarsh Community                 |
| E-4  | S 3 | Salt Hay Saltmarsh Community                  |
| E-7  | S 3 | Brackish Tidal Marsh Community                |

|      |     |                                          |
|------|-----|------------------------------------------|
| T-1  | S 4 | Pine - Hemlock/Spruce Forest Community   |
| T-2  | S 4 | Hemlock Slope Community                  |
| T-3  | S 4 | Maritime Spruce-Fir Forest               |
| T-5  | S 4 | Spruce Slope Forest Community            |
| T-7  | S 4 | Oak-Pine Forest Community                |
| T-16 | S 4 | Oak-Pine Woodland Community              |
| T-21 | S 4 | Red/White Pine Barrens Community         |
| T-25 | S 4 | Acidic Shoreline Outcrop Community       |
| T-29 | S 4 | Acidic Shoreline Shrub Thicket Community |
| T-30 | S 4 | High-energy Riverbank Community          |
| T-34 | S 4 | Beach Strand Community                   |
| T-38 | S 4 | Maritime Shrubland Community             |
| T-39 | S 4 | Open Headland Community                  |
| T-48 | S 4 | Acidic Summit Community                  |
| T-49 | S 4 | Acidic Cliff Community                   |
| P-6  | S 4 | Northern White Cedar Swamp Community     |
| P-7  | S 4 | Spruce-Fir Swamp Community               |
| P-8  | S 4 | Forested Bog Community                   |
| P-12 | S 4 | Floating Kettlehole Bog Community        |
| P-13 | S 4 | Dwarf Shrub Bog Community                |
| P-14 | S 4 | Moss Lawn Bog Community                  |
| P-16 | S 4 | Acidic Fen Community                     |
| P-22 | S 4 | Graminoid Swale Community                |
| L-3  | S 4 | Bog Pond Community                       |
| L-12 | S 4 | Lacustrine Shallow Bottom Community      |

|      |     |                                         |
|------|-----|-----------------------------------------|
| T-4  | S 5 | Spruce-Fir Flats Community              |
| T-8  | S 5 | Mixed Hardwood-Conifer Forest Community |
| T-9  | S 5 | Early Successional Forest Community     |
| T-12 | S 5 | Northern Hardwood Forest Community      |
| P-4  | S 5 | Red Maple Swamp Community               |
| P-9  | S 5 | Peatland Lagg Community                 |
| P-18 | S 5 | Beaver Flowage Community                |
| P-19 | S 5 | Shrub Swamp Community                   |

|      |     |                                        |
|------|-----|----------------------------------------|
| P-20 | S 5 | Cattail Marsh Community                |
| L-10 | S 5 | Rush Bed Community                     |
| L-11 | S 5 | Lacustrine Emergent Community          |
|      |     |                                        |
| T-17 | S U | Spruce Woodland Community              |
| T-32 | S U | Lakeshore Sand Beach Community         |
| T-33 | S U | Lakeshore Cobble Beach Community       |
| P-3  | S U | Black Willow - Alder Swamp Community   |
| P-24 | S U | Outwash Seepage Forest Community       |
| P-27 | S U | Vernal Pool Community                  |
| L-2  | S U | Eutrophic Pond Community               |
| L-5  | S U | Monomictic Oligotrophic Lake Community |
| L-6  | S U | Monomictic Mesotrophic Lake Community  |
| L-8  | S U | Dimictic Oligotrophic Lake Community   |
| L-9  | S U | Dimictic Mesotrophic Lake Community    |
| R-1  | S U | Intermittent Stream Community          |
| R-2  | S U | Peatland Outlet Stream Community       |
| R-3  | S U | Rocky Headwater Stream Community       |
| R-4  | S U | Midreach Stream Community              |
| R-5  | S U | Marsh Headwater Stream Community       |
| R-6  | S U | Deadwater Community                    |
| R-7  | S U | Main Channel River Community           |
| R-8  | S U | Backwater Slough Community             |
| R-9  | S U | Riverine Emergent Community            |
| E-2  | S U | Tidal Creek Community                  |
| E-5  | S U | Subtidal Estuary Community             |
| M-1  | S U | Intertidal Bedrock-Boulder Community   |
| M-2  | S U | Intertidal Mud Flat Community          |
| M-3  | S U | Intertidal Sand-Gravel Flat Community  |
| M-4  | S U | Sand Beach Community                   |
| M-5  | S U | Gravel-Cobble Beach Community          |
| M-6  | S U | Salt Pond Community                    |
| M-7  | S U | Mud Bottom Community                   |
| M-8  | S U | Sand Bottom Community                  |
| M-9  | S U | Cobble Bottom Community                |
| M-10 | S U | Rock Bottom Community                  |
| S-1  | S U | Cave Community                         |