



NEW HAMPSHIRE NATURAL HERITAGE BUREAU

DRED – DIVISION OF FORESTS & LANDS

PO Box 1856 – 172 PEMBROKE ROAD, CONCORD, NH 03302-1856

(603) 271-2214

[HTTP://NH.GOV/DRED/DIVISIONS/FORESTANDLANDS/BUREAUS/NATURALHERITAGE/INDEX.HTM](http://nh.gov/dred/divisions/forestandlands/bureaus/naturalheritage/index.htm)

Ossipee Lake Inventory – Preliminary Report (10/10/2005)

A Nature Conservancy ecologist from the New Hampshire Natural Heritage Bureau (NHB) surveyed the proposed town beach, parking lot, and flagged boardwalk areas on September 13 and 21, 2005.

Beach Area

The proposed beach is situated within a regionally rare sandy pond shore natural community system, which extends from the 100 ft. deed required buffer at the northeast end of the proposed beach for 600' to the west (see Figure 1). The system contains 5 natural communities, all of which are represented within the proposed beach. Natural communities are recurring assemblages of plants and animals found in particular physical environments. Four of the 5 natural communities in the system are rare in New Hampshire: a *Hudsonia* inland beach strand community (S1, the only example of this community type in the state); a twig-rush sandy turf pond shore community (S1, one of two locations in the state); a bulblet umbrella-sedge open sandy pond shore community (S2), and; a water lobelia aquatic sandy pond shore community (S1S2). The fifth natural community, a sweet gale - speckled alder shrub thicket, is considerably less rare in New Hampshire (S3). Note: "S" or state ranks range from S1 (critically imperiled because extreme rarity) to S5 (demonstrably widespread and secure). See Appendix 1 for an explanation of global and state rank codes and Appendix 3 for a definition of natural communities and a discussion on exemplary natural communities. Appendix 4 describes the five natural community types from Sperduto and Nichols (2004) that occur within the sandy pond shore system at Ossipee Lake Natural Area.

A state endangered plant, *Euthamia caroliniana* (grassleaf goldenrod; S1), occurs in two subpopulations within the proposed beach area, with a third subpopulation immediately west of the proposed beach boundary (see Figures 1 and 2). Other subpopulations of this goldenrod have also been documented along the contiguous beach to the southwest of this area. *Euthamia caroliniana* is known from six locations in New Hampshire. See Appendix 2 for an explanation of rare plant state listing codes.

A second rare plant, the state threatened *Hudsonia tomentosa* (hairy hudsonia; S2), is documented as occurring within the proposed beach area. Two subpopulations were documented by the NHB in 2002 as occurring within the proposed beach. A third subpopulation of hudsonia was also recorded in 1972 by botanist and UNH professor Albion Hodgdon, immediately to the west of the proposed beach. None of these populations were relocated during the 2005 survey. The only other known occurrence of this species documented in the Ossipee Lake Natural Area was relocated during the 2005 survey, approximately 600 ft. from the southwest boundary of the proposed town beach area. This remaining subpopulation occurred beneath a large red oak and within an adjacent shrubby area dominated by *Gaylussacia baccata* (black huckleberry) and *Kalmia angustifolia* (sheep laurel). *Hudsonia* typically occurs on open sand in direct full sun. As noted in the Hotspot Report for the Ossipee Lake Natural Area (NH NHB 2003), "The fact that the remaining plants at this site are all around or beneath trees and shrubs suggests that trampling of the open sand areas has relegated the population to less suitable areas."



A small population (5' x 5' patch) of *Phalaris arundinacea* (reed canary grass), a very aggressive and invasive grass species, was also found along the shore, just beyond the proposed town beach. This population should be removed to prevent its spread into the rare natural communities along the shore. This plant was not observed by the NHB during a detailed 1993 survey and is likely a recent arrival.

Parking Lot and Boardwalk

The upland habitat around the parking area near Route 25 and along the east end of the proposed trail is characterized by hemlock - beech - oak - pine forest (S5). This is a very common community occurring on glacial till and terrace soils of low to mid elevations in central and southern New Hampshire.

There are several peatland communities that occur within an exemplary poor level fen/bog system at the site (see Figures 1 and 2). Peatland communities along or near the proposed boardwalk area include highbush blueberry - mountain holly wooded fen (S3S4), winterberry - cinnamon fern wooded fen (S4), red maple - Sphagnum basin swamp (S4), and black spruce - larch swamp (S3). Additional field work is needed to confirm the presence and extent of some of these natural communities. A record for the rare olive bog moss *Sphagnum majus* occurs for the site but the location is not specific. This moss will be searched for early in the 2006 growing season in the peaty communities along the proposed boardwalk. Two species of orchid, seen in leaf only along the proposed boardwalk area, will also need to be revisited early in the 2006 growing season to determine their identity. A Final Report of all findings will be completed and submitted by July 17, 2006.

Citations

New Hampshire Natural Heritage Bureau. 2003. Targeted Biodiversity "Hot Spot" Inventories at Four NH Natural Areas in 2002. Concord, NH.

Sperduto, Daniel D. and William F. Nichols. 2004. Natural Communities of New Hampshire. NH Natural Heritage Bureau, Concord, NH. Pub. UNH Cooperative Extension, Durham, NH.





Figure 1. Portion of Ossipee Lake State Park and the proposed town beach, boardwalk, and parking areas.

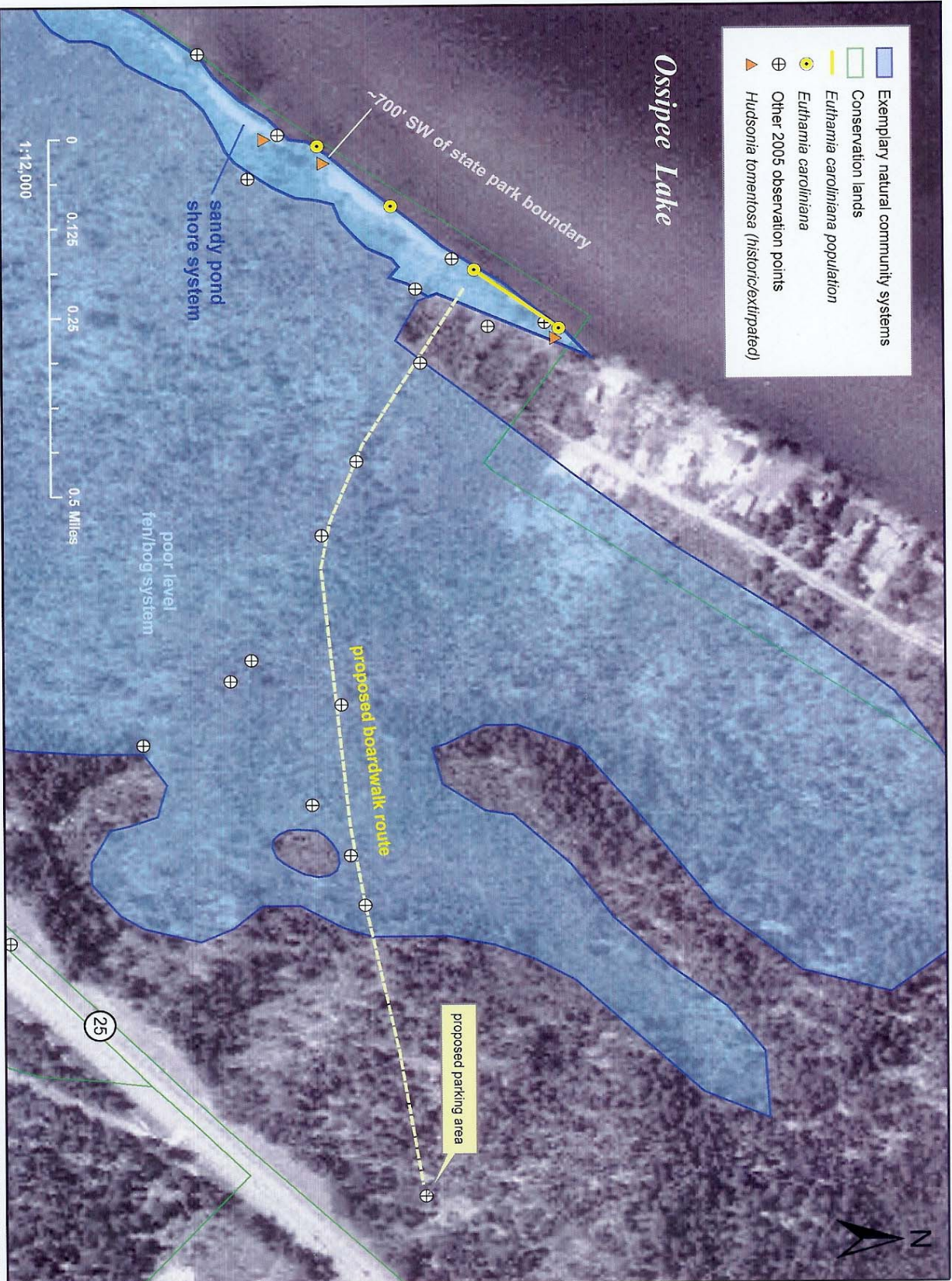


Figure 2. Close-up of proposed town beach, boardwalk, and parking areas.

Appendix 1. Explanation of global and state rank codes.

Ranks describe rarity both throughout a species' range (globally, or "G" rank) and within New Hampshire (statewide, or "S" rank). The rarity of sub-species and varieties is indicated with a taxon ("T") rank. For example, a G5T1 rank shows that the species is globally secure (G5) but the sub-species is critically imperiled (T1).

Code Examples Description

1	G1	S1	Critically imperiled because extreme rarity (generally one to five occurrences) or some factor of its biology makes it particularly vulnerable to extinction.
2	G2	S2	Imperiled because rarity (generally six to 20 occurrences) or other factors demonstrably make it very vulnerable to extinction.
3	G3	S3	Either very rare and local throughout its range (generally 21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction because of other factors.
4	G4	S4	Widespread and apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.
5	G5	S5	Demonstrably widespread and secure, although the species may be quite rare in parts of its range, particularly at the periphery.
U	GU	SU	Status uncertain, but possibly in peril. More information needed.
H	GH	SH	Known only from historical records, but may be rediscovered. A G5 SH species is widespread throughout its range (G5), but considered historical in New Hampshire (SH).
X	GX	SX	Believed to be extinct. May be rediscovered, but evidence indicates that this is less likely than for historical species. A G5 SX species is widespread throughout its range (G5), but extirpated from New Hampshire (SX).

Modifiers are used as follows.

Code Examples Description

Q	G5Q	GHQ	Questions or problems may exist with the species' or sub-species' taxonomy, so more information is needed.
?	G3?	3?	The rank is uncertain due to insufficient information at the state or global level, so more inventories are needed. When no rank has been proposed the global rank may be "G?" or "G5T?"

When ranks are somewhat uncertain or the species' status appears to fall between two ranks, the ranks may be combined. For example:

G4G5	The species may be globally secure (G5), but appears to be at some risk (G4).
G5T2T3	The species is globally secure (G5), but the sub-species is somewhat imperiled (T2T3).
G4?Q	The species appears to be relatively secure (G4), but more information is needed to confirm this (?). Further, there are questions or problems with the species' taxonomy (Q).
G3G4Q S1S2	The species is globally uncommon (G3G4), and there are questions about its taxonomy (Q). In New Hampshire, the species is very imperiled (S1S2).



Appendix 2. Explanation of state listing codes.

In 1987, the New Hampshire state legislature passed the Native Plant Protection Act (RSA 217-A) and formally recognized that “for human needs and enjoyment, the interests of science, and the economy of the state, native plants throughout this state should be protected and conserved; and . . . their numbers should be maintained and enhanced to insure their perpetuation as viable components of their ecosystems for the benefit of the people of New Hampshire.” To compile a list of the species requiring protection, the NH Natural Heritage Bureau collaborated with knowledgeable botanists and identified the most imperiled taxa as “endangered” and those likely to become endangered as “threatened.” In addition to endangered and threatened categories, state watch and indeterminate categories exist. Plants listed under these latter two categories do not receive protection under the Native Plant Protection Act. However, because they are at least relatively rare in New Hampshire, plants listed as watch or indeterminate warrant some consideration when planning management activities.

Endangered: Native plants documented as having five or fewer natural occurrences in the state observed within the last 20 years, or plants with more than five occurrences that are, in the judgment of experts, critically imperiled by extirpation due to other important rarity considerations (number of individuals, area of population occupancy, restrictiveness and distribution of species’ geographic range, habitat rarity, population trends, population viability, and degree of protection).

Threatened: Native plants documented as having 6-20 natural occurrences in the state observed within the last 20 years, or plants with more than 20 occurrences that are, in the judgment of experts, vulnerable to extirpation due to other important rarity considerations (number of individuals, area of population occupancy, restrictiveness and distribution of species’ geographic range, habitat rarity, population trends, population viability, and degree of protection).

Watch: Native plants documented as having 21-100 natural occurrences in the state observed within the last 20 years, or plants that are, in the judgment of experts, possibly vulnerable to extirpation due to other important rarity considerations (number of individuals, area of population occupancy, restrictiveness and distribution of species’ geographic range, habitat rarity, population trends, population viability, and degree of protection). Native plants whose status is uncertain, but are possibly in peril, may be designated state watch as well.

Indeterminate: Indeterminate taxa are under review for listing as endangered, threatened, or watch, but their rarity, nativity, taxonomy, and/or nomenclature are not clearly understood.



Appendix 3. Natural communities.

Natural communities are recurring assemblages of plants and animals found in particular physical environments. New Hampshire has a fascinating and complex variety of natural communities, from tidal marshes to alpine meadows, riverbanks to mountain forests, and streams to lakes. Each type of natural community has a unique set of environmental conditions that support certain species adapted to those conditions. For example, a rich hardwood forest typically has a canopy of sugar maple and white ash underlain by dutchman's breeches, blue cohosh, and certain other plants, animals, and microbes. This natural community occurs on moist soils enriched with nutrients, and many of the species present grow only under these conditions. Pitch pine/scrub oak barrens, in contrast, develop on extremely dry, nutrient-poor sands and gravels, and are characterized by drought- and fire-resistant pitch pine, scrub oak, low-bush blueberries, and a variety of rare moths and butterflies that depend upon these plants and conditions.

Just as individuals can be classified into species, plant assemblages can be classified into natural community types. Classifying natural communities is a useful way of viewing the landscape because it allows us to distill the broad range of complex interactions between species and their environments into a limited number of units that share certain key features. Natural communities are distinguished from one another using three primary characteristics. Each has:

- a definite plant-species composition;
- a consistent physical structure (such as forest, shrubland, or grassland); and
- a specific set of physical conditions (such as nutrient level, water availability, and climate conditions).

Natural community types are usually defined in terms of plants because they are easy to study, often compose the physical structure to which most other organisms respond, and are sensitive indicators of physical and biological factors that influence many types of organisms. Since plant assemblages often correspond closely to other groups of organisms, they can be used as “coarse filters” that include many of the species and processes in a natural community even if they have not been specifically identified.

Exemplary natural communities include all examples of rare types (such as a rich mesic forest) and high-quality examples of common types. High-quality natural communities are identified as having relatively little human impact. These areas have greater potential to contain or achieve natural dynamics that are characteristic of the original community types. A forested natural community need not be “old growth” to obtain exemplary status. Typical exemplary forested natural communities have a variety of characteristic species, natural regeneration within forest gaps, multiple age classes, diverse structural characteristics, abundant standing and fallen woody debris, intact soil processes, and little direct evidence of human disturbance. Exemplary natural communities represent the best remaining examples of New Hampshire's flora, fauna, and underlying ecological processes.



Appendix 4. Descriptions of natural community types from Sperduto and Nichols (2004) that occur within the “Beach Area.”

• **Hudsonia inland beach strand (S1)**

GENERAL DESCRIPTION: This community occurs only on Ossipee Lake in NH where ice-push and wave action have created large berms around portions of the lakeshore. These berms are comprised of sand from the extensive sand plain in and around Ossipee Lake mixed with organic matter deposited by waves. These berms are open, wind-blown sands with scattered shrubs and herbs that occur from 1-1.5m above late summer water levels. They are associated with several other regionally rare sandy pond shore communities that form narrow bands at different elevations along the shore line. Dry site and coastal plain species are characteristic.

CHARACTERISTIC VEGETATION: This community is characterized by a regionally rare assemblage of species that includes *Hudsonia tomentosa* var. *intermedia* (hairy hudsonia), *Hudsonia ericoides* (golden-heather)*, the rare hybrid *Hudsonia x spectabilis*, *Quercus ilicifolia* (scrub oak), and *Schizachyrium scoparium* (little bluestem). Other frequent and characteristic species include *Prunus pumila* var. *susquehannae* (dwarf cherry), *Vaccinium macrocarpon* (large cranberry), *Panicum virgatum* (switch-grass), *Gaylussacia baccata* (black huckleberry), *Aronia melanocarpa* (black chokeberry), *Lechea intermedia* (pinweed), *Danthonia spicata* (poverty oat-grass), *Juniperus communis* var. *depressa* (ground juniper), *Panicum boreale* (purplish northern panic-grass), *Panicum clandestinum* (deertongue). An interrupted canopy of trees may be present, including *Pinus rigida* (pitch pine), *Acer rubrum* (red maple), and *Betula populifolia* (gray birch).

CLASSIFICATION CONFIDENCE: 2-3

DISTRIBUTION: Found only around the margins of Ossipee Lake at several locations, including Ossipee Lake Natural Area (Ossipee). This community may occur on the shores of sandy lakes in nearby Maine.

SOURCES: NHB field surveys; Sperduto 1994b; Sperduto 2000c.

• **Twig-rush sandy turf pond shore (S1)**

GENERAL DESCRIPTION: This community occurs on sandy organic turf mats between open water or sand beach and shrub communities on sandy shores of large lakes (e.g., Ossipee Lake and Lake Massasecum). Wave and ice action are prominent disturbance forces, but less severe than in bulblet umbrella-sedge open sandy pond shore and water lobelia aquatic sandy pond shore communities, which are lower on the shoreline and have much lower percent cover of vegetation. Soil cores of inter-bedded sand, muck, and peat >1.2 m in depth attest to the dynamic nature of these pond shore communities on a time scale of decades to centuries. This community is similar to meadow beauty sand plain marsh, but contains more robust, rhizomatous, stress tolerant graminoids, a sparse *Sphagnum* presence, and is much more diverse compositionally and structurally. Numerous species of coastal plain distribution are found in this community.

Soils are shallow sandy peat mats alternating with sand layers. Sand dominates below 50 cm, or, in several cores, interbedded with organic layers to over 1 m depth.

CHARACTERISTIC VEGETATION: *Cladium mariscoides* (twig-rush) is the dominant stress tolerant matrix species. Other characteristic species include *Euthamia graminifolia* (grass-leaved goldenrod), the state-rare *Euthamia tenuifolia* (fine grass-leaved goldenrod)*, *Carex stricta* var. *strictior* (small-tussock sedge) (rhizomatous form), *Carex lasiocarpa* (hairy-fruited sedge), *Calamagrostis canadensis* (blue-joint), and *Vaccinium macrocarpon* (large cranberry). Frequent or constant species found in low abundance include *Eleocharis tenuis* (slender spike-rush), *Viola lanceolata* (lance-leaved violet), *Cyperus dentatus* (bulblet umbrella-sedge), *Sagittaria latifolia* (common arrowhead), *Spiraea tomentosa* (steeple-bush), *Myrica gale*



(sweet gale), *Scirpus pungens* (three-square rush), *Panicum virgatum* (switch-grass), *Galium tinctorium* (Clayton's bedstraw), *Bidens frondosa* (common beggar-ticks), *Muhlenbergia uniflora* (one-flowered muhly), *Glyceria canadensis* (rattlesnake manna-grass), *Dulichium arundinaceum* (three-way sedge), and *Lycopus uniflorus* (common water horehound). *Lycopodiella appressa* (slender bog clubmoss)* and *Proserpinaca pectinata* (mermaid-weed)* are two rare species known from this community, but not observed recently, along the shores of Ossipee Lake. The globally rare *Sclerolepis uniflora* (sclerolepis)* spills over into this community from deeper water habitats along Lake Massasecum.

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: Occurs on sandy organic turf mats between open water or sand beach and shrub communities on sandy shores of large lakes (e.g., Ossipee Lake and Lake Massasecum).

SOURCES: Sperduto 1994b; Sperduto 2000c.

• Bulblet umbrella-sedge open sandy pond shore (S2)

GENERAL DESCRIPTION: This natural community consists of sparsely vegetated lower sandy shores of medium to large lakes and ponds subjected to regular wave and ice disturbance and with little to no organic matter accumulation. This community is often interspersed discontinuously along unvegetated sand beach. With several species of coastal plain distribution, it is similar to meadow beauty sand plain marsh and twig rush sandy turf pond shore, but has a much lower total percent cover than either, a greater prominence of ruderals, and lacks the robust graminoids of *Cladium mariscoides* sandy turf pond shore. Short clumped graminoids, and rhizomatous forbs and graminoids, dominate along with numerous native ruderals.

CHARACTERISTIC VEGETATION: *Cyperus dentatus* (bulblet umbrella-sedge), *Viola lanceolata* (lance-leaved violet), *Juncus pelocarpus* (mud rush) (rhizomatous), and *Bidens frondosa* (common beggar-ticks) are nearly constant and vary from low to moderate abundance. Other frequent species include *Panicum* spp. (seven species; annuals and perennials), *Agrostis scabra* (rough ticklegrass), *Gratiola aurea* (golden-pert), *Aster racemosus* (small headed white aster), *Carex scoparia* (broom sedge), *Eleocharis tenuis* (slender spike-rush), *Euthamia tenuifolia* (fine grass-leaved goldenrod)*, *Euthamia graminifolia* (grass-leaved goldenrod), *Triadenum virginicum* (marsh St. John's-wort), *Eriocaulon aquaticum* (pipewort), and such annuals as *Agalinis purpurea* var. *parviflora* (small-flowered gerardia), *Bidens discoidea* (small bidens)*, *Erechtites hieracifolia* (fireweed), and on wetter or less exposed sections, sometimes *Eleocharis acicularis* (least spike-rush).

CLASSIFICATION CONFIDENCE: 1

DISTRIBUTION: Occurs on the shores of lakes and ponds that are used for water supply storage that have artificially elevated water levels (e.g., Lake Massabesic, Manchester). Such lakes may once have supported *Cladium mariscoides* sandy turf pond shores.

SOURCES: Sperduto 1994b; Sperduto 2000c.

Water lobelia aquatic sandy pond shore (S1S2)

GENERAL DESCRIPTION: This natural community occurs in shallow water environments of sandy pond shores characterized by a permanently inundated to intermittently exposed flood regime and regular wave and ice disturbance. Most examples are characterized by a very low percent cover of aquatic rosette-stress tolerant species (including "Isoetids") and various floating and submersed species and submersed forms of normally emergent vegetation. Several examples occur in protected coves or interior pools on twig rush sandy turf pond shore mats and have a much higher percent cover of vegetation, particularly of floating leaved aquatics more sensitive to wave disturbance along exposed shores.



CHARACTERISTIC VEGETATION: Component species are described in the two variants below.

VARIANTS: Two discernable variants are recognized, although some overlap is evident:

1. **Potamogeton-Pontederia pond shore variant:** This subtype is characterized primarily by floating leaved and aerenchymatous aquatics, including *Potamogeton epihydrus* (surface pondweed), *Potamogeton natans* (floating pondweed), *Pontederia cordata* (pickerel-weed), and *Sparganium americanum* (lesser bur-reed). Cover varies from very low to moderately high in coves. One of these pond shores supports New Hampshire's only population of *Sclerolepis uniflora* (sclerolepis)* (n=5).
2. **Rosette stress tolerant Isoetid pond shore variant:** This type has a lower frequency and abundance of floating-leaved aquatics and much higher frequency and abundance of rosette stress tolerant "Isoetid" species. The community is only intermittently exposed, typically as a narrow band at or near the water level line, with all or a portion of the vegetated zone staying inundated during moderately high water years. Characteristic species include *Eriocaulon aquaticum* (pipewort) (sparse to abundant), *Lobelia dortmanna* (water lobelia), *Isoetes tuckermanii* (Tuckerman's quillwort) and other *Isoetes*, *Scirpus pungens* (three-square rush), *Utricularia gibba* (humped bladderwort), and submersed aquatic forms of *Sagittaria graminea* (grass-leaved arrowhead), *Gratiola aurea* (golden-pert), *Juncus pelocarpus* (mud rush), *Eleocharis acicularis* (least spike-rush), and *Sparganium americanum* (lesser bur-reed).

Dense to intermittent, permanently flooded rhizomatous stands of *Scirpus pungens* (three-square rush) or *Juncus militaris* (bayonet rush) have been observed in New Hampshire along shallow sandy shores, but have not been quantitatively sampled. These occur in other New England states (Sorrie 1994), may deserve recognition as distinct types.

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: Shallow water environments of sandy pond shores characterized by a permanently inundated to intermittently exposed flood regime and regular wave and ice disturbance.

SOURCES: Sperduto 1994b; Sperduto 2000c.

• Sweet gale - speckled alder shrub thicket (S3)

GENERAL DESCRIPTION: This temporarily flooded shrub community usually forms a narrow zone at the upland edge of pond shores or along the side and top of sandy ice-berms formed on large lakes. It is characterized by a mixture of tall and medium shrubs, with lesser amounts of dwarf shrubs and herbs. The composition is more diverse than highbush blueberry-winterberry tall shrub thickets.

Variable soils of sand or sand and gravel, inter-bedded sand and peat turf, or sandy muck form on open pond shore beach ridge or upland edge. Soils consist of shallow O_e horizons (0-13 cm), variable A horizons (0-55 cm), with sand and gravel deposits to over 1 m. A single location included in this type has over 125 cm of peat at the surface.

CHARACTERISTIC VEGETATION: Diagnostic species occurring with higher frequency and/or greater abundance that are absent or infrequent in dense highbush blueberry-winterberry tall shrub thickets include *Myrica gale* (sweet gale), *Alnus incana* (speckled alder), *Alnus serrulata* (smooth alder), *Spiraea tomentosa* (steeple-bush), *Osmunda regalis* (royal fern), *Viburnum nudum* (witherod), *Viburnum dentatum* (northern arrowwood), and *Vaccinium macrocarpon* (large cranberry). Other less frequent species that are largely limited to this community include *Panicum virgatum* (switch-grass), *Solidago rugosa* (rough goldenrod), *Onoclea sensibilis* (sensitive fern), *Aster racemosus* (small headed white aster), *Carex stricta* var. *strictior* (small-tussock sedge), *Euthamia graminifolia* (grass-leaved goldenrod), and *Carex scoparia* (broom



sedge). Some of these less frequent species are also found in adjacent (lower) zones occupied by *Cladium mariscoides* sandy turf pond shore.

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: This community is found in central and southern NH. A good example occurs along the south shore of Ossipee Lake (Ossipee).

SOURCES: Sperduto 1994b; Sperduto 2000c.

