

IV. LACUSTRINE SYSTEM

The lacustrine system consists of waters situated in topographic depressions or dammed river channels, lacking persistent emergent vegetation, but including areas with submerged or floating-leaved aquatic vegetation. The lacustrine communities in this classification are distinguished primarily by trophic state, annual cycles of thermal stratification and circulation, morphometry (size and shape of the lake basin and drainage area), and water chemistry. The communities are described in terms of the free-floating organisms of the open water or limnetic zone (including plankton and fish), the aquatic macrophytes and fish near the shore or littoral zone, and the bottom-dwelling organisms or benthos. The limnetic zone may be divided into the epilimnion (upper lake zone), which is sunny, mixed by the wind, and comparatively rich in oxygen, and the hypolimnion (lower lake zone), which is darker, and comparatively rich in carbon dioxide from respiration and decay. The transition between the epilimnion and hypolimnion is called the thermocline. The lake bottom or benthic zone may be divided into the peripheral shallows or littoral zone, the slightly deeper sublittoral zone, and (in summer-stratified lakes) the deep, cold region where currents are minimal and light is much reduced, called the profundal zone. These zones may each have a distinctive biota at any one point in time; however, many of the plankton and fish move between zones on a regular basis.

This classification of lacustrine communities is based entirely on literature review and discussions with aquatic ecologists. The Heritage program has not done inventory work on lakes; we do not currently have in our files sufficient field data for a detailed evaluation of the lacustrine classification. Therefore the lacustrine classification is more tentative and the communities are more broadly defined than in the classification of estuarine, palustrine, and terrestrial communities. This classification needs to be tested with field surveys, and it will probably need further refinement after field data are evaluated.

A. NATURAL LAKES AND PONDS

This subsystem includes the Great Lakes, and inland lakes and ponds in which the trophic state, morphometry, and water chemistry have not been substantially modified by human activities, or the native biota are dominant. The biota may include some introduced species (for example, non-native macrophytes, introduced fishes),

however the introduced species are not usually dominant in the lake or pond community as a whole.

1. Great Lakes deepwater community: the open water community in any of the Great Lakes. In general, the Great Lakes are summer-stratified monomictic lakes: they usually do not freeze over in winter, they are mixed and isothermal in winter, and stratified in summer. One exception is that portions of eastern Lake Erie, along the New York shores, freeze over quite frequently. The Great Lakes are distinguished from inland summer-stratified monomictic lakes because of their size and access to estuarine biota through the St. Lawrence River and Welland Canal. Characteristic fishes include cisco (*Coregonus artedii*), lake whitefish (*Coregonus clupeaformis*), sea lamprey (*Petromyzon marinus*), lake trout (*Salvelinus namaycush*), rainbow smelt (*Osmerus mordax*), alewife (*Alosa pseudoharengus*), quillback (*Carpionodes cyprinus*), white bass (*Morone chrysops*), burbot (*Lota lota*), emerald shiner (*Notropis atherinoides*), mooneye (*Hiodon tergisus*), and silver chub (*Hybopsis storeriana*). Two introduced salmonids that are now common in Lake Ontario are coho salmon (*Oncorhynchus kisutch*) and chinook salmon (*O. tshawytscha*). New York's share of the Great Lakes has been significantly polluted and modified by introductions of non-native species; some introductions have resulted from migrations through the Welland and Erie canals. Many of the formerly common native fish have apparently disappeared from Lake Erie or Lake Ontario including blue pike (*Stizostedion vitreum glaucum*), bloater (*Coregonus hoyi*), kiyi (*C. kiyi*), shortnose cisco (*C. reighardi*), shortjaw cisco (*C. zenithicus*), spoonhead sculpin (*Cottus ricei*), and deepwater sculpin (*Myoxocephalus thompsoni*).

Distribution: restricted to the Great Lakes Plain ecozone.

Rank: G2G3 S1S2

Examples: Lake Ontario; Lake Erie.

Sources: Berg 1963, C. L. Smith 1985.

2. Great Lakes aquatic bed: the aquatic community of the protected shoals of the Great Lakes that occur in quiet bays that are protected from extreme wave action, and support large areas of "weeds" or aquatic macrophytes. These bays may freeze over in winter and become

inversely stratified. Characteristic fishes in the aquatic bed include pickerel (*Esox americanus*), threespine stickleback (*Gasterosteus aculeatus*), longnose gar (*Lepisosteus osseus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), Iowa darter (*Etheostoma exile*), and tadpole madtom (*Noturus gyrinus*). Goldfish (*Carassius auratus*) is an introduced fish that is well-established in Great Lakes aquatic beds. Characteristic macrophytes include the algae *Cladophora* and *Chara*, tape grass (*Vallisneria americana*), pondweeds (*Potamogeton richardsonii*, *P. pectinatus*, *P. gramineus*, and *P. pusillus*), naiad (*Najas flexilis*), horned pondweed (*Zannichellia palustris*), water stargrass (*Heteranthera dubia*), and coontail (*Ceratophyllum demersum*). Growth of *Cladophora* has been related to point sources of nutrient enrichment, especially phosphorus enrichment.

Distribution: restricted to the Great Lakes Plain ecozone.

Rank: G4 S3

Examples: Irondequoit Bay, Monroe County; North Pond, Oswego County.

Source: Clausen 1940.

3. Great Lakes exposed shoal: the aquatic community of the shallow littoral zone of the Great Lakes that occurs along windswept shores that are exposed to wave action. Aquatic macrophytes are uncommon. The alga *Cladophora* grows on rocks in the wave zone; growth of *Cladophora* has been related to point sources of nutrient enrichment, especially phosphorus enrichment. The lake substrate may be sandy, gravelly, rocky, or with submerged bedrock outcrops. Characteristic fishes include stonecat (*Noturus flavus*), freshwater drum (*Aplodinotus grunniens*), mottled sculpin (*Cottus bairdi*), and lake chub (*Couesius plumbeus*). Lake sturgeon (*Acipenser fulvescens*) was once abundant in shoal waters in the Great Lakes, has declined sharply, but should recover). More data on this community are needed.

Distribution: restricted to the Great Lakes Plain ecozone.

Rank: G4 S4

Source: C. L. Smith 1985.

4. Bog lake: the aquatic community of a dystrophic lake that typically occurs in a small, shallow basin that is protected from wind and is poorly drained. These lakes occur in areas with non-calcareous bedrock or glacial till; many are fringed by a floating mat of vegetation (in New York usually either bog or poor fen). Characteristic features of a dystrophic lake include the following: murky water that is stained brown, with low transparency; water that is low in plant nutrients (especially low in calcium), with low pH (less than 5.4); and the lake may have oxygen deficiencies in deeper water. Species diversity in bog lakes is low in all types of aquatic organisms (phytoplankton, macrophytes, zooplankton, zoobenthos, and fish); many bog lakes have no fish at all. The abundance of each species present is also low in all types of organisms, except for aquatic macrophytes and peat mosses (*Sphagnum* spp.) along the edge of the bog mat. The lack of calcium blocks bacterial action, reducing the rate of decay of organic matter with subsequent accumulation of peat or muck sediments. Colloidal and dissolved humus material reduces transparency and increases acidity of the water. Characteristic invertebrates include larvae of midges (*Chironomus* spp.) and phantom midges (*Chaoborus* spp.) in the benthos. Characteristic macrophytes include water-shield (*Brasenia schreberi*), white water-lily (*Nymphaea odorata*), yellow pond-lily (*Nuphar luteum* ssp. *pumilum* and *N. luteum* ssp. *variegatum*), and common bladderwort (*Utricularia vulgaris*).

A common feature of bog lakes is the development of a false bottom at a depth of about 1 to 3 ft (0.3 to 0.9 m) below the surface. The false bottom is composed of colloidal material and dissolved humus held in suspension that appears to be a more or less continuous bottom. When disturbed, the suspended material quickly clouds the upper layer of clear water, then slowly settles when the water becomes quiet again. Occasionally bog lakes become meromictic or chemically stratified; the chemical gradient supercedes the usual stratification by temperature.

Distribution: sparsely scattered throughout New York State north of the coastal lowlands ecozone.

Rank: G4 S3

Examples: Spring Pond, Franklin County; Mud Lake, Rensselaer County.

Sources: Clausen 1940; Cole 1975; Maitland 1978.

5. Oligotrophic dimictic lake: the aquatic community of a nutrient-poor lake that typically occurs in a deep, steeply banked basin. These lakes are dimictic: they have two periods of mixing or turnover (spring and fall), they are thermally stratified in the summer, and they freeze over and become inversely stratified in the winter. Characteristic features of an oligotrophic lake include the following: blue or green water that is clear, with high transparency (Secchi disk depths of 4 to 8 m); water low in plant nutrients (especially low in nitrogen, also low in calcium); low primary productivity (inorganic carbon fixed = 7 to 25 g/m²/yr); lake sediments that are low in organic matter (usually consisting of stones and inorganic silt); epilimnion volume that is relatively small compared with hypolimnion; and an abundance of oxygen all year, in all strata. The profundal benthos includes many species, but the abundance of each species is very low. Phytoplankton and zooplankton also have many species, with low abundance; the characteristic phytoplankton include desmids (*Staurastrum* spp.), chrysophytes (*Dinobryum* spp.), and the diatoms *Tabellaria* and *Cyclotella*. The characteristic profundal invertebrates include midge larvae such as *Tanytarsus*; in contrast to bog lakes, oligotrophic lakes usually lack phantom midges (*Chaoborus* spp.). Characteristic fishes are smallmouth bass (*Micropterus dolomieu*) in shallow areas, lake trout (*Salvelinus namaycush*) in deep water, and either slimy sculpin (*Cottus cognatus*) or mottled sculpin (*C. bairdi*). Brown trout (*Salmo trutta*) and rainbow trout (*S. gairdneri*) are commonly introduced. In the Adirondacks, this community provides habitat for the common loon (*Gavia immer*). Characteristic macrophytes include small rosette-leaved aquatics that are restricted to shallow bottoms from 3 to 10 ft (1 to 3 m) deep. Characteristic rosette-leaved aquatics include pipewort (*Eriocaulon aquaticum*), water lobelia (*Lobelia dortmanna*), and quillwort (*Isoetes echinospora* ssp. *muricata*). Characteristic free-floating aquatics are slender water milfoil (*Myriophyllum tenellum*) and bladderworts (*Utricularia purpurea*, *U. resupinata*).

Distribution: throughout New York State, especially common in the Adirondacks.

Rank: G4 S3

Examples: Lake George, Warren and Essex Counties; Schroon Lake, Essex and Warren Counties; Skaneateles Lake, Onondaga and Cayuga Counties.

Sources: Bloomfield 1978a; Cole 1975; Ferris et al. 1980; Maitland 1978; Roberts et al. 1985.

6. Mesotrophic dimictic lake: the aquatic community of a lake that is intermediate between an oligotrophic lake and a eutrophic lake. These lakes are dimictic: they have two periods of mixing or turnover (spring and fall); they are thermally stratified in the summer, and they freeze over and become inversely stratified in the winter. Characteristic features of a mesotrophic lake include the following: water that is moderately clear, with medium transparency (Secchi disk depths of 2 to 4 m); water with moderate amounts of plants nutrients; moderate primary productivity (inorganic carbon fixed = 25 to 75 g/m²/yr); lake sediments with moderate amounts of organic matter; and moderately well-oxygenated water. Characteristic fishes are warmwater fishes such as yellow perch (*Perca flavescens*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and pumpkinseed (*L. gibbosus*). These lakes typically have a diverse mixture of submerged macrophytes, such as several species of pondweeds (*Potamogeton amplifolius*, *P. praelongus*, *P. robbinsii*) and tapegrass (*Vallisneria americana*). More data on this community are needed.

Distribution: throughout New York State.

Rank: G4 S3S4

Examples: Hemlock Lake, Livingston and Ontario Counties; Lower St. Regis Lake, Franklin County.

Sources: Bloomfield 1978a; Cole 1975; Maitland 1978.

7. Eutrophic dimictic lake: the aquatic community of a nutrient-rich lake that occurs in a broad, shallow basin. These lakes are dimictic: they have two periods of mixing or turnover (spring and fall); they are thermally stratified in the summer, and they freeze over and become inversely stratified in the winter. Characteristic features of a eutrophic lake include the following: yellow, green, or brownish-green water that is murky, with low transparency (Secchi disk depths less than 2.5 m); water rich in plant nutrients (especially high in phosphorus, nitrogen and calcium), high primary productivity (inorganic carbon fixed = 75 to 250 g/m²/yr); lake sediments that are rich in organic matter (usually consisting of a fine organic silt or copropel),

water that is well-oxygenated above the summer thermocline, but oxygen-depleted below the summer thermocline or under ice; epilimnion volume that is relatively large compared with hypolimnion; and a weedy shoreline. Phytoplankton and zooplankton are usually abundant, but there are only a few species present; characteristic phytoplankton are cyanobacteria (blue-green algae). Aquatic macrophytes are abundant in shallow water, and there are many species present, but species diversity is generally lower than in mesotrophic lakes. Typically these are the lakes with nuisance problems of exotic plants such as Eurasian water milfoil (*Myriophyllum spicatum*), water chestnut (*Trapa natans*), and pondweed (*Potamogeton crispus*). The abundant profundal benthos is poor in species, including only species tolerant of low oxygen; characteristic profundal invertebrates are larvae of midges (*Chironomus* spp.) and phantom midges (*Chaoborus* spp.). Usually there are many species of fish, especially minnows (*Cyprinidae*). Characteristic fishes are warmwater fishes such as yellow perch (*Perca flavescens*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), pumpkinseed (*L. gibbosus*), yellow bullhead (*Ictalurus natalis*), brown bullhead (*I. nebulosus*), golden shiner (*Notemigonus crysoleucas*), and stocked white perch (*Morone americana*). Two additional species that are characteristic of eutrophic lakes on Long Island are eastern mudminnow (*Umbra pygmaea*) and pirate perch (*Aphredoderus sayanus*). More data on aquatic macrophytes are needed.

Distribution: throughout New York State, usually at low elevations.

Rank: G4 S3S4

Examples: Canandarago Lake, Otsego County; Honeoye Lake, Ontario County; Onondaga Lake, Onondaga County; Saratoga Lake, Saratoga County.

Sources: Bloomfield 1978a, 1980; Cole 1975; Maitland 1978.

8. Summer-stratified monomictic lake: the aquatic community of a lake that is so deep (or large) that it has only one period of mixing or turnover each year (monomictic), and one period of stratification. These lakes generally do not freeze over in winter (except in unusually cold years), so the water circulates and is isothermal during the winter. These lakes are thermally stratified only in the summer; they are

oligotrophic to mesotrophic. The dominant fishes are salmonids such as cisco (*Coregonus artedii*), and lake trout (*Salvelinus namaycush*). A characteristic crustacean of the hypolimnion is *Senecella calanoides*, which was named after Seneca Lake. Characteristic aquatic macrophytes include pondweeds (*Potamogeton gramineus*, *P. richardsonii*, *P. pectinatus*), horned pondweed (*Zannichellia palustris*), naiad (*Najas flexilis*), waterweed (*Elodea canadensis*), tapegrass (*Vallisneria americana*), and coontail (*Ceratophyllum demersum*).

The best-known examples in New York are Cayuga and Seneca lakes. These lakes are very deep (mean depths of 179 ft and 290 ft respectively) relative to their size (66.4 sq. mi. and 67.7 sq. mi. respectively). The Great Lakes (e.g. Lakes Ontario and Lake Erie) are also summer-stratified monomictic lakes (except the extreme west end of Lake Erie), but they are not included in this community because of their larger size and access to estuarine biota through the St. Lawrence River and the Welland Canal.

Distribution: uncommon in upstate New York, north of the Coastal Lowlands ecozone.

Rank: G3G4 S2S3

Examples: Cayuga Lake, Cayuga, Seneca, and Tompkins Counties; Seneca Lake, Seneca, Schuyler, and Yates Counties.

Sources: Berg 1963; Bloomfield 1978a; Muenscher 1928.

9. Winter-stratified monomictic lake: the aquatic community of a lake that has only one period of mixing each year because it is very shallow in relation to its size (e.g. Oneida Lake, with a mean depth less than 20 ft and surface area of approx. 80 square miles), and is completely exposed to winds. These lakes continue to circulate throughout the summer; they never become thermally stratified in the summer. These lakes are only stratified in the winter when they freeze over and become inversely stratified (coldest water at the surface); they are eutrophic to mesotrophic. Characteristic fishes are walleye (*Stizostedion vitreum*), largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescens*), and trout perch (*Percopsis omiscomaycus*). Characteristic aquatic macrophytes include water stargrass (*Heteranthera dubia*), coontail (*Ceratophyllum demersum*), and pondweeds (*Potamogeton* spp.)

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Distribution: uncommon in upstate New York, north of the Coastal Lowlands ecozone.

Rank: G3G4 S2?

Example: Oneida Lake, Oneida and Oswego Counties.

Sources: Berg 1963; Bloomfield 1978b.

10. Meromictic lake: the aquatic community of a small and relatively deep lake that is so protected from wind-stirring that it has no annual periods of complete mixing, and remains chemically stratified throughout the year. Meromictic lakes in New York freeze over in winter, so they are thermally stratified in winter; they pass through spring and fall periods of isothermy without circulating. Meromictic lakes frequently have dichothermic stratification, meaning that the minimum temperature occurs in the middle stratum. The stagnant waters in the lower part of a meromictic lake become heavily loaded with dissolved salts and lack oxygen. Species diversity is low because very few organisms can tolerate the extreme chemical conditions of the lower strata of a meromictic lake. The best-known example in New York is Green Lake Fayetteville; characteristic species of this lake include a purple sulfur bacterium (*Lamprocystis roseopersicina*), stoneworts (*Chara* spp.), waterweeds (*Elodea* spp.), and numerous green algae and cyanobacteria. Benthic fauna consists primarily of gastropods (six species of snails), crustaceans, and insects. No fishes are known from Green Lake Fayetteville. More data on this community are needed.

Distribution: uncommon in upstate New York, north of the Coastal Lowlands ecozone.

Rank: G3G4 S1S2

Examples: Green Lake Fayetteville, Onondaga County; Lowery Pond, one of Junius Ponds, Seneca County.

Sources: Berg 1963; Eggleton 1956; Pendl and Stewart 1986.

11. Marl pond: the aquatic community of a small, shallow spring-fed pond in which the water has a high concentration of calcium; as a result of chemical or photosynthetic removal of carbon dioxide from the water, the calcium precipitates out of the water as calcium carbonate (CaCO_3).

This calcium carbonate is deposited on the substrate and forms a marl sediment. Stoneworts (*Chara* spp.), some other algae, cyanobacteria, and at least one species of moss (*Didymodon tophaceus*) can be involved in photosynthetic precipitation of calcium carbonate; stoneworts are usually present in marl ponds. Marl ponds have very low primary productivity and sparse growth of aquatic macrophytes. Certain diatoms may be abundant, but low levels of available plant nutrients restrict growth of other algae and cyanobacteria. More data on this community are needed.

Distribution: known only from the Finger Lakes Highlands subzone of the Appalachian Plateau ecozone.

Rank: G3G4 S1

Sources: Cole 1979; NHP field surveys.

12. Inland salt pond: the aquatic community of a small, spring-fed pond in which the water is salty from flowing through salt beds in the aquifer. These salt springs occur in central New York, and were once common around Onondaga Lake in Syracuse and near Montezuma. Most of the springs have been exploited for the production of salt, and are very disturbed or completely destroyed. The pond is permanently flooded, but the water levels fluctuate seasonally. The one example of this community that has remained least disturbed is dominated by ditch grass (*Ruppia maritima*), and has at least one species of small fish (probably a killifish, *Fundulus* sp.). The bottom and shores of an inland salt pond are very mucky. More data on this community are needed.

Distribution: known only from the Great Lakes Plain ecozone.

Rank: G2 S1

Example: Carncross Salt Pond, Wayne County.

Sources: Catling and McKay 1981; NHP field surveys.

13. Oxbow lake: the aquatic community of a small, shallow, usually stagnant lake or pond that occurs in an old river meander or oxbow that has been cut off from a main channel stream by deposition of a levee. These are usually

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eutrophic lakes with abundant aquatic vegetation. More data on this community are needed.

Distribution: throughout New York State.

Rank: G4 S3

14. Coastal plain pond: the aquatic community of the permanently flooded portion of a coastal plain pond with seasonally and annually fluctuating water levels. These are shallow, groundwater-fed ponds that occur in kettle-holes or shallow depressions in the outwash plains south of the terminal moraines of Long Island and New England. Aquatic vegetation may be abundant; characteristic plants include water-shield (*Brasenia schreberi*), white water-lily (*Nymphaea odorata*), bayonet-rush (*Juncus militaris*), spikerush (*Eleocharis robbinsii*), purple bladderwort (*Utricularia purpurea*), water milfoil (*Myriophyllum humile*), naiad (*Najas flexilis*), waterweed (*Elodea* spp.), pondweed (*Potamogeton oakesianus*), and a peat moss (*Sphagnum macrophyllum*). Characteristic fishes include chain pickerel (*Esox niger*) and banded sunfish (*Enneacanthus obesus*). Coastal plain ponds are breeding ponds for tiger salamander (*Ambystoma tigrinum*). A series of coastal plain ponds are often hydrologically connected, either by groundwater, or sometimes by surface flow in a small coastal plain stream. More data on this community are needed.

Distribution: in the Coastal Lowlands ecozone on Long Island.

Rank: G3G4 S2

Examples: Crooked Pond, Suffolk County; Scoy's Pond, Suffolk County.

Sources: Muenschler 1939; Theall 1983; NHP field surveys.

15. Oligotrophic pond: the aquatic community of a shallow, nutrient-poor pond. The water is very clear and the bottom is usually sandy or rocky. Oligotrophic ponds are too shallow to become stratified in the summer; they are winter-stratified, monomictic ponds. Aquatic vegetation is sparse, and species diversity is low. Characteristic species are rosette-leaved aquatics such as pipewort (*Eriocaulon aquaticum*), water lobelia (*Lobelia dortmanna*), and quillwort (*Isoetes echinospora*). Oligotrophic ponds may have either cold-water or warm-water fishes, depending upon summer

temperatures. Very small ponds with no inlet or outlet may lack fish and have an abundance of aquatic insects. A characteristic fish of the cold-water ponds is brook trout (*Salvelinus fontinalis*). More data on this community are needed.

Distribution: little information is available; common in the Adirondacks, may also occur in the Appalachian Plateau, Taconic Highlands, and Tug Hill ecozones.

Rank: G4 S4

Source: NHP field surveys.

16. Eutrophic pond: the aquatic community of a shallow, nutrient-rich pond. The water is usually green with algae and the bottom is mucky. Eutrophic ponds are too shallow to become stratified in the summer; they are winter-stratified, monomictic ponds. Aquatic vegetation is abundant. Characteristic plants include coontail (*Ceratophyllum demersum*), duckweeds (*Lemna minor*, *L. trisulca*), waterweed (*Elodea canadensis*), pondweeds (*Potamogeton* spp.), water starwort (*Heteranthera dubia*), algae (*Cladophora* spp.), yellow pond-lily (*Nuphar luteum*), and white water-lily (*Nymphaea odorata*). Characteristic fishes are usually warm-water fishes. More data on this community are needed.

Distribution: little information is available; probably occurs throughout New York State, and is more common at low elevations.

Rank: G4 S4

Example: Black Pond, Jefferson County.

Source: Gilman 1979.

B. LACUSTRINE CULTURAL

This subsystem includes communities that are either created and maintained by human activities, or are modified by human influence to such a degree that the trophic state, morphometry, water chemistry, or biological composition of the resident community are substantially different from the character of the lake community as it existed prior to human influence.

1. Acidified lake: the aquatic community of a formerly oligotrophic or mesotrophic, dimictic lake that has received so much acid deposition (pH less than 4.7; sulfate and nitrate are now the

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dominant anions in precipitation in the Northeast) that the pH of the lake has decreased significantly. The changes in diatom assemblages in sediment cores from a few of these lakes have been used to infer the pH history of these lakes. Acidified lakes show a large decrease in pH (with pH usually less than 5.25) during the last 30 years relative to pH changes during the previous centuries. Associated with the decrease in pH are significant changes in the biota of the lake, such as a decrease in the number of species of fishes, diatoms, and most aquatic macrophytes present, and a change in the composition of species assemblages. Typically there are blooms of benthic green algae and cyanobacteria, and an increase in the growth of peat mosses (*Sphagnum* spp.) or bladderworts (*Utricularia* spp.). One bladderwort (*Utricularia geminiscapa*) and one pondweed (*Potamogeton confervoides*) are reported to be restricted to lakes with pH less than 5.1.

Distribution: most common in the Adirondacks, but may also occur throughout eastern New York in the Appalachian Plateau, Taconic Highlands, and Hudson Valley ecozones.

Rank: G5 S5

Example: Silver Lake Webb, Herkimer County.

Sources: Charles 1984; Roberts et al. 1985; Schindler 1988; Singer et al. 1983; Whitehead et al. 1986.

2. Cultural eutrophic lake: the aquatic community of a formerly eutrophic to mesotrophic lake that has received an increase in nutrients (especially phosphorus and nitrogen) from sewage effluent, agricultural runoff, and other pollutants. This nutrient enrichment has resulted in a significant increase in productivity of the lake (especially in the phytoplankton); annual productivity of these lakes exceeds 300 g carbon/m²/yr. An extremely eutrophic lake is characterized by high amounts of photosynthetic pigment in the water and, consequently, low transparency; blooms of cyanobacteria are common from midsummer through fall. Characteristic macrophytes are weedy exotics such as Eurasian water milfoil (*Myriophyllum spicatum*), water chestnut (*Trapa natans*), and pondweed (*Potamogeton crispus*). These macrophytes may grow to high densities, excluding other species and thus severely reducing species diversity.

Distribution: throughout New York State.

Rank: G5 S5

Sources: Bloomfield 1978a, 1980.

3. Farm pond/artificial pond: the aquatic community of a small pond constructed on agricultural or residential property. These ponds are often eutrophic, and may be stocked with panfish such as bluegill (*Lepomis macrochirus*) and yellow perch (*Perca flavescens*). The biota are variable (within limits), reflecting the species that were naturally or artificially seeded, planted, or stocked in the pond.

Distribution: throughout New York State.

Rank: G5 S5

4. Reservoir/artificial impoundment: the aquatic community of an artificial lake created by the impoundment of a river with a dam. Reservoirs are constructed to collect water for municipal and/or agricultural water use, to provide hydroelectric power, and to improve opportunities for recreational activities (e.g. boating, swimming) and development. Characteristic fishes include chain pickerel (*Esox niger*) and other pikes (*Esocidae*); brown bullhead (*Ictalurus nebulosus*) or yellow bullhead (*I. natalis*) or both of these; bluegill (*Lepomis macrochirus*) or pumpkinseed (*L. gibbosus*) or both of these; golden shiner (*Notemigonus crysoleucas*), and fathead minnow (*Pimephales promelas*). Reservoirs are often stocked with rainbow trout (*Salmo gairdneri*).

Distribution: throughout New York State.

Rank: G5 S5

5. Quarry pond: the aquatic community of an excavated basin that is created as part of a rock quarrying operation. The sides of the basin are often very steep, thereby eliminating any shallow shoreline habitats. Water levels usually fluctuate, reflecting recent precipitation patterns.

Distribution: throughout New York State north of the Coastal Lowlands ecozone.

Rank: G5 S5

6. Artificial pool: the aquatic community of a small pool that is constructed for recreational activities (e.g. swimming) or as a decorative

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element in a landscape design. The water is typically chlorinated and flushed on a regular basis to reduce or eliminate the growth of algae and bacteria; there is minimal development of any aquatic biota.

Distribution: throughout New York State.

Rank: G5 S5

7. Industrial cooling pond: the aquatic community of an artificial pond constructed as a holding pond to allow for cooling of high temperature industrial effluents.

Distribution: throughout New York State.

Rank: G5 S5

8. Sewage treatment pond: the aquatic community of an artificial pond constructed for sewage treatment (chemical and biological decomposition of sewage) prior to release to a stream or aquifer.

Distribution: throughout New York State.

Rank: G5 S5