Wetlands

Description:

Much of the information on wetlands provided below was adapted from Kiviat and Stevens (2001).

- Tidal and Non-Tidal Wetlands

  The Hudson River Estuary corridor contains a rich diversity of wetland types, which in turn supports a variety of plant, wildlife, and fish species. About 29 of the 57 wetland community types occurring in New York have been documented in the Hudson River Estuary corridor (Howard et al. 2002, Edinger et al. 2002). Wetlands represent a transition between aquatic and terrestrial systems and as such, generally support high species diversity. Some wetlands (e.g., bogs) support low species diversity but represent an important component of biodiversity at the landscape scale.

  Tidal wetlands occur along the 152-mile Hudson River estuary and include brackish tidal marsh, brackish intertidal mudflats, freshwater tidal swamp, freshwater tidal marsh, and freshwater intertidal mudflats. The species composition of Hudson River Estuary wetlands change as the water characteristics change from brackish to fresh. Examples of non-tidal wetlands include fens, bogs, scrub-shrub swamp, and forested, floodplain, and headwater wetlands.

  Tidal wetlands of the Hudson River Estuary corridor include (Kiviat and Stevens 2001):

  Fresh and Brackish Subtidal Shallows: The subtidal shallows is the zone between the mean low water elevation and approximately 6.5 ft below mean low water. This zone supports beds of submerged vegetation, which are well-known for their importance to fish and waterfowl. In some areas, the subtidal shallows extend into portions of tidal tributary mouths. This habitat is found throughout the tidal Hudson, but is more extensive in shallower reaches of the river, including the Haverstraw Bay-Tappan Zee and areas north of Saugerties.

  Fresh and Brackish Intertidal and Supratidal Marsh: The intertidal marsh is the herbaceous wetland (i.e., dominated by non-woody plants) and mudflat zone between mean low water and mean high water. A supratidal marsh is a predominately herbaceous wetland occurring at elevations between mean high water and approximately 3.3 ft above mean high water. Possibly the best-studied Hudson River habitat, the marshes attract attention because of their documented importance to fish and birds. These habitats also support many rare plant species, are important for recreation, and appear to play a beneficial role in Hudson River water quality. The combined intertidal and supratidal zones cover approximately 26% of the 58,000 acre high-tide surface area of the tidal Hudson River between the Rip Van Winkle Bridge and the New York-New Jersey state line. The intertidal marshes probably comprise somewhat less than half of the 26%.

Intertidal and Supratidal Swamp: The intertidal swamp is a wooded wetland, dominated by trees or shrubs, occurring in the upper intertidal zone, but below mean high water. A supratidal swamp is a wooded wetland lying between mean high water and approximately 3.3 ft above mean high water. It thus receives tidewater only during spring tides and storm tides. Tidal swamps have been studied little in the Hudson or elsewhere on the Atlantic coast. Hudson River intertidal and supratidal swamps are known to support rich biological communities, including numerous rare plants and a few rare animals. Most tidal swamp is in highly sheltered areas where tidal wetlands predated the Hudson River railroads, on dredge spoil deposits between the railroad and mainland, or at stream mouths, between islands and the mainland, and in protected coves. The largest examples are at Mill Creek, Stockport Flats, Rogers Island, Rams Horn Creek, and Tivoli Bays.

Tidal Tributary Mouth: The mouths of tributaries where nontidal and tidal waters mix, differ in substrate and chemistry from the adjoining aquatic habitats of the tributary and Hudson River. Tidal tributary mouths often have relatively scoured, rocky bottoms, fluctuating turbidity, and a shorter ice season than the adjoining bays or coves. These areas are important foraging habitats for fishes and water birds, and important spawning habitats for ocean and Hudson River fishes. Tidal stream mouths are found throughout the estuary, although in urban areas some streams have been diverted into culverts or artificial channels.

Non-tidal wetlands of the Hudson River Estuary corridor include (Kiviat and Stevens 2001):

Wet Clay Meadow: Wet clay meadows are wet meadow or wet oldfield habitats on clayey soil; most were formerly agricultural fields. Post-agricultural wet meadows may seem unexceptional on first inspection, but some are significant habitats for rare plants. This habitat should be expected wherever level, non-forested expanses of clayey soils occur in the Hudson River Estuary corridor, generally at 100-200 ft elevation.

The threatened spreading globeflower. Photo by Troy Weldy.

Fen and Calcareous Wet Meadow: These are open (i.e., unshaded by trees), herb-dominated (usually sedge-dominated), calcerous, shallow wetlands. Fens are distinguished by groundwater seepage, and a “fen plant community”, typically including shrubby cinquefoil. Calcareous wet meadows may have a variety of water sources, and a less specialized plant community. Fens and calcareous wet meadows occur where bedrock is limestone or other carbonate rock, or where the soils contain glacier-transported materials from carbonate rocks. These habitats

support many rare plants and animals, and are sensitive to hydrological changes and pollution. Most fens and calcareous wet meadows are at low elevations.

Blue flag iris. Photo by Paul Jensen.

Non-Calcareous Wet Meadow: These are wetlands with non-calcareous soils and groundwater where the soil is saturated for part or all of the growing season, but only shallowly and briefly inundated, if at all, and which support predominantly herbaceous (non-woody) vegetation. Non-calcareous wet meadows are common in the Hudson River Estuary corridor. They occur where there is seepage, or accumulation of rainwater or runoff, on soils that are moderately to highly acidic. Wet meadows usually occur where there is or was livestock grazing, mowing, hay cutting, recent abandonment of crops, or where woody vegetation has recently been cleared. Wet meadows also occur in beaver meadows (abandoned beaver ponds) and some partially drained marshes. Wet meadows are often associated with the margins of marshes or swamps. Biodiversity values of non-calcareous wet meadows are poorly studied.

Hardwood Swamp: In prevalent usage the term "swamp" refers to a wetland dominated by trees or shrubs. Non-tidal hardwood swamps are fairly common in the study area; conifer swamps are very rare, very different ecologically, and very important for biodiversity. Swamps may be inundated throughout, may contain only small streams or pools, or may border larger streams, ponds, or lakes. Springs or seeps (groundwater discharge) may be present within or at the edges of swamps. Hardwood swamps are more extensive in areas of lower human population and are more common and extensive at lower elevations. Kettle shrub pools are an important type of swamp habitat, particularly to the threatened Blanding's turtle. Kettle shrub pools are deep-flooding, seasonal, shrub-dominated wetlands on glacial outwash, originally formed by the melting of stranded blocks of glacial ice.

Beaver Pond: Beaver ponds are created by beavers building dams across small to medium-sized perennial streams. Beaver ponds flood portions of the riparian area for a few years or sometimes longer. The pond accumulates silt, organic matter, and nutrients. Eventually the beavers die or leave the pond, the dam deteriorates, and the water level of the pond draws down, leaving a beaver meadow — a silty marsh or wet meadow. Beaver ponds and beaver meadows are different from surrounding habitats and are used by many other animals and plants. Beaver ponds are widespread in the Hudson River Estuary corridor, except in areas of high human population density where beaver ponds are usually drained to prevent damage to roads, yards, and ornamental trees.

Circumneutral Pond Lake: These are calcareous spring-fed water bodies with deep, organic substrates, and supporting vegetation of both acidic bogs and calcareous

marshes. Floating peat mats and rafts are often present. Circumneutral bog lakes contain a variety of habitats for rare and uncommon species. Bog lakes are probably widespread near the Hudson River Estuary although many (and the best known) examples occur farther inland.

Acidic Bog: Acidic bogs are perennially wet, very low-nutrient wetlands dominated by low shrubs and peat mosses, with acidic, organic soils. Bogs are rare in the Hudson River Estuary corridor, are strikingly different from other wetlands, and support many uncommon and rare plants.

Marsh: Marshes are wetlands dominated by herbaceous (non-woody) plants, and with standing water through all or much of the growing season. Marshes are very important habitats for many species of birds. A marsh may be isolated from other surface waters, may adjoin a pond or stream, or may have a stream flowing through it. Nontidal marshes are widespread throughout the Hudson River Estuary corridor, but are mostly at low elevations where more water and nutrients collect.

- Vernal Pools

Vernal pools are seasonal or ephemeral wetlands that form in shallow depressions and alternate on an annual basis between a stage of standing water and extreme drying conditions. They are found in a variety of settings, including depressions in upland forests, in floodplains, in wet meadows, and as part of large wetland complexes. By definition, vernal pools are free of fish and thus can support a rich community of amphibians and invertebrates that would be difficult to sustain if fish were present. Vernal pools are a common, but threatened habitat type that look unassuming, but are critical breeding areas for several species (see below).

Vernal pool at Ward Pound Ridge Reservation. Photo by Dennis DeMello.

Overall, characteristics of vernal pools vary greatly in terms of recharge, discharge, source of water, and geology. Largely fed by precipitation, these small pools may be most readily identified in the spring. Often occurring in small depressions, many dry up in late summer. However, a few have water year round.

Ecological Importance:

- Tidal and Non-Tidal Wetlands

Wetlands are unparalleled in their importance to many fish and wildlife species, providing a variety of habitat components such as breeding grounds, nesting sites, foraging areas, and other critical habitat. Because of historical losses in wetlands across North America, including New York State, these habitats often support endangered, threatened, and special concern plant and animal species. For example, the Hudson River Valley contains critical wetland habitat for the federally listed

bog turtle, Blanding's turtle, and northern cricket frog. Additionally, wetlands along the Hudson River Estuary are especially important for migratory waterfowl in the Atlantic Flyway. Tidal wetlands of the estuary represent some of the state's rarest ecological communities and are important as nursery areas for a number of marine and anadromous fish. Furthermore, wetlands perform a variety of unique physical, chemical, and biological functions that are essential to the health of the environment. Wetlands regulate water flow, protect lake and river shore areas from erosion, and improve water quality.

Quality tidal habitats have low densities of introduced plants such as water-chestnut and Eurasian watermilfoil, and smaller fractions of artificial materials (cinder, demolition debris, railroad ties) in the sediments. Many state-listed rare plants (e.g., Long's bittercress, spongy arrowhead, estuary beggar-ticks, smooth bur-marigold, goldenclub, Fernald's sedge) and other species in the Hudson Estuary corridor that are almost or completely restricted to the Hudson depend upon tidal marsh habitats. Extensive cattail stands, and to some extent mixed cattail stands, support breeding birds that depend to a variable degree on grass-like marsh plants. The mouths of tributaries, where nontidal and tidal waters mix, are important foraging habitats for fishes and water birds, and important spawning habitats for ocean and Hudson River fishes.

Northern cricket frog. Photo by John White.

Common animals of nontidal wetlands include white-footed mouse, raccoon, red-winged blackbird, swamp sparrow, and green frog. Wetlands are used by muskrat, mink, beaver, tree swallow, waterfowl, herons, shorebirds, northern water snake, turtles, frogs, and many invertebrates. Larger live or dead trees often contain cavities used by bats, owls, woodpeckers, eastern bluebird, gray treefrog, and other cavity-using animals. In addition, many species use the buffer areas surrounding wetlands, which may not be protected.

In general, higher quality nontidal wetlands have the following features: a large extent; absence or rarity of invasive plants (e.g., purple loosestrife, common reed, reed canary grass); an intact buffer zone with minimal impingement by intensive land uses; absence of landfills or dumps upstream or upgradient; and light or no livestock grazing. Large mats of floating filamentous algae that cover pools for long periods each year indicate overfertilization from external sources. High quality fen and calcareous wet meadows have minimal cover of tall herbs, tall shrubs, or trees. Higher quality wet clay meadows have a greater abundance of sedges (other than tussock sedge). Hardwood swamps of high quality have larger trees and more large downed wood in the swamp.

- Vernal Pools

Vernal pools (or woodland pools) are a common, but threatened habitat type in the Hudson River Estuary corridor. They are often damaged because they are overlooked or not appreciated by landowners, or in environmental reviews for development. Vernal pools and their surrounding terrestrial areas provide critical habitat for a number of amphibians and invertebrates, some of which breed only in vernal pools. Vernal pools are the only significant breeding areas for Jefferson salamander, spotted salamander, marbled salamander, and wood frog. Other typical users include spring peeper, spadefoot toad, gray treefrog, American toad, and other amphibians that depend on pond habitats for reproduction.

Spotted salamander.
Photo courtesy of Cornell University.

Frogs move from the forest to vernal pools where they mate and lay eggs and then return to the woods after breeding. The deposited eggs hatch into tadpoles, which transform into adults sometime within 6 to 15 weeks. Salamanders spend much of the year underground in tunnels made by small woodland mammals. They emerge from the ground in early spring and migrate up to half a mile on warm, rainy nights to vernal pools. Once they have deposited their eggs, the adult salamanders typically wait for the next rainy night, when they return to the forest. The developing amphibians prey on fairy shrimp, copepods, daphnia, phantom midge larvae, and mosquito larvae. Young adults leave the vernal pools once they have lost all traces of gills and return to breed about two to four years later.

Because these species are largely dependent on vernal pools for breeding success (the risk of predation is high in permanent wetlands), the loss of vernal pools in upland areas will lead to the loss of amphibian species that depend on them, and thus loss of biodiversity. Amphibians in general are declining worldwide, as are many vernal pool dependent amphibians in the Northeast. Jefferson salamander, marbled salamander, and blue-spotted salamander are listed as special concern in New York State. The four-toed salamander, spotted salamander, and wood frog are vernal pool-using species threatened in the Northeast.

Vernal pools are also important habitat for other species, such as wetland dependent turtles (including the state-listed Blanding's turtle and spotted turtle), birds (including the federally listed American black duck), and small mammals. In Dutchess County, kettle shrub pools (a type of vernal pool formed by the melting of stranded blocks of glacial ice) support populations of the threatened Blanding's turtle. Neotropical migrant birds such as the worm-eating warbler, veery, and wood thrush also use vernal pools.

Conservation Strategies:

- Tidal and Non-Tidal Wetlands

Freshwater tidal and non-tidal wetlands in New York State are protected under the Freshwater Wetlands Act, Article 24, and salt-water tidal wetlands in the lower estuary are regulated under the Tidal Wetlands Act, Article 25 of the Environmental Conservation Law. However, most small freshwater wetlands less than 12.4 acres are not covered under this legislation. Exceptions are certain smaller wetlands of unusual local importance and wetlands above one acre in size that are regulated within the Adirondack Park. Efforts to identify and protect smaller wetlands should be encouraged. Adequate protection of the uplands buffering wetlands is essential to preserving the integrity of wetland ecosystems and habitat quality for wildlife.

Physical disturbances to tidal wetlands should be avoided or minimized, and tidal flushing should be fully maintained. Dredge spoil disposal in the last century has eliminated large areas of tidal wetlands, especially between Saugerties and Albany. Large areas have also been filled for construction of the railroads and for urban-industrial development, especially in the Westchester and Albany areas. Pervasive chemical pollutants, such as PCB and metals, have contaminated the water and substrates of the Hudson River tidal habitats. Power boating and jet skiing in the shallows can have numerous effects, including pollution and toxic effects on organisms. Motorized craft should be excluded from shallows as much as possible to prevent pollution, and disturbance of animals and plants there. Abandoned and derelict duck blinds should be removed from tidal wetland habitats and duck hunters encouraged to use temporary blinds that are removed each season. The U.S. Army Corps of Engineers and NYSDEC are studying the potential for "restoring" some of the subtidal and intertidal habitat altered by spoil disposal.

Wetland stream. Photo by Paul Jensen.

The mouths of tributaries are degraded by stream channel alteration and water pollution, particularly near urban-industrial areas. Removal of obsolete dams and other structures, and restoration of stream bank plant communities would benefit tributary mouths. In some cases, fish ladders may be needed to provide access for spawning above dams that cannot be removed. Boat traffic in some areas constitutes intense disturbance of tributary mouth and tidal habitats. Finally, restoration of tidal flow should be emphasized and may require the installation of structures that allow flows to bypass obstructions.

Without mowing, burning or grazing, wet meadows are likely to be overgrown by purple loosestrife, shrubs and trees. Common reed is also a potential problem. Invasive species monitoring and control efforts will be particularly effective on sites

that currently have minimal invasive species problems. Recent advances in reducing purple loosestrife are encouraging and may present opportunities for local community involvement in the future.

Non-tidal wetlands, like tidal wetlands, are sensitive to hydrological changes and pollution. Filling, dumping, damming, excavation (to create ponds), siltation, pollution (from road or agricultural runoff), alteration of vegetation, and drainage are destructive to wetlands. Upstream changes in water quantity (changes in hydrology) or quality also impact wetlands. The woody vegetation in communities such as red maple-hardwood swamps and dwarf shrub bogs is often killed by higher water levels caused by downstream dams or road-bed impoundments. Low-intensity grazing or hay cutting may be compatible with biodiversity in some types of wetlands, depending on the kinds of rare or uncommon biota present. Restoration or protection of wetland hydrology, restoration of wetland plant communities, maintenance of buffer zones, control of invasive species, identification and protection of smaller wetlands, and management of certain types of wetlands through mowing, grazing or burning are conservation management actions needed for wetlands. Best Management Practices (BMP's) for timber harvesting (Welsch et al. 1995) and agricultural operations to promote wetland conservation should be encouraged and implemented in the Hudson River Valley.

Great horned owl.
Photo courtesy of Cornell University.

- Vernal Pools

Identification and mapping of vernal pools is a necessary first step in their conservation. Learning how to recognize these pools, even in the dry season, is of critical importance. Vernal pools can be identified through a variety of signs and plant species that may indicate their presence. Some of these identifiers include blackened and compressed leaf litter, buttressed tree trunks, water marked tree trunks, and vegetation such as red maple, highbush blueberry, and buttonbush. Pools should be identified in late winter or early spring when they are most readily recognized. Calhoun and Klemens (2002) recommend Best Development Practices and planning tools for conserving vernal pool wildlife and Welsch et al. (1995) provides Best Management Practices for timber harvests. Management plans for foresters and local governments (master planning or open space planning) should call for identifying the location of biologically important vernal pools, and the establishment of protective buffer zones around these areas. Reschke (1990) points out that more data on characteristic plants and invertebrates are needed.

Biodiversity areas notable for wetlands (Figure 12):

- Dutchess County Wetlands
- Esopus/Lloyd Wetlands and Ridges
- Harlem Valley Calcareous Wetlands
- Hudson River Estuary and Tidal Wetlands
- Hudson River Estuary Area of Biological Concern

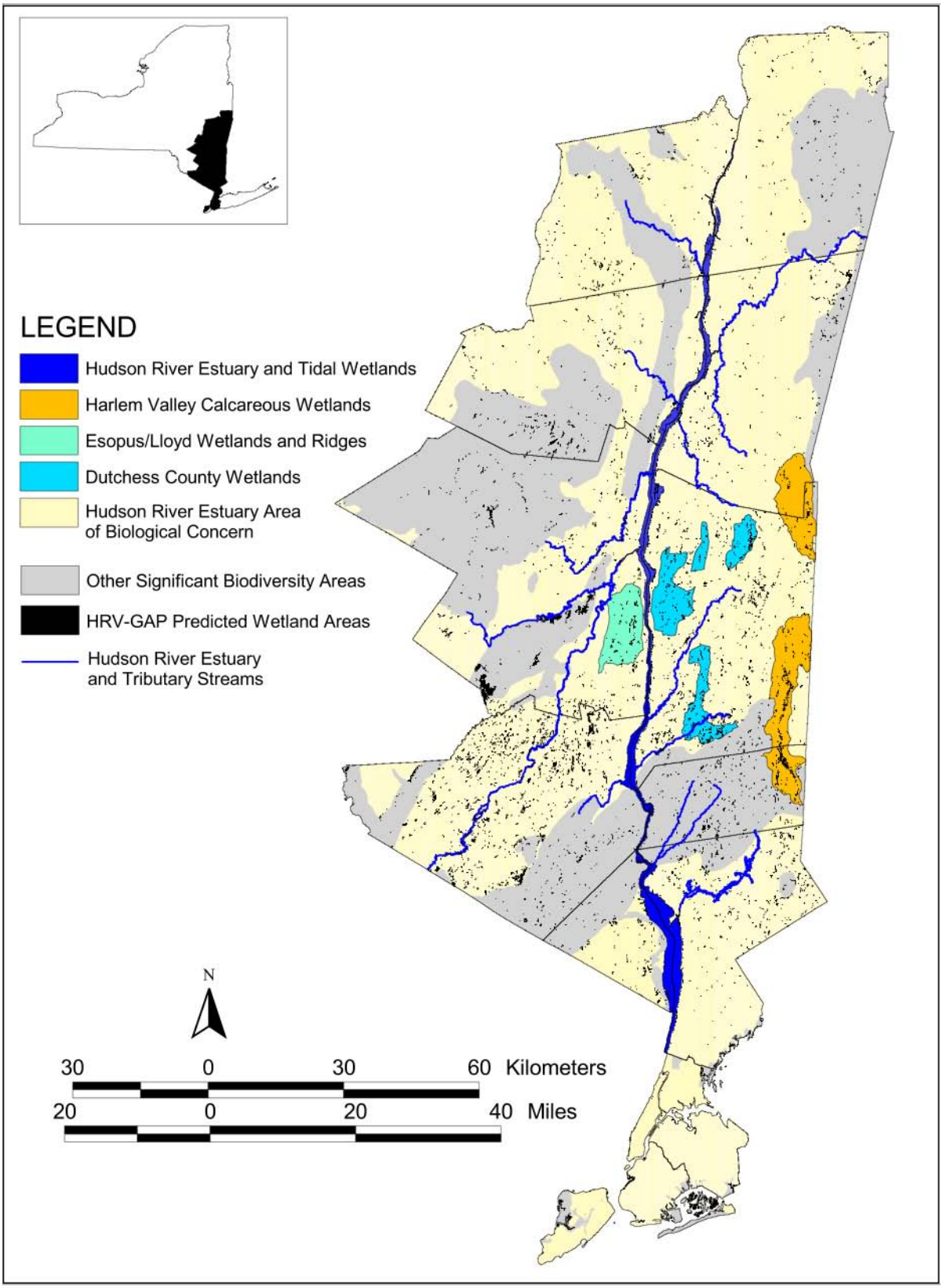

Figure 12. Significant biodiversity areas of the Hudson River Estuary corridor notable for wetlands. The map shows wetland occurrences predicted by the Hudson River Valley Gap Analysis (Smith et al. 2001) as black polygons. This is not a regulatory map.