Tributaries & Riparian Habitat

Description:

The health of the Hudson River Estuary is closely linked to the health of its tributaries and their watersheds. There are roughly 65 major tributaries to the Hudson River Estuary with over 3,600 miles of streams in the estuary watershed. These tributaries and adjacent riparian areas provide important habitat for fish and wildlife. Migratory fish, like herring and eel, and resident species, such as black bass, rely on tributary habitats to complete their life cycles. Blue crabs use the tributaries for nursing and overwintering. In the Hudson River Estuary, the mouths of tributary streams and rivers are influenced by daily tides, and are thus unique communities.

Intertidal swale. Photo courtesy of Kathryn Schneider.

Streams include channel habitat and riparian areas on the tops of the banks, the floodplain, and non-floodplain areas adjoining the stream. A typical stream channel exhibits a sequence of microhabitats in the form of pools, riffles, and runs. Pools and slow runs might support submerged vegetation while channel bars and portions of low banks can support plants such as willows, alder, silky dogwood, spotted jewelweed, stinging nettle, and whitegrass. Streambanks and floodplains are often dominated by plants tolerant of flooding and ice damage. The floodplain is the low-lying area that is flooded by a stream at statistical intervals. The 100-year floodplain for example, is predicted to be flooded once per century. Floodplains contain a variety of habitats, including but not limited to upland meadow, wet meadows, swamps, marshes, and lowland forests. Although once common, floodplain forest is now rare in the Hudson River Estuary corridor.

Riparian habitats represent only a small portion of the landscape, but are a critical source of biodiversity. A riparian zone is an interface between aquatic and terrestrial systems. Riparian ecosystems cover the land bordering a stream, wetland, lake, tidewater, or other body of water. The suitability of these zones for supporting aquatic and terrestrial plants and animals can be altered by agricultural and timber harvesting activities, the creation of physical structures such as buildings, roads, and dams and other human disturbances such as recreation.

Ecological Importance:

Riparian zones serve a variety of functions, including those related to physical and chemical characteristics of streams (e.g., moderating water temperature, controlling stream erosion and sedimentation, controlling non-point source pollution) and they provide habitat for a variety of fish and wildlife species. Many aquatic invertebrates, which are food for predatory fish, use riparian vegetation as habitat and depend upon leaves as a source of food. Leaves fallen from streamside trees are the carbon source that fuels the entire aquatic food chain in small to medium-sized tributary streams. Riparian trees

also help to create critical habitat features, such as cover, undercut banks, and piles of woody debris that trap nutrients. Even a narrow band of woody vegetation contributes to edge of channel habitat structure (such as undercut banks) and temporary bank stabilization. Riparian vegetation is a source of woody debris that helps to create microhabitat within the stream channel. In addition to supporting the aquatic environment, riparian areas are unique ecosystems in themselves, and present optimal conditions for a number of plant and animal species. The soils and microclimate within riparian areas often contain the right conditions for ferns, orchids, and other plants that prefer rich, moist soils and environs.

Riparian zones tend to be biodiverse, because they provide a close juxtaposition of wildlife habitat requirements, an increased number of niches due to increased plant diversity and structural heterogeneity, and high edge-to-area ratios resulting from their linear shape. Riparian corridors are networks that provide potential routes for animal movement, seed dispersal, and gene flow across landscapes, and may serve as a source area for recolonization of nearby disturbed areas. Loss of mature, riparian forest remains an issue of concern in the Hudson River Estuary corridor. Wildlife species that depend upon wide bands of mature riparian forest, riparian wetlands, and silt-free channel beds are the most imperiled.

Belted kingfisher. Photo by Isidor Jeklin.

Terrestrial animals utilize riparian areas for foraging, breeding, migration, hibernation, and refuge. Semi-aquatic mammals that use tributary habitats include mink, muskrat, and river otter. Bats and birds forage on insects above the water. A variety of birds use tributaries and riparian habitat, including waterfowl, woodcock, belted kingfishers, osprey, eagles, herons, and many songbirds. Streams support fish and aquatic macroinvertebrate communities, stream salamanders, green frog, snapping turtle, eastern painted turtle, wood turtle, and northern water snake. A number of invertebrates use these habitats, including damselflies, butterflies, and dragonflies.

Pollutants released in the watershed find their way to the estuary through tributaries. In the Hudson River Estuary corridor, pollutants of concern include excessive sediment and nutrients, toxic chemicals, heavy metals, and pathogens. Other significant causes of water quality impairment in tributary streams include noxious aquatic plants (particularly at tributary mouths), thermal modification, flow alteration and other habitat modifications. Many pollutants readily attach to sediment, which in excess, is also considered a pollutant. Potential pollutants such as pathogens, phosphorus, and some pesticides readily attach to sediments and are resuspended in the water column dur-

ing disturbances, or transported downstream to drinking water reservoirs or the Hudson River Estuary. All stream systems naturally erode and redeposit sediments. However, sediment erosion or deposition beyond natural rates can create conditions that aquatic organisms are unable to tolerate. Common sources of sediment include eroding banks (although some bank erosion is natural), construction sites, agricultural fields, and urban runoff.

The obstruction of fish migration by dams and other structures, and habitat alteration related to activities such as gravel mining or reservoir water releases, can also degrade tributary habitats. Dams alter the river continuum and connectivity, disrupt sediment transport, and alter natural fluctuation in water supply. Increasingly, increased impervious surfaces are causing changes to watershed hydrology, particularly in the rapidly urbanizing portions of the Hudson River Estuary corridor. Impervious surfaces such as roads, rooftops, and parking lots direct stormwater to streams as runoff, rather than allowing it to infiltrate the soil and reach the stream as groundwater. Because water is not stored in the soil and released to the stream at slower rates, the result is that low flows are more severe and last longer during summer months, while storm flows may peak at higher and more destructive levels. Both the increased flow rate and amount of water reaching the stream can cause devastating changes in channel and riparian habitats.

Headwater mountain stream. Photo courtesy of Mark Vian.

Conservation Strategies:

The cumulative effects of channelization, point and nonpoint source pollution, gravel mining, dam construction, floodplain filling, and riparian vegetation removal throughout a stream system can lead to dramatic declines in biodiversity. Best Management Practices designed to reduce these disturbances should be developed based on an understanding of how disturbances affect certain species, at what intensities, and during which times during the species' annual life-cycle. Management of stream and riparian habitats may involve the establishment of buffers, limiting livestock and human access during critical time periods, and limiting certain types of activities. Conservation easements, local zoning ordinances, and set-aside of riparian areas can create a space for natural stream processes to operate.

Minimizing development in the riparian corridor, and minimizing hydrologic alteration of the stream system within the watershed (including intermittent tributaries and wetlands) will help to protect stream biodiversity. Restoration of native riparian meadows and for-

ests, as well as natural channel morphology is essential for the protection of water quality. Stream managers should consider that alteration of floodplain, channel, and riparian habitats in one section of the stream can cause unwanted changes in downstream habitats.

Longtail weasel.
Photo courtesy of Cornell University.

Management approaches to conserving riparian zones must address both the loss and degradation of these habitats and the effects of human disturbance. The USDA Forest Service (Welsch 1991) provides specific guidelines for the conservation and maintenance of riparian zones, including recommendations for the size of forest buffer widths. In general, riparian buffer widths should be at least 300 feet to support wildlife habitat. However, conservation buffers of this size are not always possible. Buffers of at least 50 feet protect some streamside functions, although their long-term effectiveness should be examined for the particular stream and the probability of channel adjustments. Recommended buffer sizes can also be based on particular stream processes and species-specific habitat requirements (Wenger 1999). Riparian buffer recommendations should be incorporated into forestry and agricultural Best Management Practices and communicated to interested landowners.

Biodiversity areas notable for tributaries & riparian habitat (Figure 10):

- Delaware/Mongaup Rivers
- Hudson River Estuary Area of Biological Concern
- Shawangunk Kill/Shawangunk Grasslands
- Neversink River

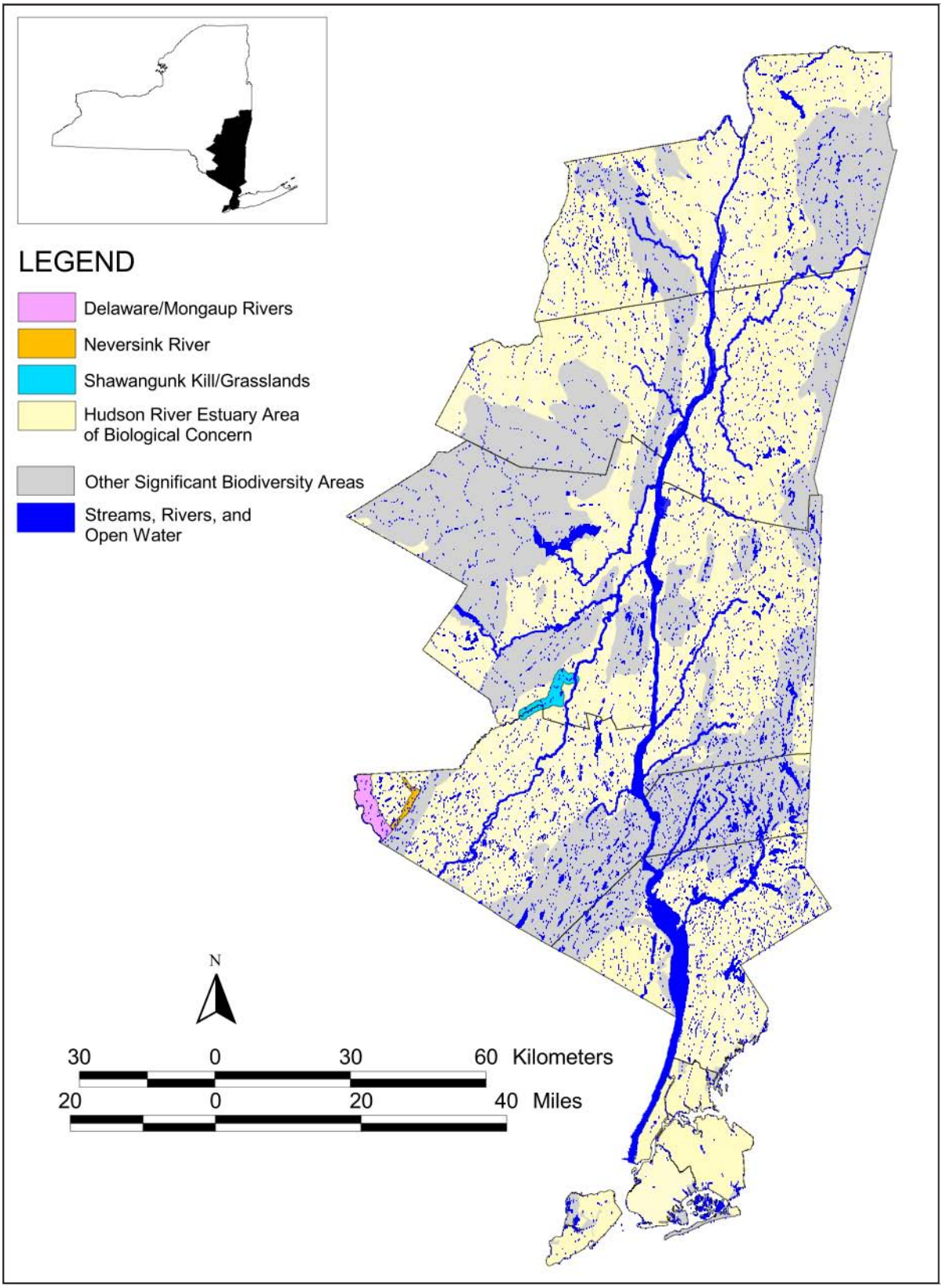

Figure 10. Significant biodiversity areas of the Hudson River Estuary corridor notable for tributaries and riparian habitat.