Executive Summary

Purpose

The *Wildlife and Habitat Conservation Framework* describes key plant and animal habitats in the 15 New York State counties bordering the Hudson River Estuary from the Federal Dam at Troy to its confluence with the ocean, an area which contains most of the lower Hudson watershed. It also identifies strategies for the protection of these habitats. The report is intended to assist individuals, non-profit groups, and government officials in developing partnerships to conserve our region's natural heritage, emphasizing voluntary measures and utilizing local home rule. It was developed as part of the *Hudson River Estuary Action Agenda*, led by the New York State Department of Environmental Conservation (NYSDEC).

Plant and Animal Habitat in the Hudson River Estuary Region

The Hudson River begins as a small mountain lake on the side of the state's highest peak, Mt. Marcy, and ends in New York Harbor, one of the world's busiest and most populated metropolitan ports. About halfway along its course it becomes an estuary, an arm of the sea, that provides spawning and nursery grounds for commercially valuable fish, crabs, and shellfish. The River's uplands are covered with forests interspersed with working farms, residential development, and small cities. These lands support a high diversity of species of global and national significance. The Hudson Valley's varied geology creates a tapestry of habitats, such as pine barrens, grasslands, cliffs, mountain ranges, caves, streams, and wetlands, including globally rare freshwater tidal wetlands. This mix of habitats gives the region exceptional importance.

The region, comprising only 13.5% of the land area of the entire state, contains nearly 85% of the bird, mammal, reptile, and amphibian species found in New York State. It is important worldwide for its rich diversity of turtles, and nationwide for its dragonflies and damselflies. It offers opportunities found nowhere else in the state for conservation of amphibian and reptile biodiversity. A number of species use the Hudson Valley as a migration route or as breeding or nursery habitat. This includes migratory fishes such as shad, sturgeon, and striped bass, as well as insects such as the monarch butterfly. Birds as varied as the cerulean warbler, marsh wren, bald eagle, osprey, and ruby-throated hummingbird all spend part of their life cycle in the Valley and part of it in places as far away as Nova Scotia and South America.

The Hudson River Estuary ecosystem is home to a number of species that have their best or only remaining populations in the region. Such species include the northern cricket frog, sable clubtail dragonfly, Kentucky warbler, timber rattlesnake, the bog turtle, Karner blue butterfly, and Indiana bat. Approximately 150 species in the watershed are listed by the NYSDEC as threatened, endangered, or of special concern in New York State. Of the 11 turtle species found in the Hudson Valley, 6 are on state or federal lists of endangered, threatened, or special concern animals, primarily due to habitat loss.

While some species flourish in the Hudson River Valley, others are threatened and some species not now listed as endangered are on the decline. Urbanization and habitat fragmentation are a major concern. Species that require connections between habitat types to complete stages in their life cycles cannot survive if these connections are broken. For example, wood frogs, spotted salamanders, and marbled salamanders require wetlands for breeding and must have adjacent woodlands for their adult stage. Animals that rely on large unbroken tracts of forest, such as the bobcat, wood thrush, cerulean warbler, and red-shouldered hawk can become vulnerable when such forest lands are broken up. Agricultural lands also provide important habitat. Meadows and shrubby fields found on Hudson Valley farms can support species such as the bog turtle, northern harrier, bobolink, meadowlark, and golden-winged warbler. Many of these species are declining in the valley as agricultural land uses decrease.

Pollution and competition with invasive or overabundant species create problems for some species. At least 10 percent of the 3,600 miles of tributary stream habitat in the Hudson Valley are stressed from agricultural and urban runoff, erosion, dams, loss of riparian buffers, and reduced groundwater recharge. Invasive species crowd out native species that serve as food and shelter for many of the regions insects and small animals. Many of these "invasives" take hold where human practices give them an extra boost.

The region is one of the most densely populated areas in the country, and its land is changing fast. According to a report released in 2001 by the Brookings Institution, between 1992 and 1997, urbanized land use in the NYC metropolitan area grew at three times the rate of population growth, and in the Albany Capital District urban land use grew at six times the rate of population growth (Fulton et al. 2001). This rapid land conversion creates an urgent challenge to organizations and agencies faced with finding new ways to include conservation in the region's growth strategy. Protecting habitat does not require that growth stop however, human developments will need to be sensitively placed to maintain important habitats and fit the needs of wildlife species.

Public lands are making an important contribution to biodiversity conservation in the Hudson River Valley, particularly for species that require large forested tracts. A century of open space acquisition has created large intact habitats in the Highlands, the Palisades, the Taconics, and the Catskills. However, 90% or more of the suitable habitat for the region's birds, mammals, amphibians, and reptiles is found on private lands. Furthermore, 23 of these species are not thought to occur at all on public land. While land acquisition will play a role in protecting some of these species, it cannot be the primary strategy. These trends highlight the need for conservation options that can be adopted by interested parties.

Local Conservation Opportunities

Key steps in conserving the richness of the Hudson's heritage can be taken by local planning boards and property owners. Local home rule gives residents the ability to create and maintain the character of their communities and provides great latitude to

communities that want to conserve their natural and biological resources. In order to make informed decisions, communities will need to identify their unique conservation opportunities. Municipalities can then identify critical areas for habitat and natural resource protection and prioritize areas suitable for development. This strategy can increase residential property values, thus providing additional revenue for municipalities. In addition, this approach improves water and air quality and provides a community with space to experience the beauty of nature. By guiding development patterns now, towns can avoid the costs of urban and suburban sprawl and preserve the sensitive wildlife habitat that nurtures the Valley's unique heritage of native plants and animals.

Individual landowners can also take action to protect these important habitats in the Hudson River Valley. Biodiversity conservation can be folded into private land stewardship in order to stem the loss of species and their habitats. With the *Wildlife and Habitat Conservation Framework,* the NYSDEC Hudson River Estuary Program hopes to provide a road map for individuals and communities to make informed decisions about land use and conservation.

The Wildlife and Habitat Conservation Framework

The *Framework* is divided into three parts. Part I provides an overview of the biodiversity issues in the region, discusses the importance of biodiversity in our daily lives, and highlights the major threats to biodiversity. Part II defines significant Hudson Valley habitat types, describes some of the characteristic plants and animals they support, and identifies their unique conservation challenges. Part III proposes various strategies for protecting our resources by working with a variety of partners to meet the needs of both people and of wildlife. It emphasizes approaches that work within New York's long tradition of home rule and property rights.

The information contained in the *Framework* builds upon 10 years of work to catalog the species and habitats of the region that form the ecosystem of the Hudson River Estuary. Since the release of the first *Hudson River Estuary Action Agenda*, NYSDEC has completed a number of wildlife and habitat inventory projects. Many of these studies were conducted in collaboration with state, nonprofit, federal, and academic partners. Collectively, they provide a solid, science-based approach to conservation and a useful source of data for further research and implementation of conservation practices.

On-going inventory projects monitor and predict the distribution of terrestrial vertebrates, breeding birds, amphibians and reptiles, rare plant and animal populations, and exceptional habitat areas. The information collected is used to determine habitats of particular significance in the region. Analyses of the data compiled suggest that the following major habitat types and associated wildlife species are most significant in this region:

- Coastal Habitats

  Coastal habitats include sand beaches, mudflats, coves, salt marshes, tidal wetlands, and tidal creeks. These habitats support waterfowl, colonial wading birds, marine and estuarine fishes, and many species of turtles, molluscs, and raptors, including the nation's symbol of freedom, the bald eagle. Dredge spoil disposal, bulkheads, and construction fill for urban and industrial development have damaged or eliminated large areas of subtidal shallows habitat. In addition, impoundments, dams, and floodplain filling currently block the migration routes for many economically important species that require temporarily flooded riparian wetlands and abandoned channel meanders (oxbows) in order to complete their life cycles. Coastal habitats are also impacted by surrounding land uses, tributary water quality, and recreational activities. Key restoration and preservation strategies should be considered at individual sites to restore native plant communities, restore fish passage and spawning habitat, improve tidal flow, and enhance water quality along our coastlines.

- Wetlands

  The Hudson River Estuary region contains a rich diversity of wetland types, from freshwater tidal swamps and brackish tidal marshes to fens, bogs, and forested wetlands. These habitats are home to a variety of species including the federally-listed black duck, wood frog, the threatened Blanding's turtle, marbled and Jefferson salamanders, muskrat, and beaver. Unfortunately, more than 50% of the wetlands in the region have been lost since European settlement. Wetland conservation strategies should include, where possible, the restoration and protection of wetland hydrology and wetland plant communities, control of invasive species, and management of certain types of wetlands through mowing and grazing. Inland intermittent vernal pools, a common but threatened wetland habitat type, should be identified and conserved along with surrounding critical woodland habitat, and best forest management practices can be used to protect them from pollution and disturbance.

- Tributaries and Riparian Areas

  High quality tributaries, riparian areas, and floodplain forests are important habitat for many species including trout and black bass, salamanders, river otters, beaver, cerulean warbler, and wood turtles. Aquatic animals are highly dependent on riparian areas for shade, leaves (as a source of food), edge-of-channel habitat structure (such as undercut banks), soil stabilization, and woody debris. Removal of riparian areas, modification of stream channels, and increasing impervious surfaces cause some of the changes to watershed hydrology that are putting the water and habitat quality of tributary streams in the Hudson River Valley at risk. Minimizing development in riparian corridors, minimizing the hydrological alteration of stream systems, protecting native floodplain meadows and forests, and restoring natural stream channels will help to protect stream biodiversity. Removal of obsolete dams or the construction of fish passage structures can restore fish migration and sediment and temperature regimes.

- Unfragmented Forest and Habitat Corridors

  Intact forests are summer breeding habitat for migratory songbirds, bobcats, black bear, wood thrush, barred owl, and red-shouldered hawks. Although few examples of "old-growth" lowland forest remain, forests of moderate-sized and moderate-aged trees continue to provide valuable habitat and have the potential to provide mature forest habitat in the future. Many of the biological communities that characterized unfragmented forests are at risk in areas of the Hudson Valley. We can preserve the species that depend on unfragmented forests and habitat corridors by conserving mature lowland forests, concentrating disturbance along the edge of forest blocks, restoring forest fragments in riparian areas, reforesting gaps between disconnected forest tracts, and controlling invasive species while managing for well-developed growth on the forest floor, .

- Open Uplands and Barrens

  This habitat type includes grasslands, shrublands, agricultural lands, and rarer communities such as pitch-pine scrub-oak barrens, and rocky summit grasslands. These areas represent increasingly rare habitat for bobolinks, meadowlarks, grasshopper sparrows, golden-winged warblers, fox, northern harrier (hawks), butterflies, and the state endangered bog turtle. Without management or disturbance, early successional habitats become forest. Many of these animals are now declining due to reforestation or development of lands that were once meadows. Maintenance of early successional habitat should be balanced with the need to conserve stands of unfragmented forest. Control of invasives combined with reintroduction of native species will help to restore degraded sand plains. Conserving large, continuous parcels of open habitat on rocky summits and facilitating infrequent mowing or prescribed fire treatment in lowland areas will help to retain a mix of grasses, woody plants, seedlings, and saplings that provide essential habitat. Outreach to agricultural communities is integral to the preservation of this habitat type.

- Caves and Cliffs

  These habitat types were formed during ancient mountain-building processes or during mining exploration. They are used by rare cliff ferns, bats, peregrine falcons, migrating hawks, and rock-cresses. Approximately 40% of the state occurrences of the eastern small-footed bat and 3 of the 8 federally endangered Indiana bat hibernacula in New York State are found in the Hudson River Valley. Rare cliff plants such as the spleenwort, prickly pear, purple cliffbrake, and three-toothed cinquefoil can be found in the region's mountains. Cliff areas also provide overwintering habitat for many snake species, support the silvery blue and orange tip butterflies, and serve as migration pathways for several hawk species. Cliff and cave inventories should be conducted in the region and conservation measures should be taken to protect sensitive portions of these habitats from land-use practices that can be damaging, such as mining and high volume recreational activities like rock climbing, hiking, and mountain biking.

The *Framework* identifies 23 land areas representing these habitat types in the Hudson Valley that are particularly significant to biodiversity. With almost 89% of the estuary's conservation area in private ownership, landowners, non-profits, sporting clubs, and businesses can play a key role in meeting the goals and targets of the *Hudson River Estuary Action Agenda*. The NYSDEC intends to continue developing a network of partners to improve the overall quality of the Hudson Valley landscape through incentive-based voluntary conservation programs.

Tools are described in this *Framework* that will allow residents to identify habitat areas that provide the highest benefits to the local environmental quality and integrity of the Hudson Valley region. While local residents can best identify the important cultural and environmental features of their communities, there are many partners within the Hudson River Valley that can provide assistance. Grants are available through the Hudson River Estuary Program to carry out habitat assessment, education, and restoration projects. State wildlife biologists are available for consultation, and many non-profit organizations offer technical guidance and services to Hudson River Valley residents, governments, and community groups.

The publication of the *Conservation Framework* is designed to help achieve the objectives of the *Hudson River Estuary Action Agenda* to conserve the rich diversity of plants, animals, and habitats of the Hudson River Estuary region for future generations. Other projects of the Hudson River Estuary Program include technical assistance for local governments in conservation planning and training for local citizens in how to assess biodiversity.

The actions of the Hudson River Estuary Program are wide-ranging — from creating access to clean swimming waters, to upgrading sewage treatment plants, to restoring robust fisheries, and protecting the watershed. Conserving the biodiversity of the Hudson River Valley is a key aspect of this mission.

Overview

Background

The Hudson River Estuary corridor is truly one of the great regions of the world and a special place within the Empire State. It is a region of remarkable beauty, historical and economic significance, and importantly, high biological diversity. From tidal wetlands and coastal ecosystems to high elevation spruce-fir forest, the region boasts a remarkable diversity of habitats, and species that depend on those habitats. Turtles, snakes, bats, frogs, salamanders, birds of prey, songbirds, waterfowl, mollusks, butterflies, old-growth trees, and unique freshwater tidal wetlands are a few examples of an extensive list that describes the biodiversity of the greater Hudson River Estuary ecosystem. Humans are an important part of the environment within the Hudson River ecosystem and are dependent on the region's abundant natural resources. From the rarest to the most common, we must strive to conserve the native plants, wildlife, and ecological communities that make this area so special and at the same time, work with people and communities to ensure that their needs are addressed.

Estuaries are bodies of water, such as rivers or bays, along coasts where the tides carry water inland. In the Hudson River, tides reach as far north as the Federal Dam at Troy and form an estuary. The tidal Hudson River estuary begins as freshwater in Troy, gradually turns brackish near the Hudson Highlands, and becomes noticeable salty at the Tappan Zee Bridge. The Hudson River Estuary corridor, extending from the Troy Dam to the Verrazano Narrows below Manhattan Island, and including the counties bordering the estuary, is the focus of New York State's Hudson River Estuary Program. In order to fully appreciate, understand, and manage the Hudson River Estuary, it is necessary to consider it in the context of its surrounding landscape and watershed. For the Estuary to be healthy, the neighboring lands and forests, and tributary rivers that flow into it must also be healthy.

To date, results from our efforts have revealed that the ecosystems surrounding the Hudson River Estuary support a remarkable array of vegetative cover types. This diversity of land cover is reflected in an abundance of wildlife species, some of which have all or a significant portion of their entire New York range within the Hudson River Estuary corridor. For example, 25 of 31 vegetative cover types identified for all of New York State occur within the 4.2 million acre Hudson River Estuary corridor, an area representing about 13.5% of the land area of New York. For all New York terrestrial vertebrates combined, 86% (308 species) have predicted occurrences from the corridor. Within this total, the Hudson River Estuary corridor provides habitat for 85% (28 species) of New York's amphibian species, 73% (27 species) of New York's reptile species, 87% (199 species) of New York's breeding bird species, and 92% (54 species) of New York's mammal species (Smith et al. 2001).

This remarkable diversity in some instances takes on global significance. In the case of turtles, the Hudson River watershed has a rich diversity of species, many of which are

endangered. The number of species found in the Hudson River watershed is matched in only a few other rivers in the world, including the Suawanee (Florida), Mekong (southeast Asia), and Irrawaddy (Myanmar).

In the last five years, the Biodiversity Program of the Hudson River Estuary Program has completed a number of projects in collaboration with partners to conserve the Hudson River Estuary's rich ecosystem. These collaborative projects include identification and mapping of wildlife habitats from satellite imagery, surveys of rare plant and animal communities and significant ecological communities, monitoring of PCB levels to determine potential affects on nesting eagles, expansion of the Hudson River Valley portion of the NYS Amphibian and Reptile Atlas, initiation of a Hudson River Valley Breeding Bird Atlas to expand and complement the statewide effort, development of a manual and related training for biodiversity assessment, collection and continued analysis of the movement of contaminants in the food chain, grants for conservation and stewardship projects, outreach and technical assistance to Hudson Valley municipalities, surveying bog turtles in the lower Hudson River Watershed, and publication of this conservation framework.

Development of a conservation framework evolved out of the need to provide current information on the biological resources of the area and strategies by which agencies, organizations, and individuals could work collaboratively to achieve realistic conservation goals. This project emphasizes voluntary approaches that can be undertaken in the context of local home rule. No new state regulations are proposed. The conservation of our biological diversity will likely be achieved through a variety of mechanisms, from outreach aimed at land-use planners, to open space protection, to partnerships with landowners to foster conservation practices at home.

Truly effective biodiversity conservation in the Hudson River Estuary corridor will embrace all available conservation tools and will result from empowering people and communities to make informed decisions in their daily lives. Indeed, a conservation program cannot succeed without a high level of public involvement. The Hudson River Estuary Program has initiated a biodiversity outreach and technical assistance program to continue expanding voluntary partnerships with local communities. In addition to training, outreach, and education, biodiversity conservation will be carried forward by projects to develop maps and other informational products that interpret biological survey results; examine the contribution of public lands to biodiversity conservation; continue local training for biodiversity assessment; monitor changes in the region's land use and wildlife communities, and continue to offer grants for conservation and stewardship projects.

Purpose of the Framework

Given the tremendous biological diversity of the region and the complexity of the issues that surround its conservation, a document is needed to identify the biological resources of the Hudson River Estuary corridor and to recommend strategies for the conservation

of those resources. This report should help to coordinate the activities of conservation agencies and organizations in the Hudson River Valley by establishing a framework and approach for biodiversity conservation.

The purpose of the *Wildlife and Habitat Conservation Framework* is to provide a foundation for a coordinated biodiversity conservation program that includes research, management, education, and outreach, and that incorporates conservation considerations into sound land-use planning through the use of a broad range of voluntary measures and conservation tools.

This report establishes a framework that can be applied to:

1) Defining conservation objectives and priorities;

2) Integrating biodiversity conservation considerations into sound land-use planning practices in the context of local home rule;

3) Promoting the use of a broad range of conservation tools, especially measures that can be undertaken voluntarily; and

4) Establishing partnerships among federal, state, and local governments, as well as communities, businesses, private organizations, and individuals.

The *Wildlife and Habitat Conservation Framework* is a product of the Hudson River Estuary Biodiversity Program of the New York State Department of Environmental Conservation (NYSDEC) Hudson River Estuary Program. It was developed under the direction of a steering committee representing more than 20 organizations interested and experienced in biodiversity conservation in the Hudson River Valley (Appendix I).

Intended Audience

We hope that the *Wildlife and Habitat Conservation Framework* is useful for those organizations and individuals working to conserve the biological diversity and uniqueness of the Hudson River Estuary corridor. In particular, it is intended to aide conservationists in establishing coordinated efforts.

While these efforts should evolve at different levels of organization, biodiversity conservation is most effective when it takes place at the local level through a variety of individuals and groups (i.e., citizens, citizens' groups, community organizations, planning boards). Resources are available for these groups as part of the Hudson River Estuary Biodiversity Program.

Overview of the Conservation Framework

This report is organized into three sections, Part I: An Approach to Biodiversity Conservation, Part II: Significant Habitats of the Hudson River Valley, and Part III: Conservation Strategies and Recommendations.

Part I: An Approach to Biodiversity Conservation

Part I provides an overview of the Hudson River Estuary Biodiversity Program and discusses biodiversity conservation within the context of the Hudson River Estuary corridor. The section focuses on the value of biodiversity in our lives, primary threats to biodiversity in the region, and considerations for biodiversity conservation.

Part II: Significant Habitats of the Hudson River Valley

Part II provides an overview of significant habitats in the Hudson River Valley and includes general information on the ecology and conservation of cave and cliff habitats, coastal habitats, open uplands and barrens, tributaries and riparian habitat, unfragmented forests and habitat corridors, and wetlands. Following each description is a list and map of significant biodiversity areas that contain that habitat type. Then, descriptions are provided for each significant biodiversity area in the Hudson River Estuary corridor.

Information presented in Part II is the foundation of a habitat-based approach to biodiversity conservation in the Estuary corridor.

Part III: Conservation Strategies and Recommendations

Part III outlines key program areas and strategies that should be developed or expanded to meet regional conservation goals and address the primary threats to biodiversity in the Hudson River Estuary corridor. The conservation strategies recommended in this document emphasize voluntary measures that can be undertaken in the context of local home rule and individual property rights. Implementation of conservation strategies should occur through a variety of mechanisms involving federal, state, and local governments, as well as private organizations with a common vision for conserving biodiversity.

In general, conservation program areas presented in this document can be grouped into three major categories: biological inventories and ecological research, land management and environmental quality, and education. Some recommendations require a long-term commitment (e.g., ecological monitoring) and may rely substantially on funds provided by state and federal agencies. Other strategies will require broad-based support from a variety of organizations ranging from government agencies to local communities and citizens. Lastly, for some strategies, significant involvement by communities will be required to address issues at the local level.

Periodic Updates

The Hudson River Estuary Biodiversity Program embraces an adaptive approach to biodiversity conservation whereby we learn from both our successes and failures and adjust our approach accordingly, using all available information. It is recommended that the information contained in this report be evaluated every two years and updated as needed.

Conditions in the Hudson River Valley are continually changing. Threats to biodiversity evolve over time; some threats will be resolved through concerted conservation action while new threats could arise. New conservation strategies and actions will need to be undertaken and old strategies discontinued (as appropriate) in response to changing conditions. In addition, available information and knowledge of biodiversity will also grow with time. The databases on which conservation strategies and actions are based are continually updated. Regular updates are essential to maintaining an effective and meaningful conservation program.

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