

**Program Area:**  
**Land Management & Environmental Quality**

Land management has a large affect on environmental quality in the Hudson River Estuary corridor. Land management strategies can address a variety of threats to biodiversity and can be implemented at multiple levels. In particular, the federal, state, and local governments are important landholders and strategies to conserve biodiversity on public lands should be implemented. The management of public and private lands should be actively coordinated, if adjoining landowners/managers are willing to conserve habitats across their boundaries.

Land management deals directly with habitat conservation measures that can be implemented at all levels, including acquiring land for conservation and public use on a willing-seller, willing-buyer basis, negotiating conservation easements, and providing land stewardship incentives to landowners. Conservation easements and land stewardship incentives can be a cost-effective way of promoting biodiversity conservation while maintaining private land ownership. Examples of land stewardship incentives may include monetary compensation (e.g., USDA Conservation Reserve Program (CRP) and Wildlife Habitat Incentives Program (WHIP)), tax breaks, or public recognition for stewardship. Land management strategies can be developed for larger landholders in particular. For example, in the Hudson River Valley agricultural land represents a primary source of open space and can be an important source of biodiversity potential. Agricultural and forestry best management practices would both benefit these operations and support biodiversity conservation.

Specific areas that address land management should include:

- **Management Recommendations for Public Lands:**

The state and federal government own a substantial amount of land in the Hudson River Valley (Figure 5) and make many important land-use decisions influencing wildlife and habitat diversity. These public lands protect significant habitats and currently contain some of the best remaining intact landscapes in the Hudson River Estuary corridor. Municipal parks and non-profit conservation lands are also vital for biodiversity, providing not only locally important habitat, but also stopovers for migrating birds and butterflies. In suburbanizing areas such as the Hudson River Valley, parks and preserves can be crucial for biodiversity conservation.

Some of the larger areas under state ownership include State Forests and Preserves and Wildlife Management Areas managed by the NYSDEC and State Parks and Historic Sites managed by the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) (Table 4). These areas are particularly important because, in part, they serve to provide a mechanism for some level of protection (though variable) for plants and animals and their habitat. The New York State Department of Transportation and Office of General Services also own and manage a significant amount

of land in the Hudson River Estuary corridor, and offer various levels of biodiversity protection. Additionally, the United States Federal Government manages approximately 5% of the total public lands in the Hudson River Valley. Coordination of management activities among state, federal, and private landowners to meet regional conservation goals should be a high priority.

**Table 4.** Distribution of land ownership in the Hudson River Valley (Smith et al. 2001). Multiply square kilometers by 0.386 to obtain square miles.

<u>Land Stewardship</u>	<u>Total (km<sup>2</sup>)</u>	<u>% HRV</u>
US Fish and Wildlife Service	1	<0.01
US Forest Service	0	0.0
Dept. of Defense – US Military Reservation	66	0.4
National Park Service (NPS)	35	0.2
<b>Federal Government Total</b>	<b>102</b>	<b>0.6</b>
OPRHP – State Parks, Preserves, and Historic Sites	490	0.3
NYSDEC – Div. of Public Affairs and Education	5	0.0
NYSDEC – Div. of Lands and Forests	994	6.0
NYSDEC – Div. of Fish, Wildlife, and Marine Res.	90	0.5
Division of Military and Naval Affairs	8	<0.1
<b>State Government Total</b>	<b>1,586</b>	<b>9.6</b>
City of New York Parks and Recreation	14	0.1
New York City Dept. of Environmental Protection	80	0.5
The Nature Conservancy Preserves	24	0.1
Remaining Local and Non-Governmental	13	0.1
<b>Local and Non-Governmental Total</b>	<b>118</b>	<b>0.8</b>
<b>Private Total</b>	<b>14,668</b>	<b>89</b>
<b>Total</b>	<b>16,474</b>	<b>100</b>

State public lands fall under a variety of different types or categories, each with a different mandate and capacity for protecting sensitive plant and animal species and critical habitats. These variable mandates generally relate to differences in priorities given to public use and access. Because of this, conservation priorities and subsequent policies are different for State Forests, State Parks, State Wildlife Management Areas, Multiple-Use Areas, transportation rights-of-way, and other public lands. In spite of these differences, however, some broad-based recommendations can be made that transcend different public use and natural resource management mandates.

Informed land management will assure that biodiversity conservation is considered in decisions affecting the future use of public and non-profit conservation lands. The following recommendations promote the conservation of biodiversity in the Hudson River Estuary corridor while recognizing the importance of public access to biodiversity.

### **Strategies for public land management:**

- Identify opportunities to conserve biodiversity on public lands and incorporate them into site management plans;
- Tailor policies and programs to consider the protection and conservation of biological diversity. State agencies should make efforts to incorporate conservation considerations into their planning, particularly where it has never been a consideration. State agencies that have traditionally considered some level of conservation should re-evaluate and re-examine conservation policy and actions to include and emphasize biodiversity conservation;
- State and Federal lands should serve as a model for private land owners, demonstrating the value of biodiversity and providing examples of sound conservation approaches;
- Actively coordinate the management of public and private lands, concentrating on those lands that are adjacent to each other or lie across political boundaries;
- Allow or mimic natural processes including natural disturbance regimes such as fire and flooding;
- Retain natural land cover. When possible and compatible with management objectives, maintain lands in a natural state, minimizing human disturbance;
- Manage state lands to protect all native elements of biodiversity rather than a single or few species;
- Minimize habitat fragmentation;
- Develop a management plan for each state land holding that outlines conservation strategies that address principle threats to biodiversity;
- Promote wise recreational use on state lands compatible with regional biodiversity conservation goals and reduce existing conflicts between recreation and biodiversity conservation;
- Target, monitor, and evaluate road and highway construction and other infrastructure projects to ensure that sensitive areas and species are avoided and protected on state lands. Promote the use of NY Natural Heritage Program and other biological data by state agencies overseeing proposed projects and activities to direct growth and development away from critical areas of biodiversity on state lands;
- Incorporate habitat considerations into right-of-way management programs. Use native plant species in plantings on public lands (e.g. highway medians and shoulders). Schedule maintenance on state lands to avoid negative effects on nesting or migratory species (e.g., delayed mowing);
- Upgrade conservation status (e.g. stewardship rank as outlined in Table 2) of state lands that have important elements or areas of biodiversity;
- Retrofit roadways, culverts, drains, and fences to allow for the natural migration of reptiles and amphibians;
- Facilitate public understanding of the role of public lands in conserving biodiversity; and

- Support programs that help municipal parks and non-profit preserves to identify habitats and manage them in a regional context, including conservation of sensitive areas, removal of invasive and exotic species, restoration of native plant communities, and management where appropriate.
- **Control of Invasive & Overabundant Species:**

Several invasive exotic plant species have become established in the Hudson River Estuary corridor, including purple loosestrife, common reed, and water chestnut. When these plants form monotypic stands the result can be an overall decrease in the biodiversity of an area, most often in biodiversity rich wetlands.

To date, the Hudson River Estuary Biodiversity Program has focused on efforts to control purple loosestrife in the Hudson River Valley. Biological control of purple loosestrife appears promising, however the control effort is still undergoing evaluation by NYSDEC and Cornell University. The biological control agents being tested include a root-boring weevil and two leaf-eating beetles. A spectral fingerprint was developed for purple loosestrife, cattail, and common reed (using remote sensing and GIS analysis) and was used to map stands of loosestrife in the Lower Hudson River Valley (Richmond et al. 2002).

The development of management plans for other invasive species in the Hudson River Valley should be a priority. Additionally, research on ecological relationships and impacts of invasive species is needed to provide a sound basis for management decisions. Research and management activities could be directed at invasive plant and animal species such as water chestnut, common reed, mute swan, hemlock woolly adelgid, and the zebra mussel. Initial research efforts should focus on understanding the abundance and distribution of invasive species and their interaction with and effects on native plants and animals. Using this information, species-specific management plans can be developed and implemented.

Overabundant wildlife species also have a profound influence on local and regional biodiversity. White-tailed deer are perhaps the best example of a species that can dramatically alter its habitat. Deer over-browsing changes the composition, diversity, and abundance of plant communities and associated wildlife species. Furthermore, deer over-browsing negatively affects rare plant species.

Current deer densities in the Hudson River Valley are generally high. In areas where deer densities are negatively affecting tree regeneration or threatening a rare plant or community, management plans should be developed on a site-specific basis. Management plans should stem from a monitoring program designed to track changes in the composition, diversity, and abundance of native plant communities. The use of deer exclosures can be a useful tool to monitor and demonstrate the effects of over-browsing at various deer densities. Because the NYSDEC has the authority to manage white-tailed deer in the state, efforts to promote management on a site-specific basis

(incorporating biodiversity concerns) should be encouraged. Areas that have medium to high deer densities and that contain rare plant communities should be prioritized for a monitoring and management program.

**Strategies for control of invasive & overabundant species:**

- Continue applied research to develop invasive species control methods;
- Manually remove invasive species and replace with native species;
- Develop management plans for invasive and overabundant species;
- Monitor trends in invasive and overabundant species; and
- Encourage natural landscaping.

• **Reducing Habitat Loss and Fragmentation:**

Habitat loss and fragmentation on public and private lands is probably the most significant threat to biodiversity in the Hudson River Estuary corridor. Fragmentation of large habitat areas into smaller sections can lead to the local extirpation of area-dependent species. Fragmentation might also interrupt species migrations. Newly created habitat types can form a barrier to species that are not adapted to survive in that type. In particular, roads form a barrier that raises mortality and blocks migration for some species. Reptile and amphibian species are especially susceptible to being killed while crossing roads.

Many types of disturbance can lead to the loss or degradation of habitats. Activities such as residential, commercial, industrial and municipal development; road building; gravel pit mining; agricultural clearing; logging; and power line cutting can threaten natural communities and populations by eliminating and fragmenting habitat, and by disrupting crucial ecological processes and functions. These activities provide entry points for invasive, exotic species. Alterations to and manipulations of existing hydrologic regimes and water levels can adversely affect wetland communities and species requiring wetland habitat. Hydrologic disturbances include damming, removal of man-made or beaver dams, ditch draining, irrigation pumping, dredging, and filling.

Many plant, animal, and natural community occurrences on protected lands are threatened by trampling and erosion caused by off-road vehicles, motorcycles, boat ramp activities, dirt bikes, horses, rock climbers, hikers, birdwatchers, and photographers. Invasion by exotic species often follows these activities. Those seeking to experience natural areas can inadvertently disturb sensitive species and rare plant populations and their habitat along scenic trails and mountain summits.

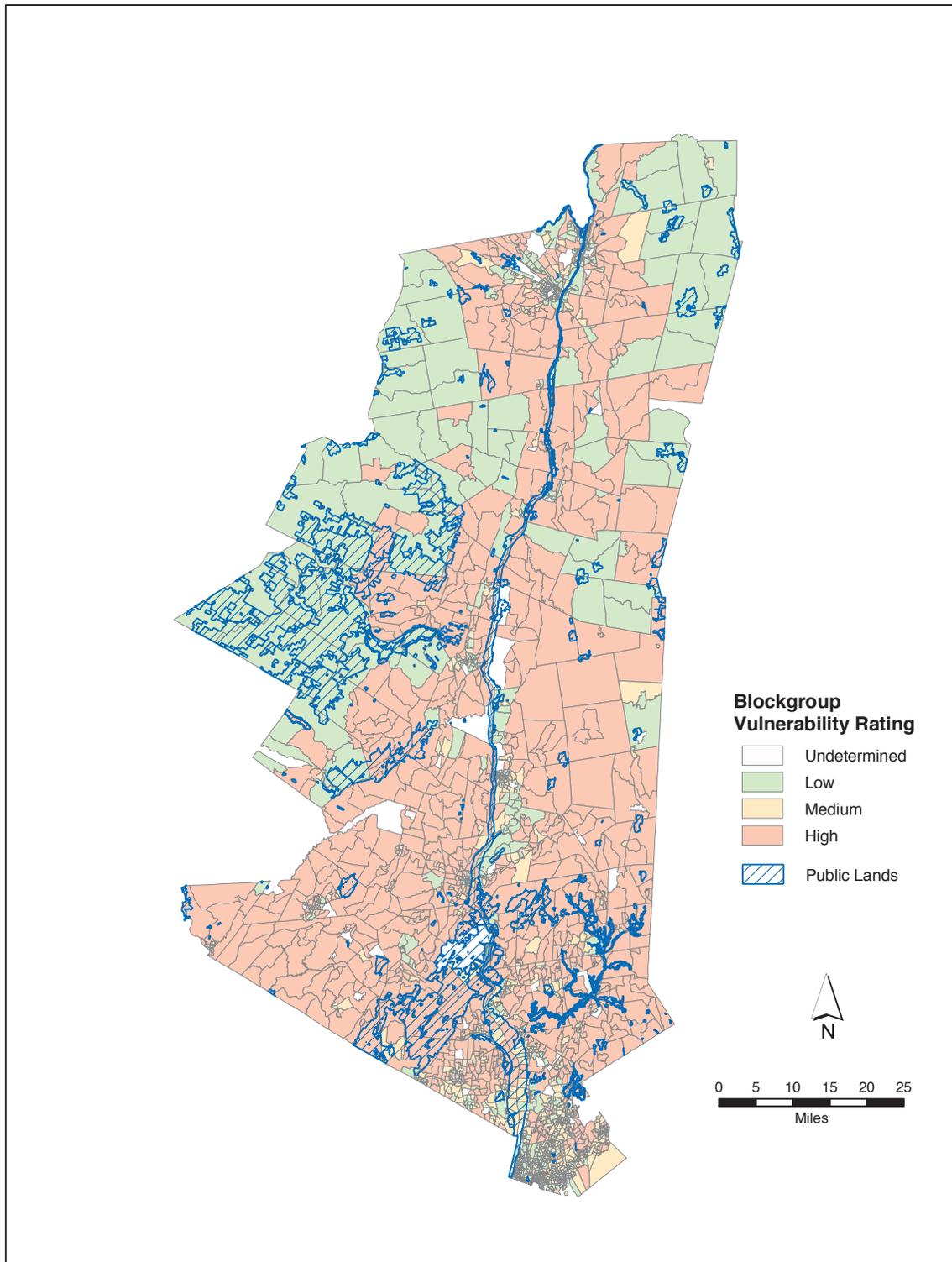
Other issues facing land managers include fire suppression, which affects communities and associated species dependent on open canopy habitats, collecting of commercially valuable plant and animal species, illegal killing of feared or unwanted wildlife, protection of old-growth forests, and grass mowing and other clearing activities that threaten species in cemeteries, airports, parks, golf courses, abandoned farm fields, and along streams. In some cases, mowing can benefit species, but the timing of such activities and the size of the open area are crucial to the success of the species.

The vulnerability of habitats to disruption in the Hudson River Estuary corridor was assessed using a model of projected residential development (Smith et al. 2004). This model is based on physical constraints and the stage of a housing neighborhood in its “life-cycle” (i.e., single-family subdivisions, multi-family dwellings, or areas under renewal) within a census blockgroup area. The results of the model’s predictions are shown in Figure 15. The areas identified as possessing a high probability of future residential development represent 59% of the total land area in the Hudson River Estuary corridor. These areas include, or are adjacent to, 48% of the land area currently under some form of public or private conservation management (much of the public land areas are not actually available to residential development). Over 86% percent of the land areas within the highly vulnerable to development (high-ranking) category have no long-term conservation mechanism (governmental or legal). These high-ranking areas have total species richness values (measured by total species count) ranging from 86 to 147. The highest species richness reported for any area in the Hudson River Estuary corridor is 151 out of a potential 308 (Smith et al. 2001). The average species count of 130 for the high-ranking areas highlights the conflict between maintaining wildlife habitat and providing for land development.

Given the tremendous pressures on the biological diversity of the Hudson River Valley, the full range of conservation tools will be required to effectively address the loss and fragmentation of the significant habitats presented in Part II. Conservation strategies and actions described in this section include land acquisition (on a voluntary, willing-seller basis), conservation easements, outreach, education, legislation, cooperative land agreements, and tax incentives.

**Strategies for reducing habitat loss and fragmentation:**

- Identify unfragmented core habitat areas and habitat corridors at scales appropriate for the presentation of species and processes;
- Reclaim the best possible minimum thresholds of habitat connectivity through restoration efforts where fragmentation has already occurred;
- Provide land stewardship incentives to landowners, non-profits, sporting clubs, and others and advise them on desirable management practices (e.g., provide greater tax incentives for owners to keep property in forest management);
- Acquire land and conservation easements for protection and public use on a willing-seller, willing-buyer basis;
- Advance opportunities for wildlife-related recreation (e.g., hunting, birdwatching, and other pursuits);
- Support the viability of forestry and agriculture compatible with biodiversity conservation;
- Provide information and support to local planning boards to incorporate biodiversity considerations into land use decisions consistent with local home rule;
- Promote the conservation and restoration of habitats considered most significant for biodiversity conservation in the region (e.g., restore tidal



**Figure 15.** Census block groups within the Hudson River Estuary corridor ranked according to their likelihood of residential development (Smith et al. 2004). The blue-hatched areas are public or private lands in conservation stewardship. Within the “high vulnerability” areas, about 14% of the lands are considered to be in conservation or public stewardship.

- and non-tidal wetland hydrology; remove obsolete dams and other structures; conduct controlled burning or mowing on early successional habitats; identify and buffer vernal pools and freshwater wetlands; reduce livestock use of riparian areas; and restore native plant communities); and
- Develop site-specific strategies for significant habitats and biodiversity areas.

- **Pollution Control:**

Sources of pollutants include permitted or illegal point sources, such as failing municipal and industrial wastewater systems, toxic dumps, and leaking landfills; and nonpoint sources such as petrochemicals, pathogens, and lawn chemicals transported with urban and suburban runoff, agricultural runoff, construction-site runoff, and acid or nitrogen-enriched precipitation.

**Strategies for pollution control:**

- Support continued reduction in air and water pollution in the region;
- Develop and promote farming and forestry Best Management Practices (BMPs); and
- Educate homeowners, landowners, and the agricultural community about the impacts of pesticides, herbicides, and fertilizers on wildlife species.

**Program Area:**

**Education**

Education strategies address a variety of threats to biodiversity and can be implemented at a variety of levels. Many education strategies address the desire to raise public awareness and understanding about biodiversity issues and the need for conservation. A general educational goal is to increase understanding of biodiversity conservation in the Hudson River Estuary corridor and promote the utilization of conservation tools in local land-use planning and land stewardship by property owners, communities, local governments, and land trusts.

Many local governments (county, town, city, and village), land trusts, and communities desire more information and assistance with biodiversity conservation. The Hudson River Estuary Biodiversity Program has partnered with other organizations to develop several tools for biodiversity conservation, including a NY Natural Heritage Program database, maps, and conservation guides for biodiversity element occurrences in the Hudson River Estuary corridor, Hudson River Valley Gap Analysis land cover and species distribution maps, GIS trainings, and a Biodiversity Assessment Manual for the Hudson River Estuary Corridor (Kiviat and Stevens 2001) and related training programs. These tools can be useful to local governments and land trusts for biodiversity conservation planning.

As part of the educational process we should promote the interaction between state conservation agencies, their partners, and the public. A positive relationship fosters coopera-