Description of the Basin

The Allegheny Basin covers an area of approximately 1,900 square miles (1.2 million acres) in the southwestern corner of New York State, just north of the state line with Pennsylvania. The Allegheny River itself originates in Pennsylvania. It enters New York State at the Cattaraugus-Allegany county borderline, continues westward for about 48 miles and returns to Pennsylvania, where it empties into the Ohio River and, eventually, into the Mississippi River.

In New York, the Allegheny flows through unglaciated land that extends to the south in Pennsylvania. This is the largest area of unglaciated land in New York State (NYS) and soils above the river valley are residual soils derived from shales and sandstone, lacking limestone. This makes them deficient in lime. This area is the northernmost extension of the unglaciated upland of the Allegheny Plateau (Muller, 1977).

Aquatic habitat in the basin is comprised of 3,945 miles of streams and rivers but is also provided by extensive wetlands, some large lakes, and a reservoir. The headwaters of the Allegheny have a rich geologic history, including glaciations on 4 separate occasions, which has led to diverse plant and animal life. Because of its geology and connection to the Ohio and Mississippi Rivers, the basin supports one of the most biologically diverse aquatic systems in the northeastern United States. The basin provides critical habitat for many species, including Species of Greatest Conservation Need (SGCN). According to the Ohio River Basin Commission, as of 1980, the Allegheny basin sustained 288 bird species, 38 mammals, 114 fish, and 64 reptiles and amphibians.

The basin is within the Appalachian Highlands, or Western Allegheny Plateau ecoregion, and includes 3 sub-watersheds: French Creek, Chautauqua Lake, and the Allegheny River. The major municipalities within the basin are Jamestown, Salamanca, and Olean. Parts of 3 counties comprise the basin (Chautauqua, Cattaraugus, and Allegany) and had an estimated population of 200,000 people basin-wide in 2000.

The Allegheny Basin varies from the rugged, heavily wooded Allegheny Hills along the Pennsylvania border to the flatter lands in the north and west. The predominant land-cover classifications are deciduous and mixed forest (67% combined) and agricultural lands, according to the US. Environmental Protection Agency's (USEPA) Multi-Resolution Land Classification (MRLC) map information (Allegheny Table 1, Allegheny Figure 1). Approximately 27% of the land area of the basin was classified as row crops or pasture/hay lands based on MRLC interpreted data. The MLRC national data distinguishes between natural grassland and old fields, hay, pasture and row crops. No lands are classified as natural grasslands in the basin. In New York, pasture/hay lands and row crops are often referred to as grasslands by many management agencies, including the New York State Department of Environmental Conservation (DEC). Just over 2 percent of the basin is classified as developed land. As land use changes, urban areas are expected to develop primarily on agricultural land (Allegheny River Basin Comprehensive Coordinated Joint Plan, 1980). The data provided here relates to the entire Allegheny basin, but, where available, more detailed information is provided below for the 3 sub-watersheds.

The sub-watershed of French Creek drains approximately 100 square miles in New York before flowing into Pennsylvania. This sub-watershed is characterized by a variety of land uses and cover, including pasture and cropland (47%), mixed hardwood forests (45%), wetlands (6%), and residential areas (2%). It is primarily rural-agricultural, with dairy agriculture being the dominant land use. Other primary activities include forestry, oil and gas production, and recreation (NYS Water Quality Report, October 2002(305b)). Even though this sub-watershed constitutes only 6 percent of the Allegheny basin, quite a bit of information is available. Due to the area's rich biological diversity, a number of studies have been conducted in the French Creek area.

The Nature Conservancy (TNC) teamed with many partners in 2002 to launch a single, sub-watershed-wide conservation program. One of the principal strategies of this group is to implement best management practices (BMP) on farms along streams to reduce runoff of sediment and effects on aquatic organisms. With 56 species of fish and 13 species of mussels, the entire French Creek drainage (including those portions in Pennsylvania) contains half again more than the average number of native species than are found in most other New York streams in the Atlantic coastal drainages (TNC, 2004). Many of these species disappeared from similarly small waterways of the US, but French Creek continues to provide one of the few remaining riverine refuges. TNC also conducts water quality monitoring to evaluate the benefits of these BMPs. The French Creek project was initiated in 1994 by TNC. The primary goal of the project was to guide conservation management by providing predictions of faunal diversity and habitat integrity. Such conservation efforts need to be conducted in other sub-watersheds of the Allegheny Basin and coordinated with efforts in the French Creek system.

The Chautauqua Lake sub-watershed drains approximately 765 square miles and has similar land cover to the French Creek sub-watershed. Even though it comprises 40% of the basin, very little is known about overall wildlife populations in this area. Fish habitats are best suited for lowland species associations, but cold-water streams also flow from the low hills. The largest water body in the basin, Chautauqua Lake, is located in this sub-watershed. The Chautauqua Watershed Conservancy's mission is to preserve and enhance the water quality, scenic beauty, and ecological health of the lakes, streams, and watersheds of the region by conserving key sites. Development and other land uses threaten the region's resources; only 13% of the lake's shoreline remains in a natural condition. Conewango Creek has a meandering channel with substrates of clay and sand, and the lower section, near Jamestown, has flooded backwaters that have remained un-compromised by farming.

The Allegheny River sub-watershed makes up about 54% of the basin, and drains 1,050 square miles of land. The land cover of this sub-watershed is distinctly different from French Creek and Chautauqua. It is comprised of mostly deciduous and mixed forest, especially in and adjacent to the Allegany State Park. Substantial areas along the middle section of the Allegheny River remain wild, due to management practices of the Seneca Nation of Indians (SNI). Approximately 33,000 acres within the basin are owned by the SNI. Farming is also absent from the adjoining lowlands of most of the downstream segment, because those lowlands were flooded to form the Allegheny Reservoir. More investigations are

needed to provide a better understanding of the ecology and habitats in this sub-watershed area.

Two state parks are operated and administered by NYS Office of Parks, Recreation, and Historic Preservation (OPRHP) in the basin, which totaling more than 65,000 acres in DEC's Region 9 (Allegheny Table 2). Region 9 consists of Allegany, Cattaraugus, Chautauqua, Erie, Niagara and Wyoming counties. Allegany State Park provides primarily upland habitats for many SGCN. Long Point State Park, on Chautauqua Lake, provides about 2 miles of undeveloped shoreline as well as upland habitat on 360 acres of parkland.

Audubon New York designated 2 areas within the Allegheny basin as draft important bird areas (IBA) (Allegheny Table 3). The Allegheny Forest Tract IBA is located in Cattaraugus and Chautauqua Counties. It was designated for 11 species at risk; the high percentage of the state's population of bald eagles and cerulean warblers; and forest cover, which includes sugar maple mesic, oak, deciduous wetland, evergreen northern hardwood; and successional hardwoods. This site includes the Allegany State Park and extensive surrounding forested land. The Kinzua Dam creates the Allegheny Reservoir, and water level varies from season to season and from year to year. This site is listed in the 2002 NYS Open Space Plan (OSP) as a priority site and supports long-term research and monitoring projects.

The Chautauqua Lake IBA, located in Chautauqua County, was designated for species at risk (pied-billed grebe and common tern) and waterfowl congregation areas. Owned by the State of New York, the lake is accessible to public use, while the shore areas are mostly in private ownership. This site is listed in the 2002 OSP as a priority acquisition. Pollution could have negative effects on this aquatic system, as could the heavily developed (89%) lakeshore.

There are approximately 6,695 acres in 9 DEC wildlife management areas (WMA) in the basin (Allegheny Table 4). They range in size from 31 acres to almost 2,011 acres. These WMAs provide multiple habitats for fish and wildlife, including upland and wetland systems. These lands should include habitat management regimes for SCGN. There are 28 state forests in the Allegheny basin, totaling 45,108 acres. These forests are also prime areas for protection and management of multiple species.

Critical Habitats of the Basin and the Species That Use Them

DEC staff compiled the SGCN information in the State Wildlife Grants (SWG) database and was asked to indicate habitats associated with critical life stages and activities for those species. During the analysis for each basin, a listing of species occurring in the basin and the critical habitats associated with their life cycle at the system and subsystem level was extracted from the database. The resulting aquatic and terrestrial habitats are summarized in Allegheny Tables 5 and 6. The last column of these tables indicates the number of species that use each System-Subsystem as critical habitat. The habitat classifications in the database were adapted from the New York Natural Heritage Program's (NYNHP) *Ecological Communities of New York State*, second edition. In most cases, the habitats were simplified from the many vegetation associations listed in the community classifications. In the case of the Lacustrine and Riverine systems, the subsystems were modified to reflect the classifications most often used by DEC fisheries managers, e.g. "cold water – shallow." Three aquatic habitat systems support 55 species in the Allegheny basin (Lacustrine, Palustrine, Riverine) and those are further refined into 14 subsystems. Within the terrestrial habitat system 3 subsystems support 63 SGCN in this basin.

Each of these systems and subsystems is further refined into a habitat category in the SWG species database and can be viewed in the taxa reports in Appendix A. The habitat categories are excluded here for the sake of simplicity but were considered during the basin analysis. A complete listing of habitat types used in the preparation of the CWCS can be found in Appendix B. These critical habitats are not a comprehensive listing of all the habitat associations found in the basin, but rather a subset of the habitats deemed critical to SGCN that occur in the basin (Allegheny Tables 5 and 6). In addition, a single species may require multiple habitats throughout its life cycle, so the total of the final columns may exceed the 109 SGCN that presently or historically occurred in the basin.

Overall Trends in the Basin

The Nature Conservancy recently assessed the landscape condition of New York via a watershed approach (Stratton and Seleen, 2003) and depicted relative quality at the US Geological Survey's 11-digit scale watersheds on a map of New York State. Six indicators of watershed condition were used in the analysis: population density, road density, protected lands, dam density, natural land cover and interior forest cover. The landscape condition of the Allegheny basin is rated as quite good, second only to the Adirondack and Catskill mountain areas of the state. Landscape condition tends to be better in the Allegheny and French Creek sub-watersheds, with condition declining in the Chautauqua Lake sub-watershed around the highly developed lake. Correspondingly, the water quality of the basin, predicted by percent forest cover and impervious surface, is rated as good to excellent when compared to the rest of the state. This directly correlates to the high forest cover (67%) and relatively low human population.

Agricultural lands constitute an average of 27% of the Allegheny Basin. As noted earlier, that percentage is much higher (47%) in the French Creek sub-watershed. No estimates of agricultural lands were found for the Chautauqua Lake sub-watershed, but given the similarities in land cover (Allegheny Figure 1) between it and the French Creek sub-watershed it is likely the Chautauqua sub-watershed also contains approximately 50% agricultural lands. There are no major grassland wildlife zones as defined by the US Department of Agriculture (USDA) in the Allegheny Basin, but with the amount of land in pasture and hay, it is likely that individual areas can be managed to support grassland habitats and the SGCN that depend on them in these 2 sub-watersheds. The same situation applies to preserving high grassland related biodiversity areas in the French Creek and Chautauqua Lake sub-watersheds.

According to DEC data, wetland types of the Appalachian highlands during the 1990s were 59% forested, 22% shrub, 11% emergent and 8% open water. These wetland areas, totaling 446,000 acres, provide critical habitat for many SGCN in the basin. It is estimated that the Chautauqua sub-watershed supports the greatest amount of wetlands in the drainage. In the Appalachian highlands, there has been a balance of gains and losses, but there have been losses of shrub and emergent marsh systems, with corresponding increases in forested and open water wetlands. Because it is a large geographic area, the Appalachian highlands area contains about 19% of all the state's wetlands, but at a fairly low density: only 3.8% of the ecozone is wetland, compared to about 8% statewide. Because of wetland scarcity on the landscape, wetland conservation should be considered a priority in this basin.

NYNHP's database indicates the Allegheny Basin is biologically diverse for a number of taxa groups tracked by that program: mollusks, herpetofauna, and fish. Allegheny Table 9 provides a summary of species diversity in the Allegheny Basin relative to the total number of SGCN statewide: herpetofauna and fish are particularly high, at 30 percent. Studies of biodiversity should continue in the basin to assess SGCN and their habitats and to recommend appropriate conservation actions.

There are 86 SGCN that currently occur in the basin and 23 species that historically occurred in the basin (Allegheny Tables 8-9). In this chapter, species that historically occurred, but for which there are no recent confirmed records, will be referred to as "having no recent record." Current data is lacking or insufficient to determine whether those historically occurring species still exist or have been locally extirpated. Thorough literature searches, field surveys, and monitoring are required to establish a current status of the population of most, if not all, species in the basin. Establishing baseline species and population records should be a priority, as those data can be used to guide future studies and management practices.

Of the 86 SGCN currently occurring in the basin, it is believed that the populations of 29 species are decreasing, 5 are increasing, 6 are stable, and 46 are of unknown status. Given the fact that loss of species has occurred in alarming numbers (36%) in this basin, priority must be given to conserving the remaining species in the Allegheny Basin. Some species, such as bigeye chub, mountain brook lamprey, Ohio lamprey, river redhorse, hellbender, short-headed garter snake, mucket, streamline chub, spotted darter, blue breast darter, longhead darter, and gilt darter are found in very limited distribution statewide. A few of these species occur only in the Allegheny Basin, and the rest are found in only 1 or 2 other basins statewide.

The human population of the Allegheny Basin has not changed significantly since the 1950s, but, like most parts of the state, sprawl is increasing. Only 2 percent of the basin is classified as developed land. As land use changes, however, urban areas are expected to develop primarily on agricultural land (Allegheny River Basin Comprehensive Coordinated Joint Plan, 1980).

The changes and/or reduction in agriculture have been and continue to be a major event in the basin, both in terms of economics and the environment. Reduction of agricultural land results in loss of grasslands used for haying and pasture. The amount of land in agriculture in this basin has been reduced from about 85% of the total land cover in 1900 to 27% in 2002. However, agricultural land use has essentially remained the same between 1968 and 1995 (NY Aquatic Gap Analysis, 2004). The nature of the remaining agriculture has changed as well. In some instances, smaller farms have consolidated into larger units and monocultures have become more expansive. It is difficult to generalize about the effects of farm consolidation, but it can result in better financial resources, improved farming practices and less effect on natural resources, although this does not always occur. Regardless of farm size, it should be noted that financial health and security are not the only factors that determine the type and quality of stewardship of natural resources. Cropland diversity has decreased, as row crop monocultures have become the dominant agricultural land-use practice. Consequently, adjacent edge habitats in the form of grasslands, woodlands, and strip cover (e.g., fencerows, hedgerows) have either been lost outright or dramatically altered in size and shape. This loss of habitat not only affects resident wildlife communities but may also have played a role in the decline of migratory species, such as Neotropical migratory birds, that breed in the basin.

The basin, especially in the Allegheny River sub-watershed, was predominantly a forested ecosystem and is now dominated by deciduous and mixed forest cover. Increases in mature secondary growth forest cover have been accompanying the

decline in agricultural acreage in this basin and statewide as one would expect. However, where mature forest stands exist with "old-growth" characteristics efforts should be made to move toward maintaining and expanding these types of stands. Not surprisingly, fish and early successional forest/shrubland birds are declining; approximately half of the forests breeding birds are believed to be stable as forests mature in this basin. Management efforts for grasslands and wetlands should be concentrated where they exist as inherent natural communities of the landscape.

Emergent marshes in the Appalachian highlands have declined since the 1900s. Wetlands in the entire region increased by an estimated 3,000 acres between the 1980s and 1990s according to DEC Bureau of Habitat information on statewide wetland trends. However, there were notable changes in the wetland plant communities in wetlands in this region of the state as the cover type on wetlands shifted. Shrub swamp as a cover type declined by approximately 5,000 acres, and emergent marsh as a cover type declined by an estimated 16,000 acres during that same period. Open water associated wetland and forested wetland increased as cover types by an estimated 7,000 and 17,000 acres, respectively. Not surprisingly, populations of freshwater marsh nesting birds, grassland birds, lizards, and salamanders in the Allegheny Basin are generally in decline, while species associated with forest habitat are more secure.

Lakes have become more affected by shoreline development. Chautauqua Lake has extensive beds of aquatic plants that prompt control programs every year. Stream quality was assessed using macroinvertebrate indicators for 30-year trends by DEC Division of Water staff, and the French Creek sub-watershed was found to be the least degraded. Large river habitats continue to improve due to point source water pollution abatement, which began in the 1970s.

Upland/riparian land use adjacent to stream corridors has resulted in degradation and loss of aquatic habitats throughout the basin. These land uses negatively affect the diversity and populations of both fish and amphibians.

Threats

DEC staff members who compiled the SGCN information in the CWCS planning database were asked to indicate threats to SGCN and their habitats. During the analysis for the basin, a listing of threats for each species occurring in the Allegheny Basin was extracted from the database. The threats and summary figures compiled here are not listed in order of importance. The magnitude of a threat is measured by several variables including the species life history traits (i.e., its vulnerability), population trends, specific habitat type and geographic locale, and other rationales. The information provided does not quantify the magnitude of a particular threat. The information provided is intended only to paint a broad picture of the proportion of species/species groups to which a particular threat applies, and the frequency with which a particular threat was mentioned in the database. The purpose of this information is not to compare the severity of one threat against another.

General Discussion

The major environmental stressors in the Allegheny Basin are related to residential development, oil and gas production, agriculture, forestry practices, streambank erosion, altered hydrology, and gravel mining. The negative effects of these stressors on natural resources include loss of natural habitat to development, riparian buffer loss resulting in excessive nutrient and sediment loading to water bodies, reduced water quality, and contaminants and non-point source pollution from abandoned and active oil and gas wells. These major stressors are mentioned in the DEC Division of Water 305(b) report and a joint project of the Western Pennsylvania Conservancy and French Creek Project: *French Creek Watershed Conservation Plan 2002*.

The above stressors affect the 3 sub-watersheds of the basin differently. In the more densely populated areas of the basin, degraded water quality from nutrients and toxic substances and habitat destruction are of greater magnitude and are related to residential, commercial and industrial development. Oil and gas wells can release oil and brine into streams, causing negative effects on aquatic organisms. Heavy metals and polychlorinated biphenyls (PCBs) have affected fish propagation and macroinvertebrate populations in the Chadakoin River, which flows through Jamestown.

In areas of the basin dominated by agriculture, fertilizer, pesticide, and herbicide runoff and soil erosion are of greater magnitude. In these more rural areas, too, on-site septic systems leach nutrients into aquifers and surface waters. Lakes in the basin have increased nutrient levels from agriculture and on-site septic systems. These rural areas within a short distance of urban centers are also most prone to sprawl, a driving factor in habitat loss. In the heavily forested areas of the basin, unsustainable forestry practices can result in loss of or degraded habitats, particularly aquatic habitats that support SGCN.

Specific Threats to Species of Greatest Conservation Need

The most frequently cited threat to species groups occurring in the Allegheny Basin was outright loss of habitat via conversion to human-dominated land use.

This threat was the most frequently listed for both terrestrial and aquatic species. It includes hardening of the landscape with buildings and roads, but also includes activities such as clearing land, channelizing streams, removing gravel from streams, creating dikes, and draining wetlands. Complicating the picture is the habitat function provided by much of the agricultural lands in the basin at this time. Pasture and hay lands provide a surrogate for natural grasslands in the Western Allegheny Plateau ecoregion. When managed appropriately, these agricultural uses may actually be beneficial to wildlife. But when agricultural management activities, such as mowing of hayfields, occur at the wrong time of year, grassland-nesting species may be disturbed or killed.

The second most commonly cited threat to SGCN in the basin is toxic contaminants. Contaminants affect both terrestrial and aquatic species in the basin. Degradation of water quality, which may also include contaminants, was the third most common threat listed to aquatic species groups in the basin. Heavy metals from oil and gas production and PCBs from disposal of industrial waster negatively affect aquatic life in the Chadakoin River (DEC, 2002).

Pesticide use on agricultural lands is of concern to herpetofauna, insects, mussels and freshwater crustaceans. Agricultural pesticides are generally non-specific in their action, meaning that they can kill off benign and beneficial invertebrate species as well as the target pests. Amphibians are particularly susceptible to pesticides and other toxins.

Degradation of water quality also comes from soil erosion and runoff (the fifth most common threat), nutrient-induced algal blooms, and reduced dissolved oxygen caused by excessive algae decay or increased temperatures. Lakes in the basin (including but not limited to Bear, Findley, Case, Harwood, New Albion, Upper, Middle, Lower Cassadaga) are affected by high algae and weed growth due to excessive nutrients from on-site septic systems. Siltation negatively affects fish populations by decreasing spawning areas and nursery habitat. The Allegheny Reservoir is operated with aggressive winter water releases for flood control around the reservoir. This diminishes the capacity to sustain fish abundance. Altered hydrology is associated with water quality degradation, which is the sixth most common threat to aquatic resources. Alterations to water flow can be caused by barriers (dams like the Kinzua, weirs, culverts, bridges, and beaver dams), water level management and withdrawal, and floodplain alteration. Ultimately, loss of aquatic habitat quantity results from alterations to water flow.

Human disturbance is considered a significant threat to both aquatic and terrestrial species in the Allegheny basin. In-stream gravel removal and upland mining directly affect a number of species. The development of roads and utility rights-of-way directly affects the number of species struck by cars on roads or which collide with power lines, cell towers, and wind mills. To protect roads, highway departments often straighten stream channels and remove gravel bars, contributing to stream instability. In the aquatic arena, collisions can also occur with boats and personal motorized watercraft. Both terrestrial and aquatic SGCN are affected by illegal or unregulated harvest by humans. “Fugitive” all-terrain (ATV) and/or off-road vehicle (ORV) use must be monitored and assessed.

Priority Issues in the Basin

Management Collaboration

- Establish mechanisms to use a landscape or ecosystem approach and to work with neighboring agencies and organizations. SGCN and habitats do not follow political boundaries; their study and management should not be restricted by artificial limits. Valuable working partnerships may potentially be formed to study, manage, and protect SGCN if a landscape or ecosystem approach is utilized.
- Establish multi-level, collaborative efforts on issues including, but not limited to, species reintroduction, habitat restoration, and education.

Baseline Status Information for SGCN

- Conduct thorough literature searches and field surveys to determine the current "baseline" of species within the basin. Monies can then be directed to fund studies to fill data gaps.
- Determine the "historical baseline" to which species diversity, population numbers and habitats should be restored.

Land Use Practices

- Improve education of agricultural community regarding the needs of SGCN on or bordering farm lands in the basin, especially aquatic species.

Vision, Goals and Objectives for the Basin

Vision

The Allegheny Basin will remain one of the more pristine areas of the state, as evidenced by landscape condition and predicted water quality. Its rich mosaic of habitat types will continue to support many SGCN. Essential habitats of the basin will be perpetuated via the following objectives:

Goals and Objectives

- Determine the status and trends (e.g. quality, quantity, and spatial connectivity) of grasslands, early successional forest and shrub, deciduous/mixed forest cover, late successional forests (with potential to become mature), wetlands, and aquatic systems in the basin.
- Assess the current condition of these habitat types in the French, Chautauqua Lake and Allegheny River sub-watersheds.
- Set goals for these habitat types (e.g., restore large blocks of mature native forest; maintain X acres of wetlands). Where possible, goals should be spatially explicit (e.g., address issues such as connectivity).
- Monitor the quality and quantity of habitats on a 10-year rotational cycle.
- Set nutrient and sediment reduction targets by 2010 to protect water quality and quantity.
- Implement BMPs on farms along stream corridors to protect water quality, reduce excessive soil erosion, protect habitat, and improve nutrient management (on-going by the French Creek Watershed Management Group).
- Use the best fluvial geomorphic technology available to establish normal stream conditions and reduce excess erosion and provide riparian habitats. Create riparian buffers and restore historic riparian conditions in some areas.
- Identify specific threats to SGCN in order to prioritize habitat protection and restoration efforts.
- Identify barrier mitigation opportunities in the basin.

Priority Strategies/Actions for Basin-wide Implementation

The following recommendations do not appear in any priority order. All of these recommendations are intended to be of high priority to implement in this basin in the coming 5 to 10 years for the benefit of the most critical SGCN in the state. See the discussion of "*Development of Conservation Recommendations for Species of Greatest Conservation Need and their Habitats*" and their prioritization in the Introduction. All of the recommendations for SGCN found in this basin can be viewed in Appendix A.

Data Collection Recommendations for Critical Habitats

AGRICULTURAL LANDS

Trends in modern farm operations toward increased field size and loss of adjacent edge habitats may negatively affect certain terrestrial and aquatic species. Additionally, farm management practices, such as conventional tillage, may have negative consequences such as loss of food source, waste grain and wheat seeds from post-harvest fields, increased soil erosion, and loss of cover. Large row-crop monocultures and decreased crop diversity negatively affect wildlife and their habitats in agriculturally dominated ecosystems.

- Specific recommendations for grassland birds include a recommendation to evaluate the effects of specific farming and management practices on productivity of grassland birds. Specific investigations should include: timing and frequency of mowing; intensity of grazing; comparative effects of management regimes (such as mowing, haying and prescribed fire) and buffer strip characteristics. The highest priority species are Henslow's sparrow, upland sandpiper, Northern harrier and sedge wren.

- Evaluate effects of local agricultural practices on aquatic habitats and develop feasible alternative practices where needed.

FORESTS

Habitat management for forest breeding raptors is largely unknown. Sustainable timber harvest is a way to manage for these species, however, harvest practices (such as high-grading) and the absence of soil retention measures can negatively affect all forest wildlife and aquatic resources.

- Specific recommendations for forest breeding raptors include a recommendation to experiment with different management techniques to provide the critical habitat needs of this suite of species. Investigations may include different cutting regimes, different buffer distances and fire management for forest breeding raptors. The highest priority species is long-eared owl.

FRAGMENTATION

Fragmentation and loss of habitats in the basin is a common threat to all aforementioned species groups. There are many issues that influence the effects and severity of fragmentation on given species groups. These include patch size and shape, edge effects and connectivity of remaining habitat patches. Juxtaposition of wetland and grassland habitats has been shown to positively

influence wildlife species diversity. This basin contains significant amounts of both habitat types and provides opportunity for landscape management of species that depend on these systems. Fragmentation is a threat to aquatic species as well. Altered hydrology in the watershed prevents or hinders migration and dispersal of a variety of aquatic species including freshwater bivalves. Isolated populations are more vulnerable to extirpation by both natural and anthropogenic events.

- Specific recommendations for freshwater marsh nesting birds and grassland birds include demographic studies to identify source and sink populations; metapopulation dynamics focusing on survival; and age at first breeding, recruitment, and dispersal. Controlled experiments to identify management actions effective in producing suitable habitat should also be conducted. Invasive species that may affect marsh birds need to be identified. High priority species for freshwater marsh nesting birds are pied-billed grebe, least bittern and American bittern. High priority species for grassland birds are Henslow's sparrow, upland sandpiper, northern harrier, and sedge wren.

- Specific recommendations for freshwater bivalves include investigations into the flow requirements of freshwater bivalves and modeling the effects of flow changes both in volume and timing. Additional research is needed on population dynamics of listed mussel species (including connectivity of habitat and genetic distinctiveness of populations and subpopulations) and controlling exotic bivalve species. The highest priority species within this group are mucket and rayed bean mussel.

- Specific recommendations for early successional forest/shrubland birds include development of guidelines for habitat management for golden-winged warbler, research into causes for declines of Canada warbler, and potential for beneficial forestry practices such as opening up the canopy and promoting ground growth and thickets. The effects of viburnum leaf beetle on applicable habitats and species utilizing them also needs to be determined. High priority species within this group are golden-winged warbler and Canada warbler.

- A specific recommendation for fish is to investigate habitat requirements, demographics and population dynamics of mountain brook lamprey, spotted darter and blue breast darter.

HUMAN-WILDLIFE INTERACTIONS

Human effects on species and their habitats are a threat to 2 species groups in the basin. Human disturbance may be caused by collisions with artificial structures, vehicles, illegal or unregulated harvest, or entanglement.

- A specific recommendation for forest breeding raptors is to monitor wind farms for mortality. High priority species within this group is long-eared owl.

INTERSPECIFIC INTERACTIONS

Interspecific interactions are a common threat to 5 species groups in a number of taxa. Such interactions result in loss of host species, disrupted predator/prey cycles, competition for life support from non-native species or species in places or numbers not historically found, detrimental hybridization, and parasites. As an

example, beaver activity (past and present) on streams and stream inhabitants should be surveyed and monitored.

- A specific recommendation for freshwater marsh nesting birds is to investigate diet and nutrition in relation to breeding habitat quality and prey populations. High priority species within this group are pied-billed grebe, least bittern and American bittern.

- A specific recommendation for lake/river reptiles, lizards, and woodland/grassland snakes is to document life history parameters, including predator/prey relationships. High priority species within the lake/river reptiles group are eastern ribbonsnake and wood turtle. High priority (and the only) species within the lizards group is coal skink. High priority species within the woodland/grassland snakes group are timber rattlesnake and short-headed garter snake.

- Specific recommendations for early successional forest/shrubland birds are to monitor status and trends and develop habitat management guidelines for golden-winged warblers, including those techniques that favor golden-wings over blue-wings.

- A specific recommendation for hellbenders and stream salamanders relating to susceptibility to random disturbance events is to periodically evaluate the status of rare species to determine appropriate status listing. High priority species are hellbenders, longtail salamanders, and red salamanders.

Data Collection Recommendations for SGCN

A number of priority species and groups need population, habitat, and life history research to address critical data gaps. This information will help more clearly identify threats and establish baseline information for these "most critical" species. Only those "most critical" species not yet identified in text will be listed here within each group; the reader can refer to previous sections for "most critical" species already identified. The research items are listed below by species group. This type of data collection will address multiple threats to many species.

It is also strongly recommended that a portion of applicable funds be used to conduct surveys of abundance, distribution, and status for all those species that are not listed as high priority because sufficient information about them is lacking to make status determinations. Absent sufficient baseline research on these species' current condition in the basin, it will never be possible to elevate them to "most critical or critical" for the purposes of directing future conservation actions, or to remove them from the list of SGCN because their status is secure.

General Data Collection

Contaminant monitoring in fauna is recommended for 3 species in 2 taxa. As outlined in the Threats section of this document, contaminants (pathogens, metals, PCBs) and pesticides are of concern. Due to a number of land uses in this basin, such as power lines and agriculture and mining activities, monitoring the effects of pesticides on sensitive species is warranted. A thorough literature review should be conducted to better understand what information is already known about pesticide use in the basin.

- A specific recommendation for freshwater marsh nesting birds is to periodically monitor the levels of contaminants in marsh birds and their eggs to assess trends and determine effects on eggshell thinning, behavioral modification, chick development, nesting success, and juvenile survival. The highest priority (and only) species within this group are pied-billed grebe, least bittern and American bittern.

- A specific recommendation for freshwater bivalves is to research effects of pesticides and other chemicals, including ammonia, on all life stages of freshwater bivalves: sperm/egg, glochidia, larva, and adults. The highest priority species within this group are mucket, elktoe, and rayed-bean and wavyrayed lampmussel. It is recommended that this item be done on a statewide basis.

EARLY SUCCESSIONAL FOREST/SHRUB LAND BIRDS

- Complete an inventory and analysis for high priority species that identifies core habitats within the basin.

- Monitor trends of all species.

- Develop a long-term monitoring program for golden-winged warblers.

- Encourage full completion of Breeding Bird Survey (BBS) routes.

FRESHWATER MARSH NESTING BIRDS

- Initiate a baseline population survey to determine abundance and distribution of these species in the basin. Refine monitoring techniques to better detect population trends.

- Inventory breeding sites and map at a coarse scale to select key monitoring locations. Analyze habitats at multiple scales to better understand characteristic important to nest site selection. Identify key migratory staging, molting and wintering areas.

- Investigate aspects of life history such as mate selection, coloniality, dispersal and foraging habits.

- Conduct studies of habitat use, prey availability, and diet at migratory staging, molting and wintering areas to assess threats and limiting factors.

- Assess and monitor the effects (past, present and future) of West Nile Virus on birds in the basin.

GRASSLAND BIRDS

- ❖ Complete an inventory of potential grassland habitat including species present, distribution, and relative abundance of priority species.

- ❖ Develop and implement monitoring program to supplement BBS for grassland bird species to determine population trends and evaluate effectiveness of conservation efforts in the basin.

HERPETOFAUNA

There are a number of high-priority species of herpetofauna that require similar types of data collection. They are:

- All species of lake and river reptiles in the basin
- Blue spotted and Jefferson salamanders
- Hellbender
- Coal skink
- Longtail and red salamanders
- All species of woodland and grassland snakes in the basin

Specific data collection recommendations for these species are:

- ❖ Document life history parameters specific to these species in New York, including age and sex ratios; longevity; age at sexual maturity; survivorship of young; predator-prey relationships; and wetland-upland habitat requirements.

- ❖ Periodically re-survey areas of known occurrence to detect population trends.

- ❖ Develop standardized habitat and population survey protocols to document the character, quality, and extent of occupied habitat. Especially document juvenile habitat use by hellbender.

- ❖ Conduct research to document the extent of upland habitat required by vernal pool breeding salamanders.

- ❖ Determine significance of specific threats to populations of these species and develop management recommendations to address significant threats.

FRESHWATER BIVALVES

- ❖ Evaluate threats to mussels and prioritize areas within the basin for remedial action.

- ❖ Develop standard survey protocols for development projects in the basin

- ❖ Investigate the best survey methods to detect rare species and evaluate status and trends of all species that occur in the basin. Determine population distribution and abundance of freshwater bivalve species in this basin and consider listing as a species at risk.

- Conduct research to determine the habitat parameters necessary to sustain populations of at risk mussel species including temperature, substrate, flow, fish hosts and forage base.

- Determine breeding phenology necessary for successful mussel reproduction including mussel density, abundance and diversity of fish hosts, water temperature and flow.

BIGEYE CHUB

- Continue sampling for these fish in the Allegheny Basin and assess population levels.

BLUEBREAST DARTER, GRAVEL CHUB, LONGHEAD DARTER, RIVER REDHORSE, AND BLACK REDHORSE

- Inventory the habitat requirements of these species and their co-inhabitants in the Allegheny basin and outside New York. Continue sampling via State Wildlife Grant (SWG) projects started in 2004.

MOUNTAIN BROOK LAMPREY, OHIO LAMPREY, SPOTTED DARTER

- Inventory the habitat requirements of these species and protect critical areas via SWG projects started in 2003.

- Gather information on their life history and abundance in the French and Olean Creek systems.

- Research long term population trends of spotted darter and interactions with other fish species.

BATS

High priority species are tree-roosting bats, eastern red and hoary bats; and the cave-roosting Indiana bat.

- Research threats to critical bat habitats and populations.

- Conduct surveys of migrants to determine timing, distribution, species composition and elevation of migrating bats.

Planning Recommendations

There are no known landscape management plans that address comprehensive natural resource conservation issues within the Allegheny basin, though the Ohio River Basin Commission and the Lake Erie Management Plan address certain components related to water quality. The French Creek Project strives to maintain aquatic biodiversity in the French Creek, but does not include issues of upland and wetlands SGCN. The Department entered into a contractual agreement with The Nature Conservancy in 2005 to develop a watershed level natural resources plan for the Allegheny basin. This plan, when completed in 2008, will provide additional in depth information about how to improve natural resources conservation in this basin.

There is a clear need for a habitat management plan for the basin that focuses on the natural restoration of large patches of mature forest and protection of existing wetlands while facilitating the management of grassland, shrublands, and early successional forests where opportunity provides, and when such efforts to retard natural succession do not interfere with re-establishment of healthy forests. Of the 86 SGCN occurring in the basin, 30 depend on grasslands, 8 depend on barrens and woodlands, 25 depend on forested habitat and 13 depend on wetlands. Some species depend on all 5 of these habitat types at some point in their life cycle. The balance and active cooperative management of all of these habitat types is the key to the health and abundance of many of the SGCN currently living in this basin. However, declines of some SGCN, most notably the early successional species, is the result of natural changes in the landscape. Management of these species should be focused in areas where their management is not inconsistent with trends toward re-establishment of the forested landscape.

The management of all public recreation lands needs to be carried out with the cooperation of many agencies. Key partners to include are DEC, NYS Office of Parks, Recreation and Historic Preservation (OPRHP), NYS Dept. of Transportation (NYDOT), US Fish and Wildlife Service (USFWS), National Park Service, Natural Resources Conservation Service, and local governments.

Private lands comprise 85% of the total land area of the state. Use of cooperative management programs, like the Landowner Incentive Program (LIP), the Wildlife Habitat Improvement Program (WHIP), and others, will be important to achieve effective habitat protection and enhancement for many SGCN. Partners in these efforts should include but are not limited to: New York State Agencies, the Seneca Nation of Indians (SNI), Audubon New York, TNC and the Natural Heritage Program (NHP), local land trusts, New York Forest Owners Association, Trout Unlimited, Ducks Unlimited, Inc., Pheasants Forever, National Wild Turkey Federation, private landowners, interested individuals, and other interested organizations.

ALLEGHENY RIVER SUB-WATERSHED

The Allegheny River sub-watershed is dominated by deciduous and mixed forest cover. Trends toward afforestation are resulting in opportunities for reducing fragmentation of the forest and this trend should be encouraged with good silvicultural practices. However, where appropriate, it may be desirable to

integrate the needs of early successional forest/shrub land birds, forest breeding raptors, tree bats, woodland snakes and vernal pool salamanders that need heterogeneous forest structure during different life stages. Herpetofauna also need wetlands within the forest in order to breed.

The most critical bird species mentioned previously all require varying types of vertical forest structure. Wildlife biologists and researchers should develop habitat management guidelines for forest stages important to SGCN that include patch size and distribution in the landscape, timing of management actions, and microhabitat characteristics. These guidelines should be considered by forest managers on public lands and made available to private forest owners interested in wildlife management.

- ❖ Determine where it is most appropriate for management of these species to occur and then develop a management plan that provides guidance on maintaining, enhancing, and restoring early successional forest/shrub habitat for Canada warbler and golden-winged warbler.

FRENCH CREEK & CHATAUQUA LAKE SUB-WATERSHEDS

The French Creek and Chautauqua Lake sub-watersheds are comprised of a matrix of forest and grasslands, with several large wetland complexes interspersed in the landscape. This provides an opportunity to integrate the needs of wetland and grassland-dependent species into a holistic basin management plan. Components of this larger picture are:

- ❖ Develop a management plan for all wetland and grassland-dependent SGCN. Minimum management area sizes for various animal classes should be determined; targets for cooperative management with landowners and temporal and spatial targets for management actions (e.g., mowing, water control) should be set. This should be a component of the above mentioned management plan and incorporate basin specific objectives from a statewide grassland bird management plan (already being developed by DEC staff) and existing wetland planning efforts including North American Waterbird Plan, Bird Conservation Regional Plans and others. Specific tasks associated with this planning include:
  - Review OPRHP State Park Master Plans for opportunities to better manage state lands for SGCN in this basin.
  - Determine where management for early successional SGCN are most appropriate and where management for such species does not conflict with forest and wetland species that may also be of conservation interest. Develop habitat management guidelines and actions for high priority grassland bird species in the Allegheny basin (Henslow's sparrow, upland sandpiper, northern harrier and sedge wren) for incorporation in balanced management plans to better coordinate conservation actions. Identify opportunities in the plan for directing federal funds to grassland habitat where such habitat is deemed desirable in this basin.
  - Continue participation in North American waterbird planning. Focus on and refine recommendations for American bittern, least bittern and pied-billed grebe.
  - Work with USDA and other partners to develop grassland management incentives that benefit SGCN on agricultural lands in this basin.

- Work with TNC to confirm that application of BMPs in the French Creek area has helped aquatic animals, and if so, extend these BMPs to other areas within the basin.

❖ Review DEC land unit management plans for opportunities to better manage state lands for SGCN in this basin, including control of invasive species.

- Develop a monitoring and control plan that includes measures to detect invasive bivalves, prevent their introduction, and to control them before they become threats.
- Incorporate freshwater mussel goals and objectives into regional and state water quality and fish management plans and policies.

Land Protection Recommendations

This category of actions encompasses a variety of acquisition mechanisms such as easements, cooperative agreements, fee title acquisition, donations, development rights acquisition and others. The type of acquisition should be determined by the interested parties, based on their means and conservation goals. Interested parties may be one or more government entities or non-governmental organizations. Acquisition should be directed toward the best metapopulation sites identified for SGCN species and possibly toward areas of best species abundance.

- A common threat to many SGCN in this basin is the degradation of water quality in aquatic habitats. This can be a result of siltation, nutrient runoff, temperature increases, toxics, and lowered dissolved oxygen. Land acquisition can be used to prevent or remediate these effects.
  - In key locations, acquire development rights to protect water quality. The high priority species groups that will benefit from this recommendation are freshwater bivalves (mucket) and freshwater fishes, such as darters.

- A common threat to many SGCN in this basin is the loss of habitat due to human activity, such as development, dredging, wetland draining, and shoreline hardening. These changes result in loss of habitat quantity and often disrupt the function of remaining habitat. Connections between patches of similar, or different yet complementary habitats are needed for migration and dispersal. Isolated patches do not allow for effective metapopulation dynamics and make species vulnerable to extirpation from a variety of causes. Reduction of patch size also results in increased negative edge effects, predation, reduction in population, and reduction in the types of species the patch can support. Habitats fragmented by construction activities, roads, and power lines increase direct mortality of animals due to collisions. Dams impair SGCN by being physical barriers to dispersal and migration of young and adults.
  - Acquisition of forested and grassland upland tracts adjacent to wetland properties is critical to protection and restoration of amphibian, reptile and freshwater marsh nesting bird species in this basin. Ideally, these will be parcels where road building has not fragmented the 2 cover types. Identification of candidate parcels with these characteristics should occur immediately. Priority species groups that would benefit from these acquisitions are vernal pool salamanders, freshwater marsh nesting birds and lizards.

- Alder Bottom Pond/French Creek property in Region 9. This acquisition priority appears in the Open Space Plan of 2002. The site, characterized by a diverse fauna community, includes valuable freshwater wetlands.
- Allegany State Park property (Region 9), which is the largest of the parks managed by OPRHP. The acquisition of private in-holdings[9] is a priority in the Open Space Plan of 2002. The site provides habitat for many species of SGCN.
- Chautauqua lakeshore lands and vistas in Region 9 are identified in the Open Space Plan of 2002. Preserving some shoreline for undeveloped riparian areas and water quality is critical due to the extremely developed lake area. The Chautauqua Watershed Conservancy also identifies key sites for acquisition and conservation projects. The state's acquisition of Cheney Farm (on the

[9] In-holding = parcels of land within park boundaries that are privately owned.

north shore of Chautauqua Lake) is a notable success in the quest to bring significant-sized parcels of undeveloped shoreline into public ownership.

- Randolph Swamp is a significant wetland area in DEC Region 9, which includes the Conewango Creek and Little Conewango Creek drainages. There is a wide diversity of habitats that support SGCN, as noted in the Open Space Plan of 2002.

Management and Restoration Recommendations

Overall alteration of the landscape since European settlement has disrupted the natural cycle of habitat disturbance (e.g. fire, wind throw); however, some of the alterations to the landscape now provide important habitat, as in the case of hay and pasture lands and early successional habitats such as old fields. However, the declines in agriculture in the basin have resulted in the natural restoration of the native hardwood forests in the basin.

Forest Land Management

Priority management recommendations are to facilitate the natural restoration of the native forest and to reduce fragmentation of that forest by allowing or enabling patches to reconnect. Further, professional silvicultural practices should be encouraged where active forestry is in place so that the overall structure and health of the forest is maintained or improved. This will benefit all forest SGCN, regardless of priority.

- Priority management recommendation for early successional forest/shrub land birds are:
  - Conduct sustainable forestry operations that provide early successional habitat with the goal of increasing this habitat type where necessary.
  - Manage forest structure; maintain various maturity stages in forest stands consistent with natural forest mosaics to benefit forest dwelling SGCN. Maintain understory trees for lower altitude nesters. Monitor and, if necessary, control deer browse of understory through deer population management. Manage, or create, small wetlands or small (~0.25 acre) vernal ponds to benefit forest breeding raptors and amphibians.

- Priority management recommendation for forest breeding raptors is:
  - Maintain appropriate breeding habitat for forest breeding raptors around occupied nest sites with emphasis on long-eared owl. Red-shouldered hawk and Northern goshawk will also benefit.

- Priority management recommendations for woodland snakes are:
  - Develop and implement mitigation strategies to counteract adverse effects of habitat fragmentation, including head starting and relocation strategies for timber rattlesnake.
  - Develop and implement an effective information and education program to gain public support for timber rattlesnake conservation.

Freshwater Wetlands & Aquatic Habitats

- Implement Best Management Practices for forest management in riparian areas in order to maintain, enhance, and restore early successional forest/shrublands. Identify opportunities in the plan for directing federal funds into such habitats.

- Priority management recommendations for freshwater marsh nesting birds are:
  - Manage predators in nesting areas to prevent egg and chick loss, where research deems it necessary and appropriate for conservation of specific populations of SGCN.

- Manage water levels in nesting areas to prevent nest loss for freshwater marsh nesting birds, and optimize water and vegetation cover for waterfowl and spotted and other uncommon wetland turtles.
- Restore emergent marsh to benefit freshwater marsh nesting birds.

❖ The priority management recommendation for lake and river reptiles is:
- Manage uplands adjacent to aquatic habitat to provide adequate and secure nesting sites and dispersal routes for migrating animals.

❖ Priority management recommendations for freshwater fish are:
- Inventory and restore habitat in the Allegheny basin for Eastern sand darter, spotted darter, blue breast darter, gravel chub black redhorse, longhead darter and river redhorse.
- Develop a restoration program within the basin for mooneye.
- Manage land use practices in riparian areas of the basin to foster buffer strip restoration and retention to minimize loss of stream cover.

❖ Priority management recommendations for hellbender are:
- Manage land use practices in riparian areas that are known hellbender streams to decrease human induced effects.
- Develop and implement mitigation strategies to counteract adverse effects of habitat fragmentation, including captive breeding, head starting, nest protection, and relocation strategies.

❖ Priority management recommendation for freshwater mussels is:
- Restore degraded habitat sites to allow for recolonization or reintroduction of listed mussels.

GRASSLANDS

❖ Priority management recommendation for grassland birds is:
- Use mowing and/or prescribed fire to manage vegetative structure of established grasslands. This should be incorporated into Landowner Incentive and Farm Bill programs, and state land unit management plans.

WATER QUALITY

A common threat to many SGCN in this basin is the degradation of water quality in aquatic habitats. This can be a result of siltation, nutrient runoff, temperature increases, toxics, and lowered dissolved oxygen. Land acquisition can be used to prevent or remediate these effects.

❖ Priority management recommendations for lake/river reptiles are:
- Manage water borne pollutants that adversely affect lake and river reptiles.

❖ Priority management recommendations for freshwater bivalves are:
- Manage or restore areas of important mussel populations by controlling degradation factors including, construction activities, livestock access, point and non-point source pollution, barriers to dispersal, and flow alterations.

❖ Priority management recommendations for stream salamanders and fish are:
- Restore habitat quality in degraded streams.

INVASIVE SPECIES

Invasive species threaten many SGCN in the Allegheny basin. This threat may be through direct competition for nesting sites, prey and other limited resources, or by alteration of the structure and quality of habitat, as in the case of invasive plants such as purple loosestrife. Displacement of native species by invasive species disrupts ecological processes.

- The priority management recommendation for freshwater marsh nesting birds is:
  - Conduct and promote the control of purple loosestrife on public and private lands where it is known to have a negative effect on marsh nesting birds. Techniques could include biological controls.

- The priority management recommendation for lake/river reptiles is:
  - Control invasive aquatic plants where they are negatively affecting salamanders. Techniques could include biological, chemical, and mechanical means.

- The priority management recommendations for vernal pool salamanders and fish are:
  - Control invasive aquatic plants where they are negatively affecting salamanders and fish. Techniques could include biological, chemical, and mechanical means.
  - Limit introductions of non-native fish and other predatory species into habitats critical to vernal pool salamanders and native fish.

- The priority management recommendation for freshwater wetland amphibians is:
  - Control invasive species to preserve suitable wetland habitat.

HUMAN–WILDLIFE INTERACTIONS

There are a variety of threats to SGCN in the basin from direct interactions with humans. These include vehicle and structure collisions, illegal and unregulated harvest, and unintentional entanglement. Species that are most susceptible to these threats are those that disperse across the landscape such as migrating birds, bats, and herpetofauna traversing to and from breeding habitats. Often fragmentation of habitats by structures, such as power lines and roads, are a significant source of mortality. Collection of wild animals for pets and food also may contribute to species declines.

- The priority management recommendations for lake/river reptiles are:
  - Reduce excessive disturbance by watercraft in habitats critical to lake and river reptiles.
  - Reduce incidental take of lake and river reptiles by fishing gear.

- The priority management recommendation for vernal pool salamanders is:
  - Reduce road kill mortality at important breeding sites and migration routes through the construction and use of amphibian crossing tunnels and other design features.

- The priority management action for hellbender is:

- Manage water pollutants and sediment loading to streams in the Allegheny basin.
- Research feasibility of removal or mitigation of some dams blocking movement of hellbenders.

❖ The priority management actions for freshwater fish are:
- Manage water pollutants and sediment loading to streams in the basin.
- Research feasibility of removal or mitigation of some dams blocking movement of fish.

Information Dissemination Recommendations

Sharing data allows stakeholder groups to make informed decisions about activities that may help or harm SGCN. Sharing information may take many forms including BMPs, fact sheets, and educational outreach programs. There is a necessity statewide to increase environmental awareness and to disseminate technical and other information, on a number of levels: with the general public, with organizations, and with local, state and federal government agencies. Many environmental education initiatives and programs currently exist. There is a need to coordinate environmental education efforts to better use the limited, available resources.

Information about most SGCN is maintained in DEC's Master Habitat Databank. It is critical that the availability of this information be made known to land managers and decision makers. The Natural Heritage Program should have the capacity to maintain current data and to disseminate such data in a timely manner so that it is readily useable. In addition, NHP should continue to develop interpreted data products, such as maps and conservation guides, for use by decision makers so they can accommodate the conservation needs of SGCN early in project design.

Agriculture and Silvicultural Recommendations

Some farm and forestry operations may lack wildlife-based objectives, thus may be detrimental to wildlife. Providing information to public and private land managers may help mitigate detrimental practices.

- Make information available to public and private land managers regarding the benefits and need for reducing fragmentation of mature forests. Also provide for early successional habitat, including even-aged forest stand management and sustainable forestry practices where it is deemed appropriate or desirable.

- Work with public utilities to manage rights-of-way to provide maximum habitat benefits to early successional forest/shrub land birds. Utilize existing information and education resources, such as SUNY Environmental Science and Forestry School's *Shrubs on Rights-0f-Way* guide.

- Develop an outreach program for public and private land managers to increase awareness of the benefits of managing the land with wildlife-friendly agricultural practices. Species groups that will benefit include fish, freshwater marsh nesting birds and grassland birds.

- Promote the establishment of vegetated buffers between agricultural fields and wetlands and streams to protect them from runoff and benefit fish, bivalves and freshwater marsh nesting birds.

- Provide education and outreach to forest managers of private and public lands regarding forestry practices compatible with forest breeding raptors and early successional forest/shrub land birds.

INVASIVE SPECIES

Introduction and spread of exotic species can often be minimized or prevented through increased awareness of natural resource users to the negative effects of these species on native wildlife. Awareness should be accompanied by specific actions that natural resource users could employ to prevent spread of invasive and exotic species.

- Implement recommendations of the Invasive Species Task Force.

HUMAN-WILDLIFE INTERACTIONS

- Provide information about negative effects of human disturbance on wildlife. Human behavior can be altered by education and outreach and can help reduce detrimental interactions.

- Enhance public education to curtail collection and translocation of fish, or killing of hellbenders and snakes. This includes dispelling common myths about dangers posed to people and pets by native snakes.

- Develop an outreach and education tool to highlight the possible detrimental effects of human disturbance on wetland dependant wildlife, especially SGCN. An example could be off-road vehicle effects on vernal pool and marsh nesting species.

- Develop outreach material to educate the public about the benefits of grasslands, freshwater mussel life history and at-risk Lepidoptera.

- Review and respond to project applications involving tall structures such as cellular transmission towers and wind turbines that may adversely affect tree bats.

Regulatory and Legislative Recommendations

Regulatory proposals will likely be made at the statewide level, though local governments have opportunities to modify or create laws and regulations to enhance local protection of SGCN. Local zoning and taxation policies can be used to discourage sprawl and habitat fragmentation without growth, an issue of particular importance in this basin.

- Regulatory proposals related to prevention of habitat loss include:
  - Review protection of wetlands smaller than 12.4 acres as wetlands of 'Unusual Local Importance' under Article 24 of the Environmental Conservation Law (ECL) that provide habitat for herpetofauna SGCN. High priority species that will benefit are blue-spotted salamander and Jefferson salamander.
  - Examine all wetland sites currently or historically used by endangered, threatened, or rapidly declining freshwater marsh nesting birds, regardless of wetland size. Wetlands locally important for these species should be reviewed either under Article 24 of the ECL or protected alternatively by local ordinance.
  - Increase regional permit oversight of development and highway projects that may affect freshwater bivalves.
  - Protect critical stream segments that provide habitat for SGCN to abate nonpoint source pollution.

- Regulatory proposals related to protection of water quality include:
  - Limit the use of pesticides on publicly owned marshes to prevent reduction of insect populations and contamination of wetlands used by SGCN, including freshwater marsh nesting birds and fish.
  - Require testing, consistent with state and EPA regulations, of all new pesticides for effects on freshwater bivalves and fish prior to approval for use in the state.
  - Afford protected stream status under ECL §608.2 to Class D non-navigable stream segments that provide habitat for SGCN. Establish protective buffers along streams in the basin.

- Regulatory proposals related to protection of animals from uncontrolled collection and/or harvest include:
  - Implement new legislation protecting hellbender, coal skink, longtail salamander, timber rattlesnake, and short-headed garter snake.
  - Review status of freshwater bivalves to determine if they warrant classification as "special concern".
  - Enhance law enforcement to limit collection and translocation of coal skink.

- Regulatory proposals related to the prevention of the introduction and spread of exotic species include:
  - Adopt recommendations of the state's Invasive Species Task Force.

Incentives

None at this time

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Tables and Figures

Tables

Figures