Threats to Species of Greatest Conservation Need and their Habitats in New York State

The DEC staff members who compiled the information about Species of Greatest Conservation Need (SGCN) in the Comprehensive Wildlife Conservation Strategy (CWCS) planning database were asked to indicate threats to SGCN and their habitats. A list of threats for each SGCN occurring in New York State was extracted from the database. The threats and summary figures compiled here (Statewide Threats Table 1.) 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.

The most significant threats were determined by reviewing information from the CWCS database, scientific literature, and conservation plans for regions throughout the State. Prominent threats to species of greatest conservation need in New York State are discussed in the sections that follow.

Habitat Loss and Fragmentation

Anthropogenic changes like development (residential and commercial, roads, power lines), dredging, changes in farming practices, wetland draining, and natural changes such as succession reduce not only habitat quantity, but the quality of habitat as well by disrupting the function of remaining habitat patches. Examples of the loss of habitat function include loss of connectivity to patches of similar habitat (or different yet complementary habitats), loss of metapopulation dynamics in small, isolated patches (“sink” habitats[7]), increased negative edge effects (increased susceptibility to predation), and reduction in the types of species the patch can support (“area sensitive” species[8]).

Despite the relatively small human population in much of upstate New York, human population growth and the development (e.g., residential, industrial, roads) that accompanies it are still a problem for some upstate areas, particularly in central and northern New York. Pendall (2003) concludes that, as land consumption has outpaced population growth, upstate New York has urbanized hundreds of thousands of acres of farm and forest land since 1980, this trend nationwide has been termed ‘suburban sprawl’. Since1990 over 13,000 new houses have been built in the Adirondack Park, many of which are secondary

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[7] Population sinks are areas of low quality habitat that do not support self-sustaining populations of wildlife. They may attract individuals from source areas of higher quality habitat and higher animal populations, but the sink population will not survive without immigration from outside sources.
[8] Area sensitive species are those that occur more frequently, or increase in density, as habitat patch area increases.

residences (Resident's Committee to Protect the Adirondacks, personal communication, September 16, 2005). Other popular second home regions in the state include the Finger Lakes, Hudson Valley, Tug Hill, Catskills, among others.

While development may bring economic prosperity to a region, development without growth can actually be economically detrimental (Pendall, 2003). Furthermore, it is important that any development that occurs be sustainable and compatible with wildlife. Sprawl that has occurred throughout the State has fragmented sensitive habitats and threatens the rare species that depend upon them.

About 30% of New York State is comprised of habitats that have been significantly altered by humans [residential and commercial development, agriculture (row crops, hay lands), parks and golf courses, and barren habitats (quarries, strip mines, gravel pits)]. Many of these habitats are maintained by suppressing ecological processes such as vegetative succession and fire. However, active management of vegetative succession is also needed. Late and early successional forest habitats may suffer because of negative public perceptions related to timber cutting. The result is large, homogenous forest tracts with lower structural, vegetative, and species diversity than would be encountered in forests with both natural disturbances (e.g., fire, wind throws) and active management (variable cutting regimes). In truth, sustainable forestry practices, when implemented in accordance with NYS silvicultural best management practices (BMP), improve forest health and resilience.

Active management of state-owned forest lands that are not in the Forest Preserve are also an important aspect of wildlife habitat across the state. A potential goal for the some SGCN may be to incorporate more structural and vegetative species diversity into forests and other habitats. But it is also important to maintain the contiguity of large blocks of habitat where they exist, and to increase the size and connectedness of habitat patches where feasible. Landscape scale planning, state forest unit management plans, and just as importantly, implementation of those plans are a major component of habitat maintenance for all forest-dependant wildlife in the state.

This management concept also applies to grassland habitats. For example, the St. Lawrence Plain and Lake Ontario Plain represent one of the most important agricultural grasslands in the northeastern United States. It is important that extensive grassland habitats remain unfragmented, and that small patches of remnant grassland be evaluated to determine whether they are sink habitats to help guide further management actions. Further, there is a critical need to counter the detrimental effect of more intensive agriculture on habitat quantity and quality for grassland-dependent wildlife. Restoration of some grassland habitat may also be necessary to support healthy populations of some grassland-dependent species.

Early successional forest and shrubland habitats are also in serious decline throughout the State. Land development is reducing habitat, natural succession is turning many of these habitats into forests, and shrublands are sometimes converted into agricultural fields. A traditional source of shrubland habitat has been the succession of abandoned farm pasture and crop fields into shrublands. The rate of farmland abandonment has slowed from peak rates in the mid-20th century, further reducing the potential for new habitats to form. There is a critical need to increase active management for these habitats and the species that rely on them. Perhaps the most serious threat to these habitats and the species that rely on them is the lack of adequate management due to misconceptions about the benefits of sustainable forestry practices for wildlife. Much of New York State's forest lands are in private ownership, making public outreach and education and important tool in addressing this threat.

Wetland habitats declined dramatically in the New York State from 1900 until the 1970s. During this time it was common practice to drain marshes for agriculture and other land use practices. The New York State Freshwater Wetlands Act (1975) protected many of these habitats, and wetland losses have been slowed dramatically. With the exception of the Adirondack Park, only wetlands larger than 12.4 acres, or certain wetlands of unusual local significance, are regulated under state law. In addition, draining wetlands for agriculture is generally exempted from state law and still occurs. Under the federal Clean Water Act, §404, wetlands are protected by regulations promulgated by the US Army Corps of Engineers. In spite of these protections, wetlands are incrementally destroyed, and wetland complexes fragmented, by smaller, more numerous projects. Many remaining wetland communities have been reduced to small, isolated fragments whose quality is threatened by siltation, runoff from agriculture and development, and introduction of invasive species.

Degraded Water Quality, Atmospheric Deposition, and Altered Hydrology

Many of the SGCN in New York State rely upon aquatic habitats during some stage of their life cycle (e.g., natal sites, foraging sites). Conservation partners have identified the degradation of water quality and the acute and chronic effects of contaminants in aquatic habitats as a significant threat to wildlife. Degraded water quality includes siltation, nutrient runoff, temperature increases, toxics (e.g., pesticides, heavy metals), lowered dissolved oxygen, and altered hydrology (dams, water withdrawal, ground water extraction). Additionally, contaminants enter aquatic and terrestrial systems through atmospheric deposition and have both habitat and population-level effects.

Water quality for humans and wildlife in the State ranges from pristine, such as the headwaters of streams in the Catskills, to poor in some urban centers. Some of the significant water quality issues in New York State include polychlorinated biphenyls (PCBs) in major water bodies such as the Hudson River, Lake Champlain, the Great Lakes, and the St. Lawrence River. PCBs enter many aquatic systems through direct discharge from industrial sites. They are persistent in the environment, attach strongly to soils and river sediments, and readily accumulate in fish, wildlife, and humans (National Research Council, 2001). PCB contamination negatively affects reproduction and survival of fish such as tomcod, mammals such as river otter, and raptors such as bald eagles. One of the more prominent cases of PCB contamination is the Hudson River. PCBs entered the river system through direct discharge from factory sites from the 1940s until 1977 (Baker et al., 2001). Levels of PCBs in the Hudson River are among the highest in the United States (Baker et al., 2001), so in an attempt to correct this problem, the Environmental Protection Agency has ordered dredging the Hudson River to remove some of the contaminated sediments.

There are several water quality problems in the Great Lakes and their tributaries and nearshore waters related to eutrophication and siltation caused by excess nutrients and runoff from agricultural operations and on site disposal systems. Levels of toxic contaminants in the Lake Ontario ecosystem, for example, have decreased significantly, and wildlife such as colonial waterbirds have overcome most of the contaminant induced effects of the 1970s and 80s; however, bioaccumulative toxics persist in sediment, water, and biota at levels of concern for some fish species such as lake trout and salmon, and for predators such as bald eagles, snapping turtles, mink, otters, and humans (Lakewide Advisory Network, 1998). Unfortunately, these problems are not unique to the Great Lakes and can be observed at many lake systems across the State.

Another water quality issue in several basins is nutrient loading. Elevated nutrient levels contribute to excessive algal and vegetative growth, thus exacerbating the spread of aquatic nuisance plants and diminishing the value of aquatic habitats for fish and wildlife. Nutrient loading is often the result of point and non-point source pollution. The primary nutrient of concern in freshwater systems is phosphorus; the primary nutrient of concern in estuarine and marine systems is nitrogen. Programs such as the Lake Champlain Basin Program have initiated efforts to reduce point and non-point sources (Lake Champlain Basin Plan - Opportunities for Action, 1993, 1996, 2003) to reduce excess phosphorous loads by 25% every five years for a 20-year period. Similar goals have been established for the Great Lakes and many smaller inland lakes. Nitrogen reduction targets have been set for all of the estuaries in the state, as well. The establishment of total maximum daily loads (TMDL) for streams and coastal waters, and planned improvements to point sources such as sewage treatment facilities, hold hope of further reductions.

A significant threat that has negative consequences for wildlife in several basins, particularly those that encompass the Catskill and Adirondack Mountain ranges, is the declining pH of water bodies due to acid rain. Utility plant pollution laden with nitric and sulfuric acid from industrial sites in the Midwestern United States (Ohio, Illinois, Indiana, Pennsylvania) is carried northeast via wind currents, and deposited in the form of precipitation onto the Catskill and Adirondack Mountain ranges. The thin, acidic soils and the nutrient-poor water bodies in these areas make them particularly susceptible to acidification. Despite the reductions in emissions that have resulted from the Clean Air Act, the Adirondacks are now more sensitive to acid deposition due to the accumulation of acids and the loss of buffering capacity in the soil (Schoch, 2002). The effects of acid rain can be seen in the damaged spruce-fir forests of the high peaks of the Adirondacks, reduced fish numbers and reproductive success in ponds with a pH of <5, and decreased foraging and reproductive success of nesting common loons (Environmental Protection Agency, 2004; Schoch, 2002). Acid deposition (nitrogen oxide compounds) products are also a significant source of nitrogen loading to coastal waters.

Mercury contamination poses a substantial threat to SGCN and is thought to be a result of atmospheric deposition. Mercury is released from anthropogenic sources (e.g., coal burning power plants) and is carried via wind currents from sources in the Midwest and deposited onto terrestrial and aquatic habitats through rain, snow, or dust. If mercury is converted to methylmercury, it can be consumed by organisms, move up the food chain, and increase in concentration as it does so

(Evers, 2005). Traditionally, high levels of mercury were correlated with decreased productivity and survivorship of common loons (Schoch and Evers, 2002), but recent findings suggest that mercury contamination is a much larger threat to human and ecological health. A recent report by Evers (2005) compiling data from 21 peer-reviewed journal articles shows elevated mercury levels in almost every taxa including fish (e.g., brook trout, yellow perch), crayfish, salamanders, waterbirds (e.g., common loon), forest songbirds (e.g., Bicknell's thrush), and furbearers (mink and otter). The report goes on to state that not only does mercury pose a threat to fish and the humans consuming them, but also to wildlife living in habitats as diverse as mountain tops and small headwater streams. Particularly high mercury levels were observed in the Adirondack Mountains. Mercury can have adverse effects on individual animals living in this region, as well as population-level effects through changes in behavior, reproduction, and body chemistry (Evers, 2005). Mercury concentrations are such that consumption advisories have been expanded within several regions across the State.

Altering the flow of riparian habitats with dams and bridges, and for flood control, agriculture, and development (roads, residential, commercial) can directly and indirectly affect fish and wildlife. Movement of populations of aquatic species such as fish and freshwater bivalves are inhibited, and habitat for all species dependent on lotic systems is lost outright or degraded through decreased conveyance and increased sedimentation. Changes in water levels and flows resulting from the construction and operation of various dams across the State are implicated in the impairment of critical fish habitats in the river habitats. Flooding of fast water river stretches impairs spawning habitat for species such as lake sturgeon (LaPan et al., 2002). In addition, manipulation of water levels in major lake systems such as Lake Ontario results in substantial water level changes, discouraging the establishment of wetlands and submergent aquatic vegetation in the nearshore zone (LaPan et al., 2002). Throughout the State, wetlands and tributaries that are flooded by dams have diminished value as spawning and nursery habitats for warm water fish.

Stream and road bank erosion, erosion of coastal soils, and erosion from agricultural fields are significant sources of sand/sediment. Once in lotic habitats, sediment fills in gravel spawning beds, decreasing salmonid spawning success, limiting macroinvertebrate production, and increasing winter mortality of fish and invertebrates such as mussels. Excessive sand and sediment loads also contribute to the formation of significant sedimentation deltas at the mouths of many tributary segments. Such deltas can restrict fish migration into the tributaries and present opportunities for the establishment of non native aquatic vegetation.

The placement of shoreline structures like bulkheads, groins, and jetties can seriously alter the coastal habitat by modifying biological resources and habitat structure, causing cumulative ecological effects and changing physical and ecological processes such as the distribution of sand on beaches. Shoreline engineering, such as jetties, bulkheads and repeated beach nourishment are short-term strategies that weaken barrier islands and other coastal habitats. These elements as well as construction in the beach and dune areas affects the ability of the system to respond naturally to human induced threats as well as storm events and sea level rise and therefore threatens the viability of all species who utilize the area throughout their lifecycle.

Aquatic and semi-aquatic invasive plants such as purple loosestrife, Eurasian water milfoil, water chestnut, Japanese knotweed, yellow iris, and invasive animals such as zebra mussels and sea lampreys are also an increasing threat to aquatic habitats statewide. This is discussed in more detail in the following section.

Invasive Species

Invasive exotic plants and animals diminish the quality of upland and aquatic habitats throughout New York State. In wetlands and other aquatic habitats, species like purple loosestrife, Eurasian water milfoil, water chestnut, Japanese knotweed, and *Phragmites australis* with little value to wildlife, displace native plant species, and disrupt ecological processes. Purple loosestrife thrives on moist, disturbed soils, and often invades following construction activity. It can form dense, impenetrable stands that are unsuitable as cover, food, or nesting sites for a wide range of wildlife. It also out-competes many rare wetland plants. Eurasian water milfoil occupies an extensive range throughout the State. This species forms dense mats of vegetation that degrades the structure and function of aquatic habitats. Similarly, dense mats of water chestnut have infested many water bodies statewide. While mechanical control of water chestnut has met with some success, water milfoil has been more difficult to control. Japanese knotweed is now forming dense riparian stands of vegetation along many river systems and tributaries to large lakes such as the Lake George. Knotweed is quickly replacing native vegetation along these waterways with little or no benefit to fish or wildlife resources. Mechanical and chemical control of knotweed has proven to be extremely difficult.

Invasive aquatic animals degrade habitat quality and/or directly affect fish and other aquatic species. Zebra mussel densities have increased dramatically in many water bodies throughout the State including the Great Lakes and Lake Champlain. Zebra mussels have affected water supplies, crowded out native mussel species, reduced the biomass of other benthic animals in many areas, and may be linked to outbreaks of Type E Botulism. Since 1999, a severe outbreak of Type E botulism has been documented along the shores of Lake Erie, and more recently, Lake Ontario. The severity of Type E botulism-caused mortality documented during the current outbreak along Lake Erie and Lake Ontario could threaten, or eliminate, sub populations of common loon with fidelity to these water bodies for migration. It is suspected that invasive exotic zebra and quagga mussels are ingesting botulinum bacteria, and then in turn, are being eaten by an exotic fish species, the round goby. Common loon and lake sturgeon feed on round gobies, thereby becoming infected with botulism. In the Hudson River, zebra mussels have caused a 57% reduction in the biomass of other benthic animals (Bode et al., 2004). From Yonkers to Troy, zebra mussels have consumed more oxygen from the Hudson River (from their respiration) than was added back to the river as a result of the post Clean Water Act improvements in sewage treatment plants (Strayer et al. 1996, D.L. Strayer pers. comm., May 2005). Although this oxygen depletion probably does not impair water quality (unlike sewage discharges), it demonstrates the magnitude of effects that can be posed by some invasive species. In all habitat types, new residential and commercial development increases the risk of new occurrences of invasive exotic plants and animals.

Sea lampreys, a parasitic invasive fish that feeds on the body fluids of other fish, have a significant effect on native fish populations. Organizations such as the Lake Champlain Fish and Wildlife Management Cooperative (DEC, Vermont Fish and Wildlife, USFWS) are currently implementing sea lamprey management programs to combat this threat. The intentional or unintentional introduction of non-native fishes have occurred in lakes and ponds statewide, causing drastic declines in native species such as round whitefish and brook trout. Numerous invasive non-native aquatic organisms can move among watersheds through canals systems such as the Erie and Champlain Canals. Potential measures to restrict or prevent introductions of such invasive species via canals should be evaluated and, if viable, implemented. Many other invasive species exist in major lake systems in New York, including the spiny water flea (*Bythotrephes cederstroemi*) and fish hook water flea (*Cercopagis pengoi*), Rusty crayfish (*Orconectes rusticus*), common carp, and alewives (Manninen, 2005).

In upland habitats, invasive exotic plants and insects introduced through human activity threaten to reduce biodiversity. For example, exotic insects like viburnum leaf beetle lack any natural predators and threaten to alter the composition of young forest stands. Beech bark disease, a fungal disease of the genus Cryptococcus, is having devastating effects on American beech trees within the Adirondack Park and across the state. American beech is the primary source of tree mast for use by wildlife within the Park. Total loss of mast in localized areas may, in turn, have significant effects on wildlife populations that utilize this food source. There are several forest pathogens and insect pests that may affect forested habitats. For example, *Sirex noctilio,* an introduced siricid woodwasp, recently discovered in upstate NY, threatens significant mortality to conifer forests. It is a threat to primarily pine forests, but also threatens spruce and fir forests. Some of these pests have yet to reach the northern portions of NYS (e.g., hemlock wooly adelgid, Asian long-horned beetle), but northward movement of the distribution of these species from New York City and vicinity has been observed.

Upland plants such as garlic mustard, bush honeysuckle and others continue to replace native plants. A species that is becoming an increasing problem is black swallow-wort (a.k.a. “the dog strangling vine”). This species has the potential to cause major disruptions to upland plant communities. Investigations into chemical and biological control mechanisms for this nuisance plant species are ongoing.

Native species present in locations or numbers not historically found can be detrimental to some SGCN. These invasive or overabundant native species can out compete the species of concern for forage or nest sites (e.g., sand shiner vs. comely shiner, or blue winged vs. golden winged warblers), can pose a predation threat (e.g., perch preying upon round whitefish), or can reduce habitat quality by altering vegetative composition and structure (e.g., black locust invading Karner blue butterfly habitat). This type of expansion of range by native species causes concern when there are unbalanced negative effects on other sensitive wildlife species. A case in point is double crested cormorants on Lake Ontario and other water bodies such as Lake Champlain. This species was first documented breeding in New York State in 1945 on Gull Island in eastern Lake Ontario as part of a natural range expansion. During the 1960s cormorant populations in the Great

Lakes were devastated by the effects of chemical contaminants (primarily pesticides) on reproduction. Pollution control, in addition to the protective status granted by the Migratory Bird Treaty Act, has allowed populations of cormorants to soar to historic highs. Cormorant populations have increased in abundance to the point where they are affecting other colonial nesting waterbirds by taking over nest sites or by destroying woody vegetation needed for nesting. Affected species include common terns and black crowned night herons. In addition, DEC and Cornell University have conducted long term studies linking cormorants to declines in small mouth bass in eastern Lake Ontario. In response to concerns about conflicts with other colonial nesting birds, DEC initiated cormorant control measures at several locations during the 1990s. As part of the Final Environmental Impact Statement on Double crested Cormorant Management in the United States (2003) prepared by the USFWS and the Management of Double crested Cormorants to Protect Public Resources in New York: Statement of Findings (2004) prepared by DEC, cooperating agencies are working to evaluate the effect of cormorant control measures and to monitor the status of island nesting colonial waterbirds and native fish species relative to the abundance and distribution of double crested cormorants.

Another example of overabundant native species has been white-tailed deer in some areas of the state. Abundant deer populations in the Adirondacks are implicated in the damage to economically important tree species like sugar maple. Browsing by deer can alter the density and species diversity and composition in forests throughout the state in areas where the population exceeds management targets.

Incompatible Silvicultural and Agricultural Practices

Farm and forest products are both important to the economy of New York State. Unfortunately, trends in modern farm operations (increased field size, loss of edge habitats, erosion due to conventional tillage, intensive grazing, poorly timed mowing/haying of fields) can have negative consequences for wildlife and their habitats in regions where agriculture (e.g., row crops, pasture/hay land) makes up a significant portion of the landscape as seen in the Lake Plains, the St. Lawrence Valley, and portions of the Lake Champlain, Mohawk River, and Hudson River valleys. Additionally, runoff from agricultural operations can increase contaminant, nutrient, and sediment loads in adjacent aquatic habitats negatively affecting the SGCN that reside there. In the forested landscapes that predominate most of the state, forestry operations that do not comply with best management practices and that are poorly planned and executed can damage habitat function and reduce habitat quality for some SGCN that reside there.

Conversely, appropriate management of agriculture and forest lands can yield immense benefits to wildlife in the state. Management of these working landscapes for wildlife can be more cost effective than primary wildlife management on abandoned lands. It is important to develop and implement farm and forestry practices that are both ecologically and economically sustainable. The vast majority of these habitat types is in private ownership and requires expanded outreach and coordination regarding the needs of SGCN on private forest and agricultural lands.

Human-Wildlife Interactions

There are a variety of threats to SGCN in the state from direct interactions with humans. These include vehicle and structure collisions, and illegal and unregulated harvest. Species that are most susceptible to these threats are those that disperse across the landscape like migrating birds and bats, and herpetofauna traversing from the upland to wetlands. Often fragmentation of habitats by structures, such as power lines and roads, are a significant source of mortality.

Anecdotal evidence and preliminary data gathering efforts have suggested that wildlife collisions with human-created structures (e.g., wind turbines, communications towers, and power lines) can have significant population-level effects. USFWS and others are currently investigating the effects of these types of structures on wildlife populations (specifically, migratory birds), but as human populations within the state continue to increase, these structures will become a more significant hazard to SGCN.

Many of the amphibian and reptile species of conservation concern have no protected status. Killing, collection/translocation, and illegal sales of herpetofauna in the pet trade have posed a significant threat to rare and declining reptile and amphibian species. Pending state legislation will convey protected status on many previously unregulated herptile species. Furthermore, public fears and misconceptions about reptiles, particularly snakes, may drive the killing and/or collection of these animals.

Climate Change

The threat with the greatest potential to affect fish and wildlife on a scale beyond the boundaries of New York State is climate change. Large quantities of carbon released into the atmosphere by human activities have increased the amount of carbon dioxide in the air and trapped the sun’s heat. This has resulted in an increase in the global temperature at a rate faster than anything that has been observed for at least 10,000 years (Millennium Ecosystem Assessment Board, 2005). Habitats in the Adirondacks such as lowland boreal systems may be particularly susceptible to climate change. Warming trends may affect the distribution patterns of plants and animals that inhabit boreal habitats and may extirpate some plants and animals that cannot adapt or move to more suitable areas. However, researchers studying this issue in the Adirondacks have not been able to reach consensus on the methods used to study climate change at a local scale, thus making predictions about future effects difficult (Jenkins, in review; Stager and Martin, 2002).

An additional effect of climate change with relevance to SGCN is the rate of severe storm and other weather driven events. By virtue of the small and isolated populations of many of New York’s SGCN, they are particularly vulnerable to coastal storms like hurricanes and nor’easters that cause erosion and flooding even after they move inland. Coastal erosion heavily affects beach and salt marsh habitats already under stress from rising sea level. Winter storm events with excessive ice can cause forest habitat damage, and heavy snowfall results in spring meltwater flooding and erosion.

Some work to address this threat is underway. The Regional Greenhouse Gas Initiative, or RGGI, is a cooperative effort by Northeastern and Mid-Atlantic states to reduce carbon dioxide emissions –– a greenhouse gas that causes global warming. To address this important environmental issue, the RGGI participating states will be developing a regional strategy for controlling emissions. This strategy will more effectively control greenhouse gases, which are not bound by state or national borders. Central to this initiative is the implementation of a multi-state cap-and-trade program with a market-based emissions trading system. However, research on the effects of climate change on local wildlife populations and their habitats must continue, and this threat will need to be addressed on a much larger scale than just the state or the Northeast. It will take a coordinated global effort to devise a solution to this global problem.

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Tables and Figures

Tables

Figures

None

Statewide Threats Table 1. A summary of threats for all Species of Greatest Conservation Need (n=537) in New York State. 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 others.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 CWCS database. The purpose of this information is not to compare the severity of one threat against another.

Threat Code	Threat Description	# of Species Groups Affected	% of All Spp Groups Statewide	% of All Threats Statewide
6	Habitat Loss - cultural (e.g., development)	75	58.6	12.6
2	Contaminants	56	43.8	9.4
13A	Degradation of Water Quality	52	40.6	8.7
1c	Human Disturbance - illegal/unregulated harvest	40	31.3	6.7
10A	Barriers to Movement in Aquatic Habitats (e.g., dams, weirs, culverts)	33	25.8	5.5
1a	Human Disturbance - collisions	27	21.1	4.5
9A	Sedimentation/Erosion (impacts on aquatic habitats)	27	21.1	4.5
4c	Interspecific Competition for Resources	26	20.3	4.4
4b	Disrupted Predator-Prey Cycles	25	19.5	4.2
3	Disease	21	16.4	3.5
7T	Habitat Loss - natural (e.g., succession)	18	14.1	3.0
12A	Competition from Invasive Exotics	14	10.9	2.3
14T	Fragmentation	14	10.9	2.3
1	Human Disturbance - general	13	10.2	2.2
5b	Susceptibility to Stochastic Events (isolated pop'ns)	13	10.2	2.2
19T	Active Alteration/Suppression of Natural Processes (e.g., fire)	12	9.4	2.0
7A	Climate Change (change in water level, temperature)	12	9.4	2.0
1b	Human Disturbance - entanglement, entrainment, impingement	11	8.6	1.8
12T	Habitat Composition Altered by Terrestrial Invasive Species	10	7.8	1.7
5a	Susceptibility to Stochastic Events (weather, storms)	10	7.8	1.7
U	Unknown Threats	9	7.0	1.5
18T	Insensitive/Unsustainable Agricultural/Silvicultural Practices	8	6.3	1.3
5c	Susceptibility to Stochastic Events (rare species)	8	6.3	1.3
14A	Altered Hydrology (water level management/extraction)	7	5.5	1.2
8A	Aquatic Habitat Altered by Natural Processes (e.g., beaver)	6	4.7	1.0
8T	Climate Change (change in species range, distb'n, migration)	6	4.7	1.0
11A	Loss of Streamside Buffers	5	3.9	0.8
15A	Habitat Composition Altered by Aquatic Invasive Species	5	3.9	0.8
15T	Reduction of Patch Size, Shape, Area	5	3.9	0.8
17T	Loss of Connectivity/Metapopulation Dynamics	5	3.9	0.8
4d	Detrimental Hybridization	5	3.9	0.8
11T	Pollution (e.g., acid rain, soil contamination)	4	3.1	0.7
4e	Parasites	4	3.1	0.7
4a	Loss of Host Species	3	2.3	0.5
10T	Barriers to Movement in Terrestrial Habitats (e.g., roads, powerlines)	2	1.6	0.3
13T	Terrestrial Habitat Composition Altered by Overuse (e.g., deer)	2	1.6	0.3
9T	Impacts of Erosion on Terrestrial Habitats	2	1.6	0.3
16A	Aquatic Habitat Composition Altered by Overuse (e.g., swans, muskrat)	1	0.8	0.2
16T	Negative Edge Effects (i.e., increased predation, "ecological traps")	1	0.8	0.2