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Final Project

Herpetofauna is a broad category of wildlife that includes all species of amphibians and reptiles. It’s usually used in reference to frogs, turtles, lizards, snakes and salamanders. In New York State, there are 72 species of herpetofauna that the Department of Environmental Conservation (DEC) believe are present in the wild (DEC 2019). A number of these species are threatened and endangered federally, so continuing conservation is a serious concern. In fact, as a category, herpetofauna are experiencing global declines at an alarming rate (Greenberg et al. 2018). However, data on the abundance and population trends of most herpetofauna in New York is completely non-existent. There is currently no systematic monitoring of herps by the state and expert analysis is the basis of most management decisions (Gibbs 2022). There are options available for responsible management of herpetofauna, which have been implemented in other places globally that could be suitable for New York, but lack of funding and updated population data has hindered efforts for decades.

The most recent attempt by the state to collect data on herpetofauna populations was a project began in the 1990s. The Herp Atlas Project began in 1990 and ran until 1999 under the direction of the New York Department of Environmental Conservation. The goal of this project was to study the distribution of herpetofauna across the state, ranging from western NY, up to the Adirondacks and down to Long Island. Using USGS 7.5-minute quadrangles as the unit of measurement, the DEC attempted to find at least 20 species in each quadrangle across the state, but certain places, like the Adirondacks had fewer usually. By 1999, the DEC had mapped out the distribution of all 70 (72 currently) herpetofauna species found in the state (DEC₁). However, this project collected no data on abundance or population trends, only geographic location. This was certainly helpful but lacked critical information for management decisions going forward. Even if the Herp Atlas Project had produced more comprehensive data, it would still be completely outdated today, since the project was completed over 20 years ago. A new Atlas Project would need to be organized to reassess the distribution of herpetofauna species and also to possibly collect some long-term population trend data. However, the likelihood of another Atlas project being attempted is low. The Herp Atlas Project, and most Atlas projects conducted across the U.S. are done using public funding from ammunition and gun sales, which are also responsible for funding nearly all wildlife management in the U.S. These funds are most often put towards the management of more charismatic and economically important species, such as deer and other megafauna. The left-over funds for herpetofauna are minimal and incapable of supporting another major effort such as the previous Herp Atlas Project (Gibbs 2022).

The best source of abundance and population trend data on herps in New York has come from citizen science platforms, such the New York Amphibians and Reptile Survey (NYARS), which is an online platform where anyone can submit observations of herps. Through this, and similar resources, active databases of herp abundance and distribution are maintained for the state of New York. However, these systems are lacking the reliability and actionable insight that the DEC projects can provide.

At the state level, management of herps is relegated almost entirely to hunting regulations, which do exist for all herp species. Every kind of snake, lizard and salamander is prohibited from hunting of any kind. All turtles, except the snapping turtle are also protected from harvesting. Snapping turtles can be taken with a bow or gun, from July 15th to September 30th, but only with a valid hunting license. Additionally, all harvested snapping turtles must have an upper shell measuring 12 inches or longer in a straight line. The daily bag limit is set at 5, while the season total is capped at 30. The only other category of herps that can be hunted are “frogs”, which includes a list of native frog species that can be found on the DEC website. A fishing license is required to harvest frogs with a spear, hook, club or by hand and a hunting license is required to take frogs with a bow or gun. Unlike the snapping turtle, there is no daily or season bag limit (DEC₂). This means that individuals can harvest as many frogs in a season as they are capable of, and the number of frogs taken each year by hunters is not known. This could lead to serious issues of population decline if left completely unchecked. With very little data on species abundance, and no bag limits or effective measures to learn harvest amounts, the actual status of many of these species is unknown (Gibbs 2022). Whereas hunting regulations for deer are at least based off population estimates and year to year trends, hunting regulations for herps have very little data to support them.

Another cause of herp mortality is road crossing, which at times can be a more serious threat to herp populations than hunting. Roads cause fragmentation of habitats, which leads to herps having to move across roads frequently, and most herp species are too slow to cross safely and too small to be seen. For some species, such as the spotted salamander, having an annual road mortality risk of 10% or higher can lead to local extirpation in a relatively short time and in the Northeast, between 22% and 73% of spotted salamander populations can be exposed to this level of mortality (Gibbs and Shriver 2005). Many species of herpetofauna migrate locally for breeding purposes, which can lead to large numbers of them crossing short lengths of road at a time, often at night, where thousands can die if the road is busy (DEC3). Additionally, reptiles and amphibians are often attracted to roads as a heat sources, since paved roadways gain heat quickly during the day and maintain it as the sun sets (Langen et al. 2007). This is concerning because annual crossing sites for breeding or wintering can be identified and steps can be taken to mitigate road mortality at these spots during peak crossing times, but consistent use of roads for heat is too widespread and constant for effective management to occur. The hotspots of road mortality can be identified using an annual sampling method of herpetofauna presence and mortality sightings. Combined with other know correlations, such as roads that divide wetlands or have wetlands nearby on either side, road sections of annual or semi-consistent herpetofauna use can be located (Langen et al. 2009).

Wildlife managers in New York have been cognizant of the issue of road mortality, and measures have been adopted to mitigate the damage to herpetofauna populations. The Amphibian Migrations and Road Crossings project is a volunteer outreach program created by the DEC to enlist the help of citizens in moving herpetofauna across dangerous roadways. These volunteers go out and survey possible road crossing sites, and track weather patterns to project the times that herpetofauna will migrate for breeding or wintering. On rainy spring nights, these volunteers will go out and manually move herpetofauna across the road, possibly in addition to coordinating traffic to minimize danger to the volunteers and herps (DEC3). The DEC also provides volunteers with educational information for self-training on herpetofauna identification. Well organized volunteer groups can record the number of sightings and migrations observed, which will be reported to the DEC. Other institutions in New York, such as Finger Lakes Community College have volunteer groups that help on known herp crossing roads (FLCC n.d.).

Although volunteer help is effective at reducing mortality, there aren’t enough people to assist herps at every migration event across the state. The best method for reducing road mortality is to integrate road crossing structures into existing roads. Implementation of wildlife road crossing structures, such as green bridges, which are large overpasses with vegetation that allow wildlife to cross roads undisturbed (Plaschke et al. 2021), have become increasingly popular, but projects to construct these are generally reserved for megafauna and species that the public wish to protect. These structures might inadvertently assist smaller wildlife like herps, but the scale of green bridges inhibits the use of them by smaller wildlife. Many different forms of road crossing structures for herpetofauna have been developed, including tunnels, bridges, underpasses and modified viaducts from existing infrastructure. Fences don’t provide a way across but are crucial for directing amphibians to crossing structures or preventing them from reaching the road before a structure is in place (Puky 2003). Tunnels or underpasses with fences have proven to be the most effective at reducing road mortality. Different species have shown preference for larger or smaller tunnels, different substrate types and variances in light permeability (Woltz et al. 2008). Especially on longer tunnels that cross multiple lanes, adding vertical shafts to provide light is needed to encourage use by a number of species. Tunnels should be made as short as possible, since tunnel length has a negative correlation with usage, regardless of species (Puky 2003). Based on these studies, road crossing structures can be designed for target species, but others might still use them as well.

Although the data is compelling for their effectiveness, the monetary factor of adding road crossing structures is significant. As with all conservation efforts involving herpetofauna, funding is lacking globally, as well as in New York. Integrating structures into existing roads would be a massive upfront cost to New York State, and money for wildlife management is already being spent on game species (Gibbs 2022).

Threats to herpetofauna in New York are abundant, and unfortunately there is little being done about it. Volunteer work and citizen science are responsible for the bulk of conservation efforts and herpetofauna population data that is available, mostly due to the lack of available funding at the state level for the DEC to work with. Without the historical databases of population trends that exist for many other species, modern monitoring of herps is even more difficult (Gibbs et al. 2005). The public cares more about game species than anything else. The societal outlook on herpetofauna has to change fundamentally before conservation can truly succeed, but progress in that regard is slow at best. Until more species become threatened or endangered, real management is unlikely to occur.

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