The Search for ELUSIVE WEASELS at Hawk Mountain Sanctuary

American ermine (Mustela richardsonii) by PGC photographer Jacob Dingel.

Did you know? The current population status of weasel species in Pennsylvania is undetermined.

Historically, three species have existed in the keystone state: the long-tailed (Neogale frenata), the short-tailed (Mustela richardsonii), and the least weasel (Mustela nivalis). Long-tailed weasels are the largest and most common species in Pennsylvania, ranging across the United States and Canada. The less common short-tailed weasel, or American ermine, is slightly smaller and exists in more northern states and Canada. Least weasels, nicknamed "mouse weasels," are the smallest of the three species. Their presence in Pennsylvania is currently unknown, as recorded sightings in the past 20 years have been in the single digits, which could indicate a population decline or may just reflect their incredibly secretive nature. These tiny carnivores are incredibly fast-moving and often exist in habitats with dense groundcover, making them difficult to monitor visually. Due to their uncertain standing, least weasels have also been overlooked by wildlife protection plans, as so little data exists to make an informed decision about conservation efforts.

Unidentified weasel species (either long-tailed or American ermine) outside of a bucket trap at Hawk Mountain Sanctuary.

Weasels are members of the family Mustelidae, which is made up of martens, fishers, badgers, otters, polecats, and the wolverine. Members of Mustelidae exist on every continent except Australia, Antarctica, and some oceanic islands including Madagascar. Characteristics of this family include well-developed carnassial teeth and enlarged scent glands, which secrete a powerful-smelling musk. This musk is important for the olfactory communication and defense of the animal, also lending to its family namesake. They are highly specialized predators that exist in terrestrial, arboreal, marine, and freshwater habitats, and they occupy specific niches in their ecosystems, targeting the most available prey in the given habitat. Mustelids offer a form of ecological pest control, regulating small mammal populations that would rapidly expand without an efficient predator. Common prey of terrestrial mustelids include rodents and rabbits, two groups of small mammals that are known to damage native flora, devastate crops, and be carriers of disease if their populations remain unchecked. Mustelids can positively impact the habitats they exist in, but unfortunately anthropogenic activities have reduced populations in different areas of the United States.

Historically, mustelids have been important to the fur industry, with the overharvest of river otters, American martens, fishers, mink, and weasel species in the 1500s leading to their near extinction in the United States. In fact, American martens serve as an example of what can happen to weasels if Pennsylvanians do not take precautionary action. In the early 20th century, American martens faced extirpation or localized extinction in Pennsylvania. And now, thriving populations exist outside the state, but due to unregulated hunting, trapping, and deforestation, there are no longer any American martens in Pennsylvania today. Reintroduction programs are presently being proposed by the Pennsylvania Game Commission (PGC), the same programs that brought river otters back to healthy river systems across the state. Hunting and trapping of otters and other mustelids are now regulated by the PGC, appeasing outdoorsmen while also ensuring sustainable, healthy populations.

Preferring to occupy forested habitats with thick vegetative cover or rocks, many weasel species can remain undetected by humans. Because of their inconspicuous nature, researchers must come up with different ways of monitoring populations that do not involve sighted surveys. Hunting and trapping records have been used to indicate animal abundance, but

Unidentified weasel species (either long-tailed or American ermine) inside a box trap in Western PA.

scientists are realizing this method may provide unreliable data. Using hunting records to estimate population dynamics can be misleading, as trapping is often used as a form of pest-management. Mustelid species like weasels, mink, fishers, and martens are opportunistic hunters, occasionally targeting poultry if readily available. If the pest becomes less of a nuisance, farmers might think it best to direct their efforts elsewhere, leading to less weasels in traps. The frequency of weasels and other mustelids being trapped may indicate a population decline, but it also may just indicate a decline in trapping efforts in general. Because of this potential for inconsistency, alternate methods must be tested and developed.

The New Approach

To get a better idea of the population status of weasels, the PA Game Commission, along with the Western Pennsylvania Conservancy, Pennsylvania Natural Heritage Program, and Millersville University, have begun a state-wide pilot study to test survey techniques. The collaborative effort joins these organizations with local individuals that are volunteering their time to test different camera traps and attractants, with the goal of determining which techniques (or combination of techniques) are most effective in drawing these tiny carnivores to camera sites. There are study sites set up all across Pennsylvania, including Monroe, Lackawanna, Indiana, and Carbon Counties, the Poconos region, and Hawk Mountain Sanctuary. Public game lands and private

properties owned by PGC staff and volunteer collaborators have three camera set-ups per study site, consisting of a trail camera and a different attractant—either a visual lure, scent lure, food bait, or a killsqueak (a specially designed auditory lure that repeatedly plays the death cry of a rodent).

Attractants vary based on location, but all sites use specially designed weasel gland lure and killsqueaks. Food attractants being used include cat or dog food, dead rodents, beaver meat, and paste bait. Olfactory lures include mustelid anal gland musk, salmon oil, beaver castor, and other mammal gland concentrates, meant to attract weasels from long distances to camera sites. Other attractants include auditory lures, consisting of the battery-powered killsqueak, and visual lures, which are still being developed. Because this initial survey effort is a pilot study, researchers are looking at different methods and their individual or combined effectiveness at attracting weasels to camera sites.

The three study sites set up at Hawk Mountain Sanctuary are managed by Dr. Aaron Haines, certified wildlife biologist and professor at Millersville University. Haines, along with research students, has been deploying three different trail camera set-ups on Sanctuary grounds. The camera set-ups currently at Hawk Mountain are bucket cameras, ammo box cameras, and open trail cameras.

Bucket cameras consist of two 5-gallon, downward-facing plastic buckets stacked on top of each other and secured to the ground with stakes. Half to full-circle holes are cut on either side of the bucket along the ground, allowing anything smaller than a mink to enter the trap. The motion-detecting trail camera is set up inside the inner bucket, lens pointed down to photograph any animal drawn in by the selected attractant. This technique has been used successfully with small mammal surveys prior, but weasels are an entirely new trial.

Illustrations provided courtesy of the PA Game Commission

Long-tailed weasel (Neogale frenata) taken at Hawk Mountain Sanctuary by John Lwasz.

Ammo boxes are the most recent method being tested at the Sanctuary, involving a camera placed on the door of an ammo box, facing inside. Two holes are cut into either side of the far wall of the box, with a clear PVC pipe going through. There is an opening in the pipe which allows a small mammal to enter the box, leading to where researchers place the attractant. Ammo box cameras have been identified as a successful survey method for weasels, but this technique requires comparative testing with other methods to determine which is the most effective and efficient method of camera trapping these small carnivores.

Open camera sites involve the simplest setup of the three: a trail camera attached to a tree or post, which faces the attractant. The attractant is placed in view of the camera, so if an animal approaches to investigate the bait or lure, it can be picked up on the motion-detecting camera. In the shot there is also a piece of PVC pipe marked by centimeters, so researchers can approximate the size of any animal the camera picks up.

The other two camera set-ups also have a method of measurement, usually a simple plastic ruler positioned at the entrance of the bucket or box. Having a form of measurement in photos is important, as the three weasel species vary slightly in length and size but are extremely similar in appearance, which can make it hard to differentiate in trail camera photos.

Identification between weasels with similar morphology and overlapping habitat preferences can prove extremely challenging—even the experts can get stumped. Furbearer biologists, wildlife biologists, and expert trappers share their trail camera photos with each other to get peer feedback and to "double-check" identification conclusions. Even in poor-quality trail camera footage, there are slight morphological differences that can be observed if a person knows what to look for. Long-tailed weasels are the largest, approximately 15-23.5 inches in length, and can be identified by their tail-length, which is nearly equivalent to their body length. They have dark brown fur with a black-tipped tail and white on their chins, chest, and underside. Some northern populations may turn white in winter, but this is less common in Pennsylvania. American ermine are slightly smaller, approximately 9-15 inches in length, but similar in coloration. Their tails are approximately half their body length and also have a black tip. American ermine are also the only Pennsylvanian mammal to undergo a white molt in the winter, making identification slightly easier in the winter. Least weasels are the smallest of the trio, approximately 6-8.5 inches in length. Like the others, coloration is brown above with white below, but they lack the black-tipped tail.

With the footage gathered from Hawk Mountain so far in the study, Haines and collaborators have identified the presence of long-tailed weasels at the Sanctuary, but no confirmed short-tailed or least weasels. Study sites were set up around the Acopian Center from April to December, but have since been relocated to new sites along the Lookout Trail, off-trail to avoid human influence by visitors. The results of this study will not only indicate weasel presence at Hawk Mountain, but may also identify effective survey strategies for weasels. Efforts are being continually expanded to other parts of the state to try to cover as much potential habitat as possible. With these results, researchers may also be able to determine the preferred habitats of weasels, as the landscape of Pennsylvania is ever-changing and past habitats may not exist in abundance anymore. The goal is to identify non-invasive survey techniques for weasel populations to learn more about the population dynamics and behavior of these elusive species, and if surveys provide reliable data on population, more can be done to implement effective conservation efforts, if necessary.

Hawk Mountain's effort to conserve and study snowy owls in the Arctic and beyond, contact **mccabe@hawkmountain.org** or **therrien@hawkmountain.org**.