

South Mountain Research Corps: Environmental Resources Problem Statement
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The South Mountain in PA is the northern terminus of the Blue Ridge Mountain chain. The topography, climate, soils, and geology of the South Mountain supports a unique assemblage of forests, plant communities, and animals. However, the South Mountain in Pennsylvania is surrounded by residential, commercial, and agricultural lands, isolating it from other plant and wildlife populations and effectively making the South Mountain an island from an ecological perspective. This isolation creates challenges for large landowners, particularly on public lands where there is substantial pressure from recreation and multiple land uses within and on properties that border the State Forest. The following is a list of potential natural resource research/monitoring priorities that could be conducted on public or private lands within the South Mountain.

Specific priorities:

- **Timber rattlesnakes in Michaux State Forest.** The PA Fish & Boat Commission has designated the timber rattlesnake (TRs) population on the South Mountain as a Special Protection Area. No take of the species is allowed, even with a valid Venomous Snake Collection permit.
 - The Bureau of Forestry developed a Timber Rattlesnake Conservation Strategy in 2016 that identifies wanton killing of TRs as one of the main issues contributing to the decline of TR populations.
 - Public education is an important component of the Conservation Strategy; particularly on the South Mountain where human-snake interactions are more likely. A project surveying and educating recreational users at major trailheads (e.g., Sunset Rocks and Pole Steeple) could help natural resource managers to achieve this conservation goal.
 - Contact Aura Stauffer (astauffer@pa.gov) for more information.
- **There are hundreds of vernal pools within the South Mountain landscape** that provide critical breeding habitat for amphibians and reptiles and contain important plant communities. Monitoring and protection of the pools is crucial to the survival of these populations. Potential research/monitoring projects include:
 - Identification and inventory of vernal pool communities on private land (e.g., northeast side of the South Mountain). Also evaluate the connectivity with forested habitat and buffers of vernal pools on private lands.
 - Monitoring amphibian breeding through egg mass counts
 - Monitoring for the presence of wildlife diseases (e.g., chytrid fungus and Ranavirus) through the use of eDNA.
 - Pilot project for monitoring and developing an effective way to remove an invasive crayfish from targeted vernal pools adjacent to the Mount Cydonia Natural Area.
 - Predicting the potential impacts of climate change on vernal pool communities.
 - Contact Aura Stauffer (astauffer@pa.gov) for more information.
- **Many early successional habitat (ESH) game species (ruffed grouse, woodcock, wild turkey) are declining.** Assistance is needed to determine which treatment methods best help these ESH species.
 - Conduct research to clarify the effects of harvest on grouse/woodcock/turkey populations or other declining young forest species in relation to habitat quality.

- Monitor grouse/woodcock/turkey population response to targeted habitat treatments in order to assess effectiveness of various management approaches
- Contact DCNR biologists Emily Domoto (edomoto@pa.gov) or PGC turkey biologist Mary Jo Casalena (mcasalena@pa.gov) for more information.
- **Coldwater fisheries and species like the brook trout** serve as indicators of higher water quality and the health of the watersheds they inhabit. Potential research topics include:
 - Evaluation of the effectiveness of liming by Trout Unlimited in the Mountain Creek watershed in comparison to a control stream with similar bedrock buffering capacity. This evaluation should include monitoring of the macro-invertebrate community and identification of the mayflies to genus and species, if possible.
 - Prediction of the effects of climate change on increasing water temperatures to coldwater fisheries on the South Mountain. For example, which streams are likely to be the most vulnerable?
 - Evaluation of in-stream and riparian fish habitat, sedimentation and bank erosion problem areas, and barriers to fish passage (e.g., on Central Pennsylvania Conservancy's Letort Spring Garden Preserve). This information could be used to guide future habitat improvement projects.
 - Evaluation of the effects of non-native species (e.g., algae, Japanese knotweed, hemlock wooly adelgid) on trout populations.
 - Evaluation of the effects of the introduction of non-native trout species such as brown and rainbow trout on wild brook trout populations.
 - Contact Fish & Boat commission fisheries biologist Bryan Chikotas (bchikotas@pa.gov) for more information.
- **Research needs from a watershed perspective** and for other water resources such as lakes and warmwater fisheries include:
 - Water quality assessment/monitoring of larger lakes within the South Mountain (e.g., Long Pine Reservoir, Laurel Lake, Fuller Lake).
 - Analysis of most cost-effective methods to improve water quality through stormwater management for watersheds in the Chesapeake Bay.
 - Can the Codorus Creek Mitigation Bank be a model that could be applied in the Potomac Watershed in the Pennsylvania and elsewhere?
 - Prioritize watersheds in Franklin County that need to be improved based on source pollutants and pollutant loading.
 - Summarize best practices for converting turfgrass/lawns to meadow to improve water quality and stormwater retention in a watershed. Develop a public engagement strategy to encourage landowners to participate.
 - Contact Joe Baker (southmountainscience@gmail.com).
- **The dominance of invasive plant species on the South Mountain landscape presents a challenge to land managers and landowners** who want to restore native natural plant communities. Here are some potential research projects:
 - Inventory the presence and monitor for the spread of high-priority invasive plant species such as swallowwort, Japanese angelica tree, Amur Corktree, poison-hemlock, common reed (Phragmites) and wavyleaf basketgrass on nature preserves such as the Mount Holly Preserve or state lands like the Michaux State Forest, Kings Gap, Caledonia, and Mont Alto State

Parks. The information can be used to create Early Detection and Rapid Response plans for these areas

- Develop effective outreach materials for landowners on South Mountain and develop a program to enlist landowner aid in reducing the spread of high-priority species.
- Contact DCNR botanist Kelly Sitch (kesitch@pa.gov).
- Given the unique plant communities within the South Mountain landscape, **several state-listed plant species can be found in this landscape**. Some species require specific management actions to improve the viability of populations. In some cases, little is known about the specific habitat requirements or pollinator relationships that exist for these species.
 - Conduct pollinator visitation surveys for state-listed plant species within South Mountain.
 - Conduct additional botanical surveys for Allegheny chinquapin across the South Mountain landscape.
 - Monitor the success in establishment of native meadow habitats and conduct pollinator surveys to better understand which insect species are using these habitats.
 - Contact DCNR botanist Kelly Sitch (kesitch@pa.gov).
- Because of the high breeding densities of core forest bird species (e.g., scarlet tanagers), **the South Mountain has been designated as an Important Bird Area** by the Audubon Society (see PA Audubon's [Birding Guide to the South Mountain](#)). The South Mountain also provides important stopover habitat for many bird species during migration. Potential projects include:
 - Identify what observational data sets are available for the South Mountain Region (e.g., BBS routes, eBird data, local Audubon Chapters) and determine how these data could be used to guide management on the Michaux State Forest.
 - Monitor bird use of habitat over time on the Michaux State Forest after a prescribed burn. For example, monitoring after a prescribed burn to restore scrub oak barrens habitat.
 - Contact: Aura Stauffer (astauffer@pa.gov)

Reference DCNR Management Plans

Invasive Plants in Pennsylvania. DCNR webpage:

<https://www.dcnr.pa.gov/Conservation/WildPlants/InvasivePlants/pages/default.aspx>.

PA Dept of Conservation & Natural Resources. 2016. [Brook Trout Conservation Plan](#). DCNR Bureau of Forestry, Conservation Science & Ecological Services Harrisburg, PA

Stauffer, Aura. 2016. [Timber Rattlesnake Conservation Strategy for Pennsylvania State Forest Lands](#). Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Harrisburg, PA.

Reference PGC Management Plans

<https://www.pgc.pa.gov/Wildlife/WildlifeSpecies/Turkey/Documents/Pennsylvania%20Wild%20Turkey%20Management%20Plan%202018-2027.pdf>

<https://www.pgc.pa.gov/Wildlife/WildlifeSpecies/Documents/Ruffed%20Grouse%20Management%20Plan%202011-2020.pdf>

https://www.pgc.pa.gov/Wildlife/WildlifeSpecies/AmericanWoodcock/Documents/pa_woodcock_mgmt_plan_final.pdf