

Appendix J. Research and Monitoring Needs Identified by the Taxonomic Advisory Committees

This appendix contains complete lists of research and monitoring needs as identified by the TACs, listed by habitat groups or individual species, as appropriate. They occur in the same taxonomic order as throughout the document, and are alphabetical by habitat group or scientific name within habitat groups.

Fishes

Chowan Fishes

Basic research needs for bridle shiner *Notropis bifrenatus*: life history, distribution

Basic research needs for Roanoke bass *Ambloplites cavifrons*: life history, distribution

Effectiveness of BMPs in improving fish habitats and populations

Chowan Swamp and Impoundment Fishes

Effectiveness of BMPs in improving fish habitats and populations

Clinch-Powell Fishes

Effectiveness of BMPs in improving fish habitats and populations

Delmarva Peninsula Drainage Fishes

Effectiveness of BMPs in improving fish habitats and populations

Holston Fishes

Effectiveness of BMPs in improving fish habitats and populations

Effects of stocking game fish

James Fishes

Bridle shiner *Notropis bifrenatus*: distribution, habitat preferences, etc.

Roughhead shiner *Notropis semperasper*: distribution, habitat preferences, etc.

Effects of stocking game fish

Effectiveness of BMPs in improving fish habitats and populations

James Swamp and Impoundment Fishes

No research or monitoring needs were identified

New River Fishes

Effectiveness of BMPs in improving fish habitats and populations

Effects of stocking game fish

Pee Dee Fishes

Effectiveness of BMPs in improving fish habitats and populations

Piankatank Fishes

No research or monitoring needs were identified

Potomac Fishes

Bridle shiner *Notropis bifrenatus*: distribution, habitat preferences, etc.

Effectiveness of BMPs in improving fish habitats and populations

Effects of stocking game fish

Rappahannock Fishes

Bridle shiner *Notropis bifrenatus*: distribution, habitat preferences, etc.
Effectiveness of BMPs in improving fish habitats and populations
Effects of stocking game fish

Roanoke Fishes

Effectiveness of BMPs in improving fish habitats and populations
Effects of stocking game fish
Life history, habitat needs and feasibility of habitat restoration for orangefin madtom *Noturus gilberti*
Possible interactions between Roanoke bass *Ambloplites cavifrons* and rock bass *A. rupestris*
Status and distributional surveys for the bigeye jumprock *Scartomyzon ariommus*, Carolina darter *Etheostoma collis*, and orangefin madtom *Noturus gilberti*

York Fishes

Effectiveness of BMPs in improving fish habitats and populations
Effects of stocking game fish
Potential effects of King William reservoir construction on fish species in affected area of the Pamunkey River

Herpetofauna

Coastal Plain Aquatic Herpetofauna

Life history studies needed for the following species:
Mudsnake *Farancia abacura*
Rainbow snake *Farancia erythrogramma*
Northern diamond-backed terrapin *Malaclemys terrapin*
Dwarf waterdog *Necturus punctatus*
Eastern mud salamander *Pseudotriton montanus*
Glossy crayfish snake *Regina rigida*
Greater siren *Siren lacertina*
Lesser siren *Siren intermedia*
Many-lined salamander *Stereochilus marginatus*

Coastal Plain Wetland-, Forest-, or Sandy or Friable Soils-related Herpetofauna

Effects of mosquito control measures
Effects of pet trade on eastern box turtle *Terrapene carolina* and spotted turtle *Clemmys guttata*
Effects of sprawl (especially forest loss)
Life history and distribution studies needed for the following species:
Carpenter frog *Rana virgatipes*
Little grass frog *Pseudacris ocularis*
Striped southern chorus frog *Pseudacris nigrita*
Spotted turtle *Clemmys guttata*
Chicken turtle *Deirochelys reticularia*
Canebrake rattlesnake *Crotalus horridus*
Eastern box turtle *Terrapene carolina*
Queen snake *Regina septemvittata*
New Jersey Chorus Frog *Pseudacris feriarum*
Eastern glass lizard *Ophisaurus ventralis*
Eastern slender glass lizard *Ophisaurus attenuatus*
Eastern spadefoot *Scaphiopus holbrooki*
Scarletsnake *Cemophora coccinea*
Eastern hog-nosed snake *Heterodon platirhinos*

Mount Rogers Area Herpetofauna

Effects of acid deposition/climate changes
Effects of horses and other recreational use of habitat (trampling, soil compaction, etc.)
Population sizes and trends
Temperature monitoring

Mountain Forest Herpetofauna

Effects of horse and other recreational use of habitat (trampling, soil compaction, etc.)
Population sizes and trends
Overall distribution and life history, demographics, population connectivity (gene flow) for all the species in the habitat group

Statewide

Effects of pet trade on eastern box turtle *Terrapene carolina* and spotted turtle *Clemmys guttata*
Effects of sprawl (especially forest loss)
Distribution and life history studies

Tennessee and New Drainage Herpetofauna

Impacts of compounds found in water (reproduction, overall health, etc.)
Presence and impacts of compounds present following treatment of wastewater

West Piedmont Upland Herpetofauna

Distribution and life history studies
Effects of pet trade on eastern box turtle *Terrapene carolina* and spotted turtle *Clemmys guttata*
Effects of sprawl (especially forest loss)

Birds

Barrier Island and Beach Birds

Assess reproductive success and rates
Determine effects of flame retardant levels
Evaluate the role of aquaculture
Institute higher frequency of monitoring (more frequently than once every 10 years)
Investigate the role of mercury levels in piscivores

Coastal Marsh Birds

Conduct statewide wading bird breeding surveys every three to five years
Conduct studies on potential displacement of solitary marsh nesters (American oystercatcher *Haematopus palliatus*, clapper rail *Rallus longirostris*, American black duck *Anas rubripes*, etc.) by double-crested cormorants *Phalacrocorax auritus* and brown pelicans *Pelecanus occidentalis*
Determine current status and distribution
Investigate the effects of structural changes to habitat on bird biology, communities, and populations
Increase all monitoring of these species (very little currently occurs)
Monitor mute swans
Perform targeted surveys for rails

Early Successional Birds

Research effects of biocides on vital rates of birds

Grassland Birds

No research or monitoring needs were identified

High-elevation Coniferous Forest Birds

Assess status of these habitats
Develop long-term monitoring protocols
Gather baseline data
Gather historical data
Identify the effects of acid precipitation
Perform targeted surveying

High-elevation Deciduous Forest Birds

Develop long-term monitoring protocols
Gather baseline data
Gather historical data
Perform targeted surveying

Mature Deciduous Forest Birds

Conduct targeted nightjar (family Caprimulgidae) surveys
Current monitoring (BBS) is adequate except for whip-poor-will *Caprimulgus vociferus*
Investigate the effects of exotic vegetation on these species

Pine Savannah Birds

No research or monitoring needs were identified

Wooded Wetland Birds

Increased monitoring for these species in this habitat type (BBS is adequate for most of these species, but this habitat type may not be well-covered)

Purple Sandpiper *Calidris maritima*

Conduct targeted surveys

Bicknell's Thrush *Catharus bicknelli*

Conduct targeted monitoring at fall banding stations

Wayne's Warbler *Dendroica virens waynei*

Conduct targeted surveys

Peregrine Falcon *Falco peregrinus*

Continue coastal monitoring
Increase mountain monitoring

Bald Eagle *Haliaeetus leucocephalus*

Monitor shoreline concentration areas

Loggerhead Shrike *Lanius ludovicianus*

Conduct targeted surveys
Gather historical data

Black Rail *Laterallus jamaicensis*

Conduct targeted surveys

Appalachian Bewick's Wren *Thryomanes bewickii altus*

Conduct targeted surveys
Gather historical data

Eastern Kingbird *Tyrannus tyrannus*

Investigate the effects of loss of honeybees

Golden-winged Warbler *Vermivora chrysoptera*

Conduct targeted surveys
Gather historical data

Mammals

Eastern Big-eared Bat *Corynorhinus rafinesquii macrotis*

Assess possible effects of wind energy projects
Develop a year-round standardized monitoring program
Distributional surveys are needed (especially of maternity roosts)

Virginia Big-eared Bat *Corynorhinus townsendii virginianus*

Acquire telemetry data from past research (V. Dalton and C. Stihler)
Analyze genetics to resolve taxonomy
Assess possible effects of wind energy projects
Locate additional summer maternity sites
Maintain current species monitoring efforts
Monitor abiotic factors in caves

Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus*

Assess population genetics
Evaluate effects of parasites

Virginia Northern Flying Squirrel *Glaucomys sabrinus fuscus*

Assess population genetics
Evaluate effects of parasites
Survey private property and past sites that are not regularly visited

Snowshoe Hare *Lepus americanus*

Increase population monitoring efforts
Locate remaining populations

Fisher *Martes pennanti*

Survey using bait stations and remote cameras

Southern Rock Vole *Microtus chrotorrhinus*

Continue surveys and include as a part of larger survey efforts
Use remote sensing and GIS to identify potential habitat

Least Weasel *Mustela nivalis*

Determine specific threats
Perform targeted surveys to assess population levels

Southeastern Myotis *Myotis austroriparius*

Check for contamination through blood testing of wild caught specimens
Continue inventory efforts to determine range and habitat needs
Monitor known sites

Gray Myotis *Myotis grisescens*

Assess possible effects of wind energy projects
Determine bachelor colony sites and movements
Increase monitoring of abiotic cave factors
Locate and characterize winter hibernacula
Maintain present species monitoring efforts

Eastern Small-footed Myotis *Myotis leibii*

- Add known hibernacula to present bat monitoring efforts
- Assess possible effects of wind energy projects
- Conduct targeted summer surveys
- Evaluate the effects of pesticides on this species and its prey
- Identify and monitor important cave abiotic factors
- Increase monitoring of cave abiotic factors
- Locate and characterize summer maternity colonies

Indiana Myotis *Myotis sodalis*

- Assess possible effects of wind energy projects
- Evaluate the effects of pesticides on this species and its prey
- Identify and monitor important cave abiotic factors
- Locate and characterize summer maternity colonies
- Maintain current monitoring efforts

Allegheny Woodrat *Neotoma magister*

- Conduct distribution surveys (continuation of Mengak's work)
- Evaluate parasite epidemiology

Pungo White-footed Mouse *Peromyscus leucopus easti*

- Survey Eastern Shore and Back Bay NWR to state line

Cotton Mouse *Peromyscus gossypinus*

- Determine distribution and habitat requirement
- Use remote sensing and GIS to identify potential habitat using historical data

Delmarva Fox Squirrel *Sciurus niger cinereus*

- Collect hair samples for DNA analyses
- Monitor existing populations and future translocated populations using spring trapping, nest boxes, and infrared cameras
- Request sighting information from landowners and hunters

Southeastern Fox Squirrel *Sciurus niger niger*

- Conduct status and distribution surveys
- Evaluate use of nest boxes
- Follow-up on reported sightings

Long-tailed Shrew *Sorex dispar*

- Conduct targeted surveys to assess status
- This species is similar to rock voles in terms of habitat, but not much is known (life history, etc.)

Dismal Swamp Southeastern Shrew *Sorex longirostris fisheri*

- Distribution and status surveys needed

Southern Water Shrew *Sorex palustris*

- Determine threats to this species
- Use remote sensing and GIS to identify potential habitats

Eastern Spotted Skunk *Spilogale putorius*

- Perform targeted surveys to determine habitat needs, distribution and status
- Use remote camera surveys where appropriate

Southern Bog Lemming *Synaptomys cooperi*

- Distribution surveys needed

Appalachian Cottontail *Sylvilagus obscurus*

Need updated distribution surveys including eastern cottontail

Marsh Rabbit *Sylvilagus palustris*

Increase overall monitoring

Perform status and distribution surveys

General Mussel Research Needs

Resolve taxonomy of the lances, genus *Elliptio*

Mussels

Clinch Mussels

Assess amount and composition of metals released during power generation

Assess composition of leachate from dumps associated with power generation facilities

Assess effectiveness of BMPs in improving mussel habitat

Evaluate effects of by-products from coal processing

Evaluate presence and impacts of compounds found in treated wastewater (i.e. pharmaceuticals and hormones)

Holston Mussels

Assess amount and composition of metals released in power generation

Assess biocide pollution levels of streams and their impacts

Assess composition of leachate from dumps associated with power generation facilities

Assess effectiveness of BMPs in improving mussel habitat

Evaluate effects of by-products from coal processing

Evaluate levels and causes of bacterial infections and the lethality of infestation

Evaluate levels and causes of parasite infections and the lethality of infestation

Evaluate presence and impacts of compounds found in treated wastewater (i.e. pharmaceuticals and hormones)

Research the effects of toxins released by small industry

Powell Mussels

Assess effectiveness of BMPs in improving mussel habitat

Assess the amount composition of metals released in power generation

Evaluate the effects of by-products from coal processing on mussels

Evaluate the presence and impacts of compounds found in treated wastewater (i.e. pharmaceuticals and hormones)

Assess the composition of leachate from dumps associated with power generation facilities

Dwarf Wedgemussel *Alasmodonta heterodon*

Identify minimum in-stream flow requirements

Alewite Floater *Anodonta imbecilis*

Investigate amount of sediment reduction necessary to see positive effect on mussel community

Roanoke Slabshell *Elliptio roanokensis*

Determine distribution in small watersheds

Determine minimum flow requirements

Monitor water quality during storm events

Yellow Lampmussel *Lampsilis cariosa*

Investigate amount of sediment reduction necessary to see positive effect on mussel community

Virginia Pigtoe *Lexingtonia subplana*

Resolve taxonomy issues

James spinymussel *Pleurobema collina*

Assess impacts of homeowner education

Determine distribution in small watersheds

Determine minimum flow requirements

Investigate amount of sediment reduction necessary to see positive effect on mussel community

Investigate effects of creosote from wood bridges on aquatic organisms

Investigate impacts of road salt on aquatic organisms

Monitor water quality during storm events