

Appendix I. Conservation Actions Identified by the Taxonomic Advisory Committees

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

Fishes

Big Sandy Fishes

Engage DMME/OSM and coal companies on containment and contaminant reduction strategies,
enforcement of existing regulations
Facilitator/liaison between landowners and programs
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increase hazmat response
Increased oversight and enforcement by DEQ
Stream channel restoration
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
DOF enforcement, engaging private, small foresters
Work with county boards and planning groups on all issues including sustainable development

Chowan Fishes

Facilitator/liaison between landowners and programs
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increase hazmat response
Increased oversight and enforcement by DEQ
Restructuring and providing landowner incentive program
Stream channel restoration
DOF enforcement, engaging private, small foresters
Work with county boards and planning groups on all issues including sustainable development
Work with forestry companies to alter current practices

Chowan Swamp and Impoundment Fishes

Better control of stocking grass carp (DGIF Fisheries)
Facilitator/liaison between landowners and programs
Implementation of agricultural BMPs
Implementation of forestry BMPs
Landowner education (vegetation control)
Landowner incentive program implementation
Permitting for installation of dams (USACE/VMRC)
Restructuring and providing landowner incentive program
Stricter regulations on bait shops, pet shops, etc.

Clinch and Powell Fishes

Engage DMME/OSM and coal companies on containment and contaminant reduction strategies,
enforcement of existing regulations
Facilitator/liaison between landowners and programs
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increase hazmat response
Increased oversight and enforcement by DEQ
Landowner incentive program implementation

Restructuring and providing landowner incentive program
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
DOF enforcement, engaging private, small foresters
Work with county boards and planning groups on all issues, including sustainable development

Delmarva Peninsula Drainage Fishes

Agricultural BMPs
Control population growth (zoning, etc.)
Facilitator/liaison between landowners and programs
Increase hazmat response
Increased oversight and enforcement by DEQ
Restructuring and providing landowner incentive program
Stream channel restoration
Work with county boards and planning groups on all issues, including sustainable development

Holston Fishes

Facilitator/liaison between landowners and programs
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increase hazmat response
Increased oversight and enforcement by DEQ
Restructuring and providing landowner incentive program
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
DOF enforcement, engaging private, small foresters
Work with county boards and planning groups on all issues including sustainable development

James Fishes

DEQ oversight/change of permit limits
Facilitator/liaison between landowners and programs
Fish passages/dam removals
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increase hazmat response
Increased enforcement by DEQ
Restructure and provide landowner incentive program
Spawning habitat improvements (spawning reefs)
Sturgeon restoration (especially Atlantic sturgeon *Acipenser oxyrinchus*)
Stream channel restoration
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
DOF enforcement, engaging private, small foresters
Water conservation education
Work with county boards and planning groups on all issues, including sustainable development

James Swamp and Impoundment Fishes

Better control of stocking of grass carp (DGIF fisheries)
Implementation of agricultural BMPs
Implementation of forestry BMPs
Landowner education (vegetation control)
Landowner incentive program implementation
Permitting for installation of dams (USACE/VMRC)
Stricter regulations on bait shops, pet shops, etc.
DOF enforcement, engaging private, small foresters

New River Fishes

DEQ oversight/change of permit limits
Fish passages/dam removals
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increased enforcement by DEQ
Increase hazmat response
Stream channel restoration
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
Water conservation education
Work with county boards and planning groups on all issues, including sustainable development

Pee Dee Fishes

Facilitator/liaison between landowners and programs
Implementation of agricultural BMPs
Implementation of forestry BMPs
Restructure and provide landowner incentive program
Stream channel restoration
DOF enforcement, engaging private, small foresters

Potomac Fishes

DEQ oversight/change of permit limits
Facilitator/liaison between landowners and programs
Fish passages/dam removals
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increased enforcement by DEQ
Increase hazmat response
Logperch restoration
Restructure and provide landowner incentive program
Spawning habitat improvements (spawning reefs)
Sturgeon restoration (especially Atlantic sturgeon *Acipenser oxyrinchus*)
Stream channel restoration
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
DOF enforcement, engaging private, small foresters
Water conservation education
Work with county boards and planning groups on all issues, including sustainable development

Roanoke Fishes

DEQ oversight/change of permit limits
Facilitator/liaison between landowners and programs
FERC relicensing for dams: opportunity to work with fed agencies
Fish passages/dam removals
Floodplain reclamation
Habitat assessment and reintroduction of Roanoke logperch
Increased enforcement by DEQ
Increase hazmat response
No further dam construction
Protection and establishment of riparian buffers and greenspace
Orangefin madtom *Noturus gilberti* habitat restoration
Restructure and provide landowner incentive program
Stream channel restoration
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations

DOF enforcement, engaging private, small foresters
Water conservation education
Work with county boards and planning groups on all issues, including sustainable development

Rappahannock Fishes

DEQ oversight/change of permit limits
Facilitator/liaison between landowners and programs
Fish passages/dam removals
Implementation of agricultural BMPs
Implementation of forestry BMPs
Increased enforcement by DEQ
Increase hazmat response
Restructure and provide landowner incentive program
Spawning habitat improvements (spawning reefs)
Sturgeon restoration (especially Atlantic sturgeon *Acipenser oxyrinchus*)
Stream channel restoration
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
DOF enforcement, engaging private, small foresters
Water conservation education
Work with county boards and planning groups on all issues, including sustainable development

York Fishes

DEQ oversight/change of permit limits
Facilitator/liaison between landowners and programs
Fish passages/dam removals
Increased enforcement by DEQ
Increase hazmat response
Oppose King William Reservoir; advocate constraints on water withdrawal for reservoir
Restructure and provide landowner incentive program
Spawning habitat improvements (spawning reefs)
Sturgeon restoration (especially Atlantic sturgeon)
Stream channel restoration
Stricter regulations on bait shops, pet shops, etc.
Upgrade wastewater treatment plants, enforcement and compliance, review of current regulations
DOF enforcement, engaging private, small foresters
Water conservation education
Work with county boards and planning groups on all issues, including sustainable development

Herpetofauna

Coastal Plain Aquatic Herpetofauna

Education of city and county land planners (PDC)
Enforcement of pollution regulations (takes and pollution)
Increased education and implementation of BMPs (agricultural and urban)
Increased land use planning (reduction of sprawl)
Land acquisition
Review and implement applicable PARC habitat management guidelines when available
Review of land use changes and prediction of future changes to prioritize areas for conservation
Wildlife crossings (underpasses, fences, etc.)

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

Avoid indiscriminant mosquito control measures
Education of city and county land planners (PDC)
Enforcement and prosecution of pollution regulations (takes and pollution)

Habitat restoration (fire maintained communities)
Increased education and implementation of BMPs (agricultural and urban)
Increased land use planning (reduction of sprawl) [important]
Land acquisition (important)
Population enhancement/augmentation
Review and implement applicable PARC habitat management guidelines when available
Review of land use changes and prediction of future changes to prioritize areas for conservation
Review regulations at Dulles airport (shipments of box turtle *Terrapene carolina* and spotted turtles *Clemmys guttata*)
Time of year restrictions on discing of unpaved roads
Wildlife crossings (underpasses, fences, etc.)

Mountain Forest Herpetofauna

DGIF permitting follow-through
Education
Enforcement
Habitat restoration (fire-maintained communities)
Land use planning for private lands (residential development)
Review and implement applicable PARC habitat management guidelines when available
Work with USFS and NPS to amend forestry practices and recreational use

Mount Rogers Area Herpetofauna

Education on private land issues (Christmas tree plantations, pesticides, agriculture)
Overall review of species (landscape scale, comprehensive)
Review and implement applicable PARC habitat management guidelines when available
Review USFS National Forest plans

Tennessee River Drainage Aquatic Herpetofauna

Agricultural BMP implementation
DEQ enforcement of environmental regulations
Education (landowners, PDC)
Education (landowners, PDC) on sedimentation
Education and enforcement
Enforcement and compliance of wastewater regulations
Enforcement of existing mining regulations
Engage DMME/OSM and coal companies on containment and contaminant reduction strategies
Engage private, small foresters
Increase hazmat response
Review and implement applicable PARC habitat management guidelines when available
Review forestry permit review processes
Review of current wastewater regulations
Stormwater management
Upgrade wastewater treatment plants
Urban BMP implementation
DOF enforcement of logging rules
Work with VDOT and railways re: possible solutions to frequency of spills

Western Piedmont Upland Herpetofauna

Education of city and county land planners (PDC)
Enforcement and prosecution (takes and pollution)
Increased education and implementation of BMPs (agricultural and urban)
Land acquisition
Review and implement applicable PARC habitat management guidelines when available
Review of land use changes and prediction of future changes to prioritize areas for conservation and population enhancement or augmentation
Review regulations at Dulles airport (shipments of box turtles *Terrapene carolina*)

Increased land use planning (reduction of sprawl)
Time of year restrictions on disking of unpaved roads
Wildlife crossings (underpasses, fences, etc.)

Bog Turtle *Glyptemys muhlenbergii*

Landowner education regarding the protection of wetlands
Enforcement and prosecution (takes)
Implementing BMPs and/or PARC habitat management guidelines

Birds

Barrier Island and Beach Birds

Carbon sequestration
Limit human access during appropriate season
Predator removal
Public education regarding needs of nesting birds on islands (not encroaching on colonies during breeding)
Use dredge spoil material to create artificial islands

Coastal Marsh Birds

Create dredge spoil material islands/marshes
Develop and implement an urban waterbird management plan
Forest buffers and other upland management of areas surrounding marsh
High marsh management
Manage for maritime forest (pine areas surrounding marshes)
Map non-native *Phragmites* stands
Phragmites removal
Predator control
Restore eroding marsh islands

Early Successional Birds

Alteration of management dynamics and regime
Better Farm Bill incentives (more science)
Farm Bill: hedgerow incentives
Lower stocking density after cutting
Restore warm season grasses, may include fire regime
Work with wealthy landowners for management of large tracts of private land

Grassland Birds

Acquire land
Better Farm Bill incentives (more science)
Pasture management: alter haying rotation and timing
Protect and/or improve large habitat patches
Protect farms in northern Virginia from development
Restore warm season grasses, may include fire regime
Work with wealthy landowners for management of large tracts of private land

High-elevation Coniferous Forest Birds

Acquire and restore habitat
Conserve existing stands
Coordinate with USFS regarding fire regime and land management
Improve existing habitat by linking existing habitat islands

High-elevation Deciduous Forest Birds

Conserve existing stands
Elevational constraints on development

Exotic species control and/or removal
Improve existing stands
Modify forestry practices to include uneven-aged forest management

Mature Deciduous Forest Birds

Better landscape mgmt: location of cuts, taking the landscape matrix into account when planning management
Deer management (reduce populations/increase doe days)
Educate/inform PDCs of greenspace benefits
Uneven-aged forest management

Pine Savannah Birds

Acquisition of habitat
Creation of habitat
Frequent burning of mature forest or herbicide application
Improvement of habitat
Lower stocking densities after cutting
Thinning in plantation settings
Uneven-aged, mature forest management

Wooded Wetland Birds

Acquisition of remaining habitat and upland buffer
Continue or increase conservation easements
Implement BMPs
Removal of exotic predators (domestic cats)
Restore forest structural conditions
Restore hydrologic conditions

Henslow's Sparrow *Ammodramus henslowii*

High marsh management
Removal of *Phragmites*

Purple Sandpiper *Calidris maritima*

Increase rock/riprap outcrops around coastal bridges (such as the Chesapeake Bay Bridge-Tunnel)

Bicknell's Thrush *Catharus bicknelli*

Coastal conservation actions (multiple forested habitats)

Cerulean Warbler *Dendroica cerulea*

Prepare a conservation plan

Wayne's Warbler *Dendroica virens waynei*

Restoration of Atlantic white cedar *Chamaecyparis thyoides* swamps

Peregrine Falcon *Falco peregrinus*

Increase mountain populations
Move structure-nesting young to mountains

Black Rail *Laterallus jamaicensis*

High marsh management
Removal of *Phragmites*

Northern rough-winged swallow *Stelgidopteryx serripennis*

Create artificial banks

Mammals

Eastern Big-eared Bat *Corynorhinus rafinesquii macrotis*

Erect structures that will provide alternative roosts for this species in proximity to known habitat
Increase bottomland habitat
Land acquisition/easements/agreements to preserve old buildings or other known sites
Long-term management allowing forest to mature to size necessary for roost trees to occur
Maintain large trees and artificial habitats known to be occupied
Preservation or creation of old buildings and structures
Purchase land and/or place protective easements on properties with good quality roost habitat
Work with forestry companies to eliminate destruction of mature bottomland hardwood forests
Work with industry and power companies to eliminate mercury and other heavy metals in emissions

Virginia Big-eared Bat *Corynorhinus townsendii virginianus*

Land acquisition/easements for ground water protection
Maintain current protection (two primary sites are currently protected)

Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus*

Improve air quality (NO_x, SO_x, CO_x)
Improve habitat connectivity via corridors
Maintain and expand spruce/fir forest through reforestation

Virginia Northern Flying Squirrel *Glaucomys sabrinus fuscus*

Acquisition of or easements on additional spruce forest areas
Improve habitat connectivity via corridors
Maintain and expand spruce/fir forest through reforestation

Snowshoe Hare *Lepus americanus*

Management for dense understory
Timber harvest and thinning

Fisher *Martes pennanti*

Reintroduction to appropriate sites

Southern Rock Vole *Microtus chrotorrhinus*

Cooperative conservation agreements with Forest Service
Investigate USFS management plan
Land acquisition and/or easement
Maintain forest cover with appropriate rocky substrates (talus, slate)

Southeastern Myotis *Myotis austroriparius*

Conservation easements on habitat
Enforce and improve regulations on chemical applications
Enforce and improve regulations for limiting toxins
Enforce regulations on power plants and other sources of atmospheric metals
Look for alternatives to the more harmful insecticides
Purchase properties with appropriate habitat whenever possible
Work with localities to restrict development in bottomland habitats
Work with timber companies to protect large bottomland forest tracts
Work with landowners for conservation easements

Gray Myotis *Myotis grisescens*

Cave gating
Cooperation with Bristol officials on culvert maintenance and construction
Land acquisition/easements for ground water protection
Time of year restrictions on culvert maintenance

Eastern Small-footed Myotis *Myotis leibii*

Cave gating
Cooperation from speleological groups
Land acquisition/easements for ground water protection

Allegheny Woodrat *Neotoma magister*

Protection of cliff sites/talus slopes/boulder fields

Pungo White-footed Mouse *Peromyscus leucopus easti*

Eliminate development impinging on dune habitat
Restoration of back dune habitat
Work with agencies to promote habitat

Delmarva Fox Squirrel *Sciurus niger cinereus*

Development of Habitat Conservation Plans, Safe Harbor agreements, conservation easements, stringent zoning laws, and farmland protection programs with strong wildlife conservation incentives
Forest pest management and control
Implementation of squirrel-friendly timber harvesting practices
Land acquisition by conservation agencies
Maintain connectivity between habitat patches
Speed bumps, signage and minimizing new road construction

Southeastern Fox Squirrel *Sciurus niger niger*

Habitat restoration through controlled burns and thinning of understory
Land acquisition of and easements on old growth pine habitats

Dismal Swamp Southeastern Shrew *Sorex longirostris fisheri*

Maintain current forestry practices for early successional habitats

Southern Water Shrew *Sorex palustris*

Cooperative conservation agreements with Forest Service
Investigate USFS management plan
Land acquisition or easements adjacent to Laurel Forks
Maintain riparian forest buffers around streams

Eastern Spotted Skunk *Spilogale putorius*

Reduce possibility of striped skunk introductions

Appalachian Cottontail *Sylvilagus obscurus*

Increase in timber harvest at elevation
Maintain brushy understory

Marsh Rabbit *Sylvilagus palustris*

Land acquisition and/or easement
Maintain and restore forested wetland habitat

Southern Bog Lemming *Synaptomys cooperi*

Maintain current forestry practices for early successional habitats

Mussels

Atlantic Slope Mussels

Determine and set minimum in-stream flows
Fish passage and removal of useless dams
Limit amount of impervious surfaces
Implement BMPs
Storm water management controls

Clinch Mussels

BMP implementation and education
DEQ enforcement, monitoring, and oversight of water regulations
DMME and OSM enforcement of existing regulations
Education of landowners, developers, and PDCs
Enforcement of and compliance with current wastewater regulations
Engage DMME, OSM, and coal companies on containment and contaminant reduction strategies
Engage private, small foresters
Increase hazmat response
Muskrat control
Permit review
Regulatory enforcement
Removal of dams or installation of fish passages
Restore stream flow
Review of current wastewater regulations
Upgrade wastewater treatment plants
Stormwater management
Work with VDOT and railways regarding possible solutions to spills of pollutants
DOF enforcement of forestry regulations

Holston Mussels

BMP implementation and education
DEQ enforcement, monitoring, and oversight of water regulations
DMME and OSM enforcement of existing regulations
Education of landowners, developers, and PDCs
Enforcement of and compliance with current wastewater regulations
Engage DMME, OSM, and coal companies on containment and contaminant reduction strategies
Engage private, small foresters
Increase hazmat response
Muskrat control
Permit review
Regulatory enforcement
Removal of dams or installation of fish passages
Restore stream flow
Review of current wastewater regulations
Upgrade wastewater treatment plants
Stormwater management
Work with VDOT and railways regarding possible solutions to spills of pollutants
DOF enforcement of forestry regulations

New River Mussels

DEQ enforcement or water regulations
Education and implementation of BMPs
Education of homeowners
Education of PDCs and developer regarding stormwater management
FERC relicensing
Increase hazmat response

Minimum and peak flow controls
Stormwater management

Powell Mussels

BMP implementation and education
DEQ enforcement, monitoring, and oversight of water regulations
DMME and OSM enforcement of existing regulations
Education of landowners, developers, and PDCs
Enforcement of and compliance with current wastewater regulations
Engage DMME, OSM, and coal companies on containment and contaminant reduction strategies
Engage private, small foresters
Increase hazmat response
Muskrat control
Permit review
Regulatory enforcement
Removal of dams or installation of fish passages
Restore stream flow
Review of current wastewater regulations
Upgrade wastewater treatment plants
Stormwater management
Work with VDOT and railways regarding possible solutions to spills of pollutants
DOF enforcement of forestry regulations

Southeastern Coastal Plain and Lower Piedmont Mussels

Beaver control
Dam removal and fish passage installation
DEQ enforcement of water regulations
Designate minimum flows
Education of PDCs and developers regarding stormwater management
Habitat improvement
Homeowner education
Implementation of and education about BMPs
Increase hazmat response
More efficient use of water
Population augmentation
Sediment load reduction
Stormwater management
Replace wood bridges
Reduce salt application to roadways

Aquatic Crayfish (specifically *Orconectes erichsonianus* and *O. forceps*)

Education the public regarding native crayfishes
Regulate invasive species