

## **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/liasion 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/liasion 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/liasion 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/liasion 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/liasion 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/liasion 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 discing 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<sub>x</sub>, SO<sub>x</sub>, CO<sub>x</sub>)  
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