

Appendix H. Threats to Virginia's Species of Greatest Conservation Need

The following tables include data gathered from the TACs regarding stresses on Virginia's species of greatest conservation need. See Chapter 2 for details on how this information was gathered.

Appendix H1. Stresses on Virginia's fishes as identified by Fish TAC (2004). See Chapter 2 for descriptions of scope and severity ("U" indicates "unknown", "?" indicates a questionable value, generally for a stress or source that is poorly known).

Stress	Source of Stress	Scope	Severity	Stress Comments
Big Sandy				
Hydrologic regime alteration	Industrial - mineral extraction	4	2	Stream subsidence (dewatering)
Organic pollutants	Industrial - mineral extraction	3	3?	
Sediment load alteration	Industrial - mineral extraction	3	3	
Turbidity alteration	Industrial - mineral extraction	3	2	
Habitat fragmentation	Industrial - mineral extraction	2	3	Disjunct populations caused by water quality issues
Habitat fragmentation	Industrial - power generation	2	3	
Sediment load alteration	Forestry	2	3	
Organic pollutants	Industrial - rights-of-way	2	2	Roads and railways
Nutrient input regime alteration	Municipal development	2	1	Wastewater treatment plants; straight pipes
Turbidity alteration	Forestry	2	1	
pH regime alteration	Industrial - mineral extraction	1	4	Acid mine drainage
Toxins	Industrial - other	1	4	Spills (roads and rails); accidents at industrial sites
Channel or shoreline alteration	Municipal development	1	3	
Channel or shoreline alteration	Other land management	1	3	Landowner in stream
Metals	Industrial - power generation	1	3	
Sediment load alteration	Municipal development	1	3	
Habitat fragmentation	Municipal development	1	2	Wastewater treatment plants
Habitat fragmentation	Industrial - other	1	2	Remnant mill dams
Turbidity alteration	Municipal development	1	2	Road building/bridges
Herbicides and fungicides	Industrial - rights-of-way	1	1	Roads and rails
Organic matter input regime alteration	Forestry	1	1	
Other toxins	Industrial - mineral extraction	1	U	Products of coal processing
Other toxins	Municipal development	U	U	Pharmaceuticals and their by-products
Complications due to small populations	Source not appropriate	U	U	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Metals	Industrial - mineral extraction	U	U	
Chowan				
Sediment load alteration	Forestry	4	3	
Herbicides and fungicides	Agriculture	4	2	
Insecticides	Agriculture	4	2	
Competition	Exotic or introduced species	4?	U	Effect of rock bass on Roanoke bass
Toxins	Agriculture	3	4	Pig farm lagoon spills
Sediment load alteration	Agriculture	3	3	
Dissolved oxygen regime alteration	Agriculture	3	2	Pig farms
Nutrient input regime alteration	Agriculture	3	2	Pig farms
Turbidity alteration	Industrial-mineral extraction	2	3	Gravel, titanium?, unknown possible impacts
Hydrologic regime alteration	Industrial-other	1	3	Water supply dam (Victoria)
Nutrient input regime alteration	Industrial-other	1	3	Paper mills
Turbidity alteration	Industrial-other	1	3	Paper mills
Dissolved oxygen regime alteration	Industrial-other	1	2	Paper mills
Hydrologic regime alteration	Municipal development	1	2	Water supply, extraction, potential for VA Beach water supply issues
Nutrient input regime alteration	Municipal development	1	2	Franklin, Emporia
Organic pollutants	Industrial-other	1	2	Paper mills
Sediment load alteration	Municipal development	1	2	Franklin, Emporia
Toxins	Municipal development	1	2	Franklin, Emporia
Chowan (lakes, ponds, and small impoundments)				
Hydrologic regime alteration		4	4	Dam failure (mill dams) and dam removal (beavers)
Habitat fragmentation		4	4	Dams
Habitat destruction	Exotic or introduced species	3	4	Grass carp alteration of vegetation
Herbicides and fungicides	Recreational use of habitat	3	4	Removing vegetation for pond access
Predation	Exotic or introduced species	3	3	Usually combined with habitat alteration
Herbicides and fungicides	Agriculture	3	2	
Insecticides	Agriculture	3	2	
Sediment load alteration	Forestry	3	1	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Clinch-Powell				
Sediment load alteration	Agriculture	4	3	
Channel or shoreline alteration	Agriculture	4	2	
Hydrologic regime alteration	Industrial-mineral extraction	4	2	Stream subsidence (dewatering); smaller streams
Turbidity alteration	Agriculture	4	2	
Organic pollutants	Industrial-mineral extraction	3	3?	
Sediment load alteration	Industrial-mineral extraction	3	3	
Turbidity alteration	Industrial-mineral extraction	3	2	Gypsy moth, study in WV found no effects
Habitat fragmentation	Industrial-mineral extraction	2	3	Disjunct populations caused by water quality issues
Habitat fragmentation	Industrial-power generation	2	3	
Sediment load alteration	Forestry	2	3	
Organic pollutants	Industrial-rights-of-way	2	2	Roadways and rails
Nutrient input regime alteration	Agriculture	2	1	
Nutrient input regime alteration	Municipal development	2	1	Wastewater treatment plants; straight pipes
Organic matter input regime alteration	Agriculture	2	1	
Turbidity alteration	Forestry	2	1	
pH regime alteration	Industrial-mineral extraction	1	4	Acid mine drainage
Toxins	Industrial-other	1	4	Spills (roads and rails), accidents at industrial sites
Channel or shoreline alteration	Municipal development	1	3	
Channel or shoreline alteration	Other land management	1	3	Landowners bulldozing in streams
Metals	Industrial-power generation	1	3	
Habitat fragmentation	Municipal development	1	2	Wastewater treatment plants
Habitat fragmentation	Industrial-other	1	2	Remnant mill dams
Herbicides and fungicides	Agriculture	1	2	
Turbidity alteration	Municipal development	1	2	Road building/bridges
Herbicides and fungicides	Industrial-rights-of-way	1	1	Roads and rails
Organic matter input regime alteration	Forestry	1	1	
Other toxins	Industrial-mineral extraction	1	U	Products of coal processing
Complications due to small populations	NA	U	U	Species-specific
Metals	Industrial-mineral extraction	U	U	
Other toxins	Municipal development	U	U	Pharmaceuticals and drugs in wastewater
Delmarva				
Organic matter input regime alteration	Agriculture	4	4	Poultry, tomatoes
Nutrient input regime alteration	Agriculture	4	4	Poultry, tomatoes

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Dissolved oxygen regime alteration	Agriculture	4	3	Poultry, tomatoes
Herbicides and fungicides	Agriculture	4	3	Poultry, tomatoes
Insecticides	Agriculture	4	3	Tomatoes and other crops
Nutrient input regime alteration	Municipal development	2	3	Septic systems
Channel and shoreline alteration	Municipal development	2	2	Installation of bulkheads
Herbicides and fungicides	Industrial-rights-of-way	2	1	Roads and rails
Organic pollutants	Industrial-rights-of-way	2	1	Roads and rails
Toxins	Industrial-other	2	1	Spills (roadways and rails)
Holston				
Sediment load alteration	Agriculture	4	3	
Turbidity alteration	Agriculture	4	2	
Herbicides and fungicides	Agriculture	3	2?	Row crops
Insecticides	Agriculture	3	2?	Row crops
Channel or shoreline alteration	Agriculture	3	2	
Metals	Industrial-other	3	2	Past industry at Saltville
Other toxins	Industrial-other	2	U	Small industry
Channel or shoreline alteration	Municipal development	2	2	
Channel or shoreline alteration	Other land management	2	2	Landowners bulldozing in streams
Habitat fragmentation	Industrial-other	2	2	Remnant mill dams; TVA dam on South Holston
Organic pollutants	Industrial-rights-of-way	2	2	Roadways and rails
Sediment load alteration	Forestry	2	2	
Turbidity alteration	Municipal development	2	1	
Nutrient input regime alteration	Agriculture	2	1	
Nutrient input regime alteration	Municipal development	2	1	Wastewater treatment plants
Organic matter input regime alteration	Agriculture	2	1	
Turbidity alteration	Forestry	2	1	
Toxins	Industrial-other	1	4	Spills (roads and rails), accidents at industrial sites
Sediment load alteration	Industrial-mineral extraction	1	3?	Mining of landscape rock
Habitat fragmentation	Municipal development	1	2	Wastewater treatment plants
Organic matter input regime alteration	Forestry	1	1	
Complications due to small populations	NA	U	U	Species-specific
James				
Herbicides and fungicides	Agriculture	4	3	
Insecticides	Agriculture	4	3	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Nutrient input regime alteration	Municipal development	4	3	
Sediment load alteration	Agriculture	4	3	
Turbidity alteration	Agriculture	4	3	
Channel or shoreline alteration	Agriculture	4	2	
Habitat fragmentation	Industrial-power generation	3	3	Dams, severity depends on species (high for American shad)
Habitat fragmentation	Industrial-other	3	3	Remnant mill dams
Organic pollutants	Industrial-rights-of-way	3	3	Roads and rails
Sediment load alteration	Forestry	3	3	
Herbicides and fungicides	Industrial-rights-of-way	3	2	Roads and rails
Channel or shoreline alteration	Municipal development	2	4	
Nutrient input regime alteration	Municipal development	2	4	Wastewater treatment plants, straight pipes
Toxins	Industrial-other	2	4	Industry particularly around Hopewell
Dissolved oxygen regime alteration	Agriculture	2	3	
Dissolved oxygen regime alteration	Municipal development	2	3	
Metals	Industrial-power generation	2	3	
pH regime alteration	Atmospheric deposition	2	3	
Organic matter input regime alteration	Agriculture	2	1	
Turbidity alteration	Forestry	2	1	
Competition	Exotic or introduced species	2	1	Blue and flathead catfish; severity of impact for species that use the mainstem is higher (3)
Predation	Exotic or introduced species	2	1	Blue and flathead catfish; severity of impact for species that use the mainstem is higher (3)
Toxins	Industrial-other	1	4	Spills (roadways and rails); accidents at industrial sites
Channel or shoreline alteration	Other land management	1	3	Landowner bulldozing in streams
Hydrologic regime alteration	Municipal development	1	3	Dam installation for water sources
Hydrologic regime alteration	Municipal development	1	3	Water withdrawal
Turbidity alteration	Municipal development	1	2	Road building and bridges
Organic matter input regime alteration	Forestry	1	1	
Sediment load alteration	Industrial-mineral extraction	1	1	Sand mines in Coastal Plain
Turbidity alteration	Industrial –mineral extraction	1	1	Sand mines in Coastal Plain
Complications due to small populations	N/A	U	U	Species specific
Other toxins	Municipal development	U	U	Pharmaceuticals/drugs in wastewater

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
James (lakes, ponds, and small impoundments)				
Habitat fragmentation	Agriculture	4	4	Dams
Hydrologic regime alteration	Agriculture	4	4	Dam failure (mill dams) and dam removal (beaver dams)
Habitat destruction	Exotic or introduced species	3	4	Alteration of habitat by grass carp
Herbicides and fungicides	Recreational use of habitat	3	4	Removing vegetation for access to water
Predation	Exotic or introduced species	3	3	Often combined with habitat alteration for fishing
Herbicides and fungicides	Agriculture	3	2	
Insecticides	Agriculture	3	2	
Sediment load alteration	Forestry	3	1	
New				
Sediment load alteration	Agriculture	4	3	Livestock
Turbidity alteration	Agriculture	4	3	Livestock
Hydrologic regime alteration	Dam	4	2	Reservoir used for urban and agricultural water needs
Nutrient input regime alteration	Agriculture	3	3	Livestock
Sediment load alteration	Municipal development	3	3	
Turbidity alteration	Municipal development	3	3	
Channel or shoreline alteration	Agriculture	3	2	
Hydrologic regime alteration	Municipal development	3	2	
Hydrologic regime alteration	Industrial-power generation	3	2	Claytor Dam
Nutrient input regime alteration	Municipal development	3	2	Inadequate wastewater treatment
Herbicides and fungicides	Agriculture	2	2	
Insecticides	Agriculture	2	2	Row crops, tree farming
Toxins	Industrial-other	2	2	Military installations, chemical manufacturing
Turbidity regime alteration	Industrial-mineral extraction	2	2	Limestone
Toxins	Industrial-power generation	1	1	
Pee Dee				
Channel or shoreline alteration	Agriculture	4	2	
Sediment load alteration	Agriculture	4	2	
Turbidity regime alteration	Agriculture	4	2	
Nutrient load alteration	Agriculture	4	2	Livestock
Sediment load alteration	Forestry	2	2	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Piankatank				
Toxins	Atmospheric deposition	4	2	Aerial mercury from power plants
Sediment load alteration	Forestry	3	2	
Sediment load alteration	Agriculture	2	2	
Potomac				
Herbicides and fungicides	Agriculture	4	3	Impervious surface Poultry farms, other livestock Dams, severity depends on species Remnant mill dams Roads and rails Roads and rails Shenandoah spill and others Poultry farms, other livestock Wastewater treatment plants, straight pipes Dam installation for water source Water withdrawal Atmospheric deposition Acid precipitation Eels killed in turbines
Insecticides	Agriculture	4	3	
Sediment load alteration	Agriculture	4	3	
Turbidity regime alteration	Agriculture	4	3	
Channel or shoreline alteration	Agriculture	4	2	
Channel or shoreline alteration	Municipal development	3	4	
Hydrologic regime alteration	Municipal development	3	4	
Nutrient input regime alteration	Agriculture	3	4	
Dissolved oxygen regime alteration	Agriculture	3	3	
Dissolved oxygen regime alteration	Municipal development	3	3	
Habitat fragmentation	Industrial-power generation	3	3	
Habitat fragmentation	Industrial-other	3	3	
Organic pollutants	Industrial-rights-of-way	3	3	
Sediment load alteration	Forestry	3	3	
Herbicides and fungicides	Industrial-rights-of-way	3	2	
Herbicides and fungicides	Municipal development	3	2	
Insecticides	Municipal development	3	2	
Nutrient input regime alteration	Municipal development	3	2	
Toxins	Industrial-other	3	2	
Toxins	Agriculture	3	2	
Nutrient input regime alteration	Municipal development	2	4	
Toxins	Industrial-other	2	4	
Hydrologic regime alteration	Municipal development	2	3	
Hydrologic regime alteration	Municipal development	2	3	
Metals	Industrial-power generation	2	3	
pH regime alteration	Industrial-power generation	2	3	
Unintentional capture or killing	Industrial-power generation	2	2	
Organic matter input regime alteration	Forestry	2	1	
Organic matter input regime alteration	Agriculture	2	1	
Turbidity regime alteration	Forestry	2	1	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Competition	Exotic or introduced species	1	2?	Snakehead
Predation	Exotic or introduced species	1	2?	Snakehead
Competition	Exotic or introduced species	1	4	Zebra mussels
Toxins	Industrial-other	1	4	Spills, accidents at industrial sites
Channel or shoreline alteration	Other land management	1	3	Landowner bulldozing in streams
Turbidity regime alteration	Municipal development	1	2	Road and bridge building
Sediment load alteration	Industrial-mineral extraction	1	1	
Turbidity regime alteration	Industrial-mineral extraction	1	1	
Complications due to small populations		U	U	Species-specific
Toxins	Municipal development	U	U	Pharmaceuticals and their by-products
Rappahannock				
Herbicides and fungicides	Agriculture	4	3	
Insecticides	Agriculture	4	3	
Nutrient input regime alteration	Agriculture	4	3	
Sediment load alteration	Agriculture	4	3	
Turbidity regime alteration	Agriculture	4	3	
Channel or shoreline alteration	Agriculture	4	2	
Habitat fragmentation	Industrial-other	3	3	Remnant mill dams
Organic pollutants	Industrial-rights-of-way	3	2	Roads and rails
Channel or shoreline alteration	Municipal development	2	4	
Nutrient input regime alteration	Municipal development	2	4	Wastewater treatment plants, straight pipes
Metals	Industrial-power generation	2	3	
pH regime alteration	Industrial-power generation	2	3	Acid precipitation
Dissolved oxygen regime alteration	Agriculture	2	2	
Dissolved oxygen regime alteration	Municipal development	2	2	
Herbicides and fungicides	Industrial-rights-of-way	2	2	Roads and rails
Sediment load alteration	Forestry	2	2	
Competition	Exotic or introduced species	2	1	Blue catfish
Predation	Exotic or introduced species	2	1	Blue catfish
Turbidity regime alteration	Forestry	2	1	
Toxins	Industrial-other	1	4	Spills, accidents at industrial sites
Channel or shoreline alteration	Other land management	1	3	Landowner bulldozing in streams
Toxins	Industrial-other	1	2	Various industry in and below Fredericksburg
Turbidity regime alteration	Municipal development	1	2	Road and bridge building
Habitat fragmentation	Industrial-power generation	1	1	Dams, severity depends on species

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Hydrologic regime alteration	Municipal development	1	1	Water withdrawal
Metals	Industrial-power generation	2	3	Atmospheric deposition
Organic matter input regime alteration	Forestry	1	1	
Sediment load alteration	Industrial-mineral extraction	1	1	Sand mines in Coastal Plain
Complications due to small populations		U	U	Species-specific
Toxins	Municipal development	U	U	Pharmaceuticals and their by-products
Roanoke				
Competition	Introduced/exotic species	4	3	Rock bass competing with Roanoke bass (SGCN)
Habitat fragmentation	Industrial-power generation	4	3	Dams, severity depends on species
Herbicides and fungicides	Agriculture	4	3	
Hydrologic regime	Industrial-power generation	4	3	Dams, severity depends on species
Insecticides	Agriculture	4	3	
Nutrient input regime alteration	Agriculture	4	3	
Sediment load alteration	Agriculture	4	3	
Turbidity alteration	Agriculture	4	3	
Channel or shoreline alteration	Agriculture	4	2	
Habitat fragmentation	Industrial-other	3	3	Remnant mill dams
Sediment load alteration	Forestry	3	3	
Herbicides and fungicides	Industrial-rights-of-way	3	2	Roads and rails
Turbidity alteration	Forestry	3	2	
Channel or shoreline alteration	Municipal development	2	4	
Nutrient input regime alteration	Municipal development	2	4	Wastewater treatment plants, straight pipes
Metals	Industrial-power generation	2	3	
Toxins	Industrial-other	2	3	
Dissolved oxygen regime alteration	Agriculture	2	2	
Dissolved oxygen regime alteration	Municipal development	2	2	
Organic pollutants	Industrial-rights-of-way	2	2	Roads and rails
Sediment load alteration	Industrial-mineral extraction	2	2	Sand mines in Coastal Plain
Turbidity alteration	Municipal development	2	2	Road and bridge building
Turbidity alteration	Industrial-mineral extraction	2	2	Sand mines in Coastal Plain
Organic matter input regime alteration	Agriculture	2	1	
Competition	Introduced/exotic species	2	1	Blue and flathead catfish; scope of effects on mainstem species is higher (3)
Predation	Introduced/exotic species	2	1	Blue and flathead catfish; scope of effects on mainstem species is higher (3)

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Toxins	Industrial-other	1	4	Spills (roadways and rails), accidents at industrial sites
Water temperature regime alteration	Industrial-power generation	1	4	Philpott Dam operations
Channel or shoreline alteration	Other land management	1	3	Landowner bulldozing in streams
Channel or shoreline alteration	Municipal development	1	2	Alteration of Roanoke River at Roanoke
Hydrologic regime alteration	Municipal development	1	2	Water withdrawal
Nutrient input regime alteration	Agriculture	1	1	Aquaculture
Organic matter input regime alteration	Forestry	1	1	
Parasitism	Agriculture	1	1	Aquaculture
Complication due to small populations	N/A	U	U	Species specific
Other toxins	Municipal development	U	U	Pharmaceuticals/drugs and their by-products
York				
Herbicides and fungicides	Agriculture	4	3	
Insecticides	Agriculture	4	3	
Nutrient input regime alteration	Agriculture	4	3	
Sediment load alteration	Agriculture	4	3	
Channel or shoreline alteration	Agriculture	4	2	
Habitat fragmentation	Industrial-other	3	3	Remnant mill dams
Organic matter input regime alteration	Forestry	3	2	
Organic matter input regime alteration	Agriculture	3	2	
Organic pollutants	Industrial-rights-of-way	3	2	Roads and rails
Turbidity alteration	Agriculture	3	2	
Turbidity alteration	Forestry	3	2	
Channel of shoreline alteration	Municipal development	2	4	
Metals	Industrial-power generation	2	3	Atmospheric mercury
Toxins	Industrial-other	2	3	Paper mill, oil refinery at mouth
Dissolved oxygen regime alteration	Agriculture	2	2	
Herbicides and fungicides	Industrial-rights-of-way	2	2	Roads and rails
Sediment load alteration	Forestry	2	2	
Competition	Introduced/exotic species	2	1	Blue catfish
Predation	Introduced/exotic species	2	1	Blue catfish
				Spills (roadways and rails), accidents at industrial sites
Toxins	Industrial-other	1	4	
Channel or shoreline alteration	Other land management	1	3	Landowner bulldozing in stream
Habitat fragmentation	Industrial-power generation	1	2	Lake Anna

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Hydrologic regime alteration	Municipal development	1	2	Water withdrawal, proposed King William Reservoir
Nutrient input regime alteration	Municipal development	1	2	Wastewater treatment plants, straight pipes
Turbidity alteration	Municipal development	1	2	Road and bridge building
Dissolved oxygen regime alteration	Municipal development	1	1	
Sediment load alteration	Industrial-mineral extraction	1	1	Sand mines in Coastal Plain
Complications due to small populations	N/A	U	U	Species specific
Other toxins	Municipal	U	U	Pharmaceuticals/drugs and their by-products

Appendix H2. Stresses on Virginia's herpetofauna as identified by Herpetofauna TAC (2004). See Chapter 2 for descriptions of scope and severity ("U" indicates "unknown", "?" indicates a questionable value, generally for a stress or source that is poorly known).

Stress	Source of Stress	Scope	Severity	Stress Comments
Coastal Plain Aquatics				
Habitat destruction	Municipal development	4	4	
Habitat fragmentation	Roadways	4	4	
Habitat fragmentation	Municipal development	4	4	
Herbicides and fungicides	Agriculture	4	3	
Insecticides	Agriculture	4	3	
Organic pollutants	Agriculture	4	3	
Other toxin (specify)	Roadways	4	3?	Runoff
Habitat destruction	Agriculture	3	4	
Habitat destruction	Forestry	3	4	
Habitat fragmentation	Agriculture	3	4	
Habitat fragmentation	Forestry	3	4	
Genetic alteration (e.g., hybridization)	Exotic or introduced species	3	4	Yellow-bellied sliders affected by red-eared sliders
Herbicides and fungicides	Municipal development	3	3	
Insecticides	Municipal development	3	3	
Unintentional capture or killing	Economic use of species	3	3?	By-catch, boat propellers
Unintentional capture or killing	Roadways	3	3	
Nutrient input regime alteration	Agriculture	3	2	
Habitat destruction	Roadways	2	4	
Metals	Industrial - power generation	2	2	
Nutrient input regime alteration	Municipal development	2	2	Waste water treatment plants

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Metals	Industrial - other	1	4	Various industries around Hopewell
Metals		1	4	Military installations
Organic pollutants	Industrial – other	1	4	
Other toxin		1	4	Military installations
Other toxin (specify)	Roadways	1	4	Spills
Intentional take	Economic use of species	1?	1?	Mostly diamond-backed terrapin, some by-catch
Food supply or trophic structure changes		?	U	Decreases in crayfish, eels, amphiuma
Salinity regime alteration	Municipal development	U	U	Drinking water removal, desalinization waste
Coastal Plain Wetland and Terrestrial Species				
Herbicides and fungicides	Agriculture	4	4	
Insecticides	Agriculture	4	4	
Habitat destruction	Municipal development	4	4	
Habitat fragmentation	Roadways	4	4	
Habitat fragmentation	Municipal development	4	4	
Other toxin (specify)	Roadways	4	4	Runoff
Unintentional capture or killing	Roadways	4	4	
Complications due to small populations		4	4	Several species
Insecticides	Municipal development	4	4?	
Organic pollutants	Agriculture	4	3	
Natural succession	Other land management	4	3	Fire suppression
Habitat destruction	Roadways	3	4	
Habitat destruction	Agriculture	3	4	
Habitat destruction	Forestry	3	4	
Habitat fragmentation	Agriculture	3	4	
Habitat fragmentation	Forestry	3	4	
Predation	Exotic or introduced species	3	4	Introduction of fish affects reproduction
Predation	Native species	3	4	Introduction of fish affects reproduction
Herbicides and fungicides	Municipal development	3	3	
Nutrient input regime alteration	Agriculture	3	2	
Intentional take	Other sources of stress	2	4	Killing of rattlesnakes
Unintentional capture or killing	Other land management	2	3	Discing roads (Back Bay/Great Dismal Swamp NWRs)
Intentional take	Economic use of species	2	3?	Several species
Insecticides	Municipal development	2	3?	Bt mosquito control donuts
Nutrient input regime alteration	Municipal development	2	2	Waste water treatment plants; unsure of problem
Metals	Industrial – other	1	4	Various industries around Hopewell

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Metals		1	4	Military installations
Organic pollutants	Industrial – other	1	4?	Unknown effects
Other toxin (specify)		1	4	Military installations
Other toxin (specify)	Roadways	1	4	Spills
Salinity regime alteration	Municipal development	U	U	Drinking water removal, desalinization waste
Food supply or trophic structure changes		U	U	Decreases in crayfish and toads
Mount Rogers Area Terrestrials				
Habitat degradation	Exotic or introduced species	4	3	Balsam and hemlock adelgids
Air temperature changes	Climate alteration or atmospheric change	4	3?	Direct and indirect effects
Habitat degradation	Atmospheric deposition	4	2	
Water temperature regime alteration	Climate alteration or atmospheric change	3	3	Habitat degradation and destruction
Habitat degradation	Recreational use of habitat	2	2	Horses compacting soil, trampling (?)
Complications due to small populations		U	U	Largely unknown
Mountain Forest Terrestrials				
Water temperature regime alteration	Climate alteration or atmospheric change	4	3	Habitat degradation and destruction
Natural succession	Other land management	4	3	Lack of land management, fire suppression
Habitat degradation	Atmospheric deposition	4	2	
Air temperature changes	Climate alteration or atmospheric change	4	2	Direct and indirect effects
Intentional take		4	2	USFS, VDOT, others; mostly rattlesnakes, all snakes affected
Unintentional capture or killing	Roadways	4	2	
Insecticides	Forestry	4	1	Gypsy moth, study in WV found no effects
Food supply or trophic structure changes	Exotic or introduced species	4	1	Spraying for gypsy moth, nontarget species affected
Intentional take	Economic use of species	3	4	Pet trade
Habitat destruction	Forestry	2	4	
Habitat fragmentation	Forestry	2	3	
Habitat fragmentation	Roadways	2	3	
Channel or shoreline alteration	Forestry	2	3	Forestry practices
Habitat degradation	Exotic or introduced species	2	2	Hemlock woolly adelgid
Habitat degradation	Recreational use of habitat	2	2	Horses, ATVs, mountain bikes
Intentional take		1	4	Den destruction
Habitat destruction		1	4	Den destruction
Intentional take	Scientific use of species	1	1	
Complications due to small populations		U	U	Largely unknown

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Statewide				
Herbicides and fungicides	Agriculture	4	4	
Insecticides	Agriculture	4	4	
Habitat destruction	Municipal development	4	4	
Habitat fragmentation	Roadways	4	4	
Habitat fragmentation	Municipal development	4	4	
Insecticides	Municipal development	4	4?	
Habitat destruction	Roadways	3	4	
Habitat destruction	Agriculture	3	4	
Habitat destruction	Forestry	3	4	
Habitat fragmentation	Agriculture	3	4	
Habitat fragmentation	Forestry	3	4	
Intentional take	Economic use of species	3	4	Pet trade
Herbicides and fungicides	Municipal development	3	3	
Channel or shoreline alteration	Forestry	2	3	Forestry practices
Unintentional capture or killing	Roadways	2	2	
Tennessee and New River Drainage Aquatics				
Intentional take	Economic use of species	4	3?	Asian food markets, pet trade (turtles)
Sediment load alteration	Agriculture	4	2	
Channel or shoreline alteration	Agriculture	4	2	
Turbidity alteration	Agriculture	4	2	
Hydrologic regime alteration	Dam for water use and water withdrawal	4	2	
Organic pollutants	Industrial - mineral extraction	3	3?	
Habitat fragmentation	Industrial - mineral extraction	3	3	Disjunct populations due to water quality
Sediment load alteration	Industrial - mineral extraction	3	2	
Turbidity alteration	Industrial - mineral extraction	3	2	
Hydrologic regime alteration	Municipal development	3	2	
Habitat fragmentation	Industrial – power generation	2	3	
Intentional take	Recreational use of species	2	2	Shooting turtles, hooking hellbenders, mudpuppies, etc.
Organic pollutants	Industrial - rights-of-way	2	2	Roads and rails
Insecticides	Agriculture	2	2	Row crops, tree farming
Sediment load alteration	Forestry	2	1	
Nutrient input regime alteration	Agriculture	2	1	
Nutrient input regime alteration	Municipal development	2	1	Waste water treatment plants, straight pipes
Organic matter input regime alteration	Agriculture	2	1	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Turbidity alteration	Forestry	2	1	
Other toxins	Industrial - mineral extraction	1	U	Products of coal processing
Toxins	Industrial – other	1	4	Spills (roadway and rails), industrial accidents
Channel or shoreline alteration	Municipal development	1	3	
Metals	Industrial – power generation	1	3	
Channel or shoreline alteration	Other land management	1	3	Landowner alteration of streams
Turbidity alteration	Municipal development	1	2	
Habitat fragmentation	Municipal development	1	2	Waste water treatment plants
Organic matter input regime alteration	Forestry	1	1	
Food supply or trophic structure changes		U	U	Loss of crayfish/mussels, many possible sources
Parasitism		U	U	Bacterial, fungal infections; affects amphibians
Other toxins		U	U	Pharmaceuticals, drugs
West Piedmont Upland Terrestrials				
Herbicides and fungicides	Agriculture	4	4	
Insecticides	Agriculture	4	4	
Habitat destruction	Municipal development	4	4	
Habitat fragmentation	Roadways	4	4	
Habitat fragmentation	Municipal development	4	4	
Insecticides	Municipal development	4	4?	
Habitat destruction	Roadways	3	4	
Habitat destruction	Agriculture	3	4	
Habitat destruction	Forestry	3	4	
Habitat fragmentation	Agriculture	3	4	
Habitat fragmentation	Forestry	3	4	
Intentional take	Economic use of species	3	4	Pet trade
Herbicides and fungicides	Municipal development	3	3	
Channel or shoreline alteration	Forestry	2	3	Forestry practices
Unintentional capture or killing	Roadways	2	2	
Unique (Bog Turtle)				
Habitat destruction	Agriculture	4	3	
Hydrologic regime alteration	Agriculture	4	3	Wetland drainage, stream channelization
Intentional take	Pet trade	3	4	
Unintentional capture or killing	Agriculture	3	2	Livestock trampling (?)

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Appendix H3. Stresses on Virginia's avian fauna as identified by Bird TAC (2004). See Chapter 2 for descriptions of scope and severity ("U" indicates "unknown", "?" indicates a questionable value, generally for a stress or source that is poorly known).

Stress	Source of Stress	Scope	Severity	Comments
Barrier Island and Other Beaches				
Predation	Native species	4	4	Sort out jurisdictional issues
Predation	Exotic or introduced species	4	4	
Sea level rise	Climate alteration or atmospheric change	4	2	
Human disturbance	Recreational use of habitat	2	3	
Human disturbance	Recreational use of species	1	3	
Aquaculture	Agriculture	4	U	High percentage of intertidal zone but small percentage of overall barrier island
Coastal Marsh				
Predation	Native species	4	4	
Predation	Exotic or introduced species	4	4	
Sea level rise	Climate alteration or atmospheric change	4	4	Future problem, beginning to show up
Habitat destruction	Exotic or introduced species	2	3	<i>Phragmites</i>
Hydrologic regime alteration	Municipal development	3	U	Potential to increase
Hydrologic regime alteration	Roadways	3	U	Potential to increase
Hydrologic regime alteration	Agriculture	3	U	Potential to increase
Nutrient input regime alteration	Agriculture	3	U	Potential to increase
Nutrient input regime alteration	Roadways	3	U	Potential to increase
Nutrient input regime alteration	Municipal development	3	U	Potential to increase
Habitat destruction	Exotic or introduced species	1	2	Mute swans: increasing, potential future problem
Early Successional				
Habitat degradation	Exotic or introduced species	U	U	Possible biological implications
Habitat fragmentation	Agriculture	4	3	
Habitat destruction	Agriculture	4	4	
Habitat destruction	Municipal development	3	4	
Natural succession	Agriculture	2	4	
Predation	Native species	4	2	
Predation	Exotic or introduced species	4	2	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Insecticides	Agriculture	U	U	
Herbicides and fungicides	Agriculture	U	U	
Unintentional capture or killing	Roadways	1	3	Roadside shrubs as habitat/roadside shrub promotion
Natural succession	Forestry	2	3	Artificial succession, quick canopy closure due to high stocking density
Natural succession	Forestry	1	3	Reduction in cutting (letting forest grow)
Grassland				
Habitat degradation	Exotic or introduced species	4	3	Cool season grasses
Habitat fragmentation	Agriculture	4	3	Require large patches
Habitat destruction	Agriculture	4	4	Increase in agricultural efficiency, clean farming
Habitat destruction	Municipal development	3	4	
Natural succession	Agriculture	2	4	Farm abandonment
Predation	Native species	4	2	As patch size decreases, severity increases
Predation	Exotic or introduced species	4	2	As patch size decreases, severity increases; cats
Insecticides	Agriculture	U	U	Investigate
Herbicides and fungicides	Agriculture	U	U	Investigate
High Elevation Coniferous (spruce-fir)				
Habitat destruction	Exotic or introduced species	2	4	Balsam woolly adelgid
Habitat destruction	Industrial: power generation	1	1	
Unintentional capture or killing	Industrial: power generation	1	1	Mostly problem for migrants, not breeders
Fire: manipulation of timing or frequency	Other land management	4	U	Reduction of fire is the problem, and other land management practices
Other toxin	Atmospheric deposition	4	3?	Acid rain/fog
Habitat destruction	Forestry	historical 4	historical 4	
Habitat fragmentation	Forestry	4	4	Artifact from past forestry practices
Air temperature changes	Climate alteration or atmospheric change	4	1?	Possible large future threat

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
High Elevation Deciduous				
Habitat destruction	Forestry	2	4	High-grading veneer trees
Habitat destruction	Exotic or introduced species	4	2?	<i>Ailanthus</i> , garlic mustard, etc.
Habitat destruction	Native species	4	3	Deer
Other toxin	Atmospheric deposition	4	3?	Acid rain/fog
Air temperature changes	Climate alteration or atmospheric change	4	1?	Possible large future threat
Habitat destruction	Municipal development	2	3	N. Blue Ridge, n/a for YBSA
Habitat destruction	Industrial: power generation	1	1	
Unintentional capture or killing	Industrial: power generation	1	1	Mostly problem for migrants, not breeders
Habitat destruction	Industrial: mineral extraction	1	4	more in WV than VA
Mature Deciduous				
Habitat fragmentation	Forestry	4	4	
Habitat fragmentation	Agriculture	4	4	
Habitat fragmentation	Municipal development	4	4	
Habitat destruction	Forestry	4	4	
Habitat destruction	Agriculture	4	4	
Habitat destruction	Municipal development	4	4	
Predation	Native species	4	3	
Habitat degradation	Exotic or introduced species	U	U	
Habitat degradation	Native species	4	3	Deer densities
Pine Savannah				
Fire: manipulation of timing or frequency	Forestry	4	4	
Habitat destruction	Forestry	4	4	
Habitat fragmentation	Forestry	4	4	
Natural succession	Forestry	4	4	
Habitat destruction	Agriculture	3	2	
Habitat fragmentation	Agriculture	3	2	
Habitat destruction	Municipal development	2	2	
Habitat fragmentation	Municipal development	2	2	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Wooded Wetlands				
Habitat fragmentation	Forestry	4	4	
Habitat fragmentation	Municipal development	4	4	
Loss of ecological functions	Municipal development	4	4	Destruction of surrounding upland matrix
Loss of ecological functions	Forestry	4	4	Destruction of surrounding upland matrix
Predation	Exotic or introduced species	1	1	Cats
Predation	Native species	4	3	
Habitat degradation	Forestry	4	4	High-grading
Hydrologic regime alteration	Agriculture	historical	historical	
Habitat destruction	Municipal development	4	4	Dams and land conversion
Habitat destruction	Forestry	2	4	Drained areas for pine plantation
Hydrologic regime alteration	Municipal development	U	U	May increase water levels

Appendix H3 continued. Bird species of greatest conservation need with individual threats.

Stress	Source of Stress	Scope	Severity	Stress Comments
Henslow's sparrow <i>Ammodramus henslowii</i>				
Habitat destruction	Exotic or introduced species	4	4	<i>Phragmites</i>
American black duck <i>Anas rubripes</i>				
Competition	Exotic or introduced species	4	3	Mallards
Competition	Native species	4	3	Geese
Habitat destruction	Municipal development	3	4	
Habitat degradation	Native species	3	4	
Predation	Exotic or introduced species	3	4	
Genetic alteration	Exotic or introduced species	3	2	Mallards
Redhead <i>Aythya americana</i>				
Habitat degradation	Source not appropriate	3	3	Decline in SAV
Organic pollutants	Industrial: Power generation	1	4	Oil spills
Greater scaup <i>Aythya marila</i>				
Habitat degradation	Source not appropriate	3	3	Decline in SAV

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Stress Comments
Organic pollutants	Industrial: power generation	1	4	Oil spills
Metals	Industrial: Other	1	2	
Unintentional take	Non-target species management	1	2	Bycatch
Brant <i>Branta bernicla</i>				
Habitat degradation	Source not appropriate	3	3	Decline in SAV Cultivation of shallow water clam beds (competition with aquaculture)
Competition	Agriculture	2	3	
Organic pollutants	Industrial: Power generation	1	4	Oil spills
Peregrine falcon <i>Falco peregrinus</i>				
Other toxin	Industrial: Other	4	3	Thin eggshells continue; responsible contaminant unknown
Other toxin	Industrial: Other	U	U	Potential: flame retardants
Black rail <i>Laterallus jamaicensis</i>				
Habitat destruction	Exotic or introduced species	4	4	<i>Phragmites</i>
Horned grebe <i>Podiceps auritus</i>				
Organic pollutants	Industrial: power generation	1	4	Oil spills
Northern rough-winged swallow <i>Stelgidopteryx serripennis</i>				
Channel or shoreline alteration	Erosion control	4	3	Grading of bank nesting habitat
Eastern kingbird <i>Tyrannus tyrannus</i>				
Food supply or trophic structure changes	Loss of honeybees	U	U	Investigate
Barn owl <i>Tyto alba</i>				
Habitat destruction	Agriculture	4	4	Clean farming (loss of silos and old farm structures)
Golden-winged warbler <i>Vermivora chrysoptera</i>				
Genetic alteration	Native species	2	2	Blue-winged warbler hybridization

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Appendix H4. Stresses on Virginia's mammalian fauna as identified by Mammal TAC (2004). See Chapter 2 for descriptions of scope and severity ("U" indicates "unknown", "?" indicates a questionable value, generally for a stress or source that is poorly known).

Stress	Source of Stress	Scope	Severity	Comments
Eastern big-eared bat <i>Corynorhinus rafinesquii macrotis</i>				
Habitat destruction	Municipal development	3	3	
Habitat destruction	Forestry	3	3	mainly through loss of large bottomland forest with roost trees
Toxins	Municipal development	3	3	magnification of toxins through food chain may affect long term survival, reproductive success
Insecticides	Agriculture	3	3	may affect food availability/bioaccumulation from prey to predator could affect long term survival
Metals	Atmospheric deposition	3	3	Could affect reproductive success through bioaccumulation through the food chain
Virginia big-eared bat <i>Corynorhinus townsendii virginianus</i>				
Human disturbance of hibernacula	Recreational use of habitat	4	4	
Unintentional capture or killing	Industrial: power generation	U	U	wind power effects from turbines not completely known
Carolina northern flying squirrel <i>Glaucomys sabrinus coloratus</i>				
Habitat degradation	Atmospheric deposition	3	3	
Habitat degradation	Exotic or introduced species	3	3	woolly adelgid infestation
Habitat degradation	Climate alteration or atmospheric change	2	2	
Competition	Native species	2	2	
Virginia northern flying squirrel <i>Glaucomys sabrinus fuscus</i>				
Habitat degradation	Exotic or introduced species	3	3	woolly adelgid infestation
Habitat destruction	Forestry	2	4	
Habitat degradation	Climate alteration or atmospheric change	2	2	
Competition	Native species	2	2	
Habitat destruction	Industrial: power generation	U	U	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Snowshoe hare <i>Lepus americanus</i>				
Natural succession	Other land management	4	4	
Lack of snow cover	Climate alteration or atmospheric change	2	2	
Fisher <i>Martes pennanti</i>				
Habitat destruction	Forestry	4	4	
Southern rock vole <i>Microtus chrotorrhinus carolinensis</i>				
Habitat destruction	Forestry	4	3	
Hydrologic regime alteration	Climate alteration or atmospheric change	4	3	
Least weasel <i>Mustela nivalis</i>				
Threats not known, this species may be more common than currently thought				
Southeastern myotis <i>Myotis austroriparius</i>				
Habitat destruction	Municipal development	3	3	
Toxins	Municipal development	3	3	magnification of toxins through food chain may affect long term survival, reproductive success
Habitat destruction	Forestry	3	2	mainly through loss of large bottomland forest with roost trees
Metals	Atmospheric deposition	3	2	Could affect reproductive success through bioaccumulation through the food chain
Insecticides	Agriculture	2	3	may affect food availability/bioaccumulation from prey to predator could affect long term survival
Eastern small-footed myotis <i>Myotis leibii</i>				
Human disturbance of hibernacula	Recreational use of habitat	3	3	
Unintentional capture or killing	Industrial: power generation	U	U	wind power effects from turbines not completely known
Gray myotis <i>Myotis grisescens</i>				
Habitat destruction	Municipal development	4	4	
Human disturbance of caves	Recreational use of habitat	4	3	
Unintentional capture or killing	Industrial: power generation	U	U	wind power effects from turbines not completely known

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Indiana myotis <i>Myotis sodalis</i>				
Human disturbance of hibernacula	Recreational use of habitat	3	3	wind power effects from turbines not completely known
Unintentional capture or killing	Industrial: power generation	U	U	
Allegheny woodrat <i>Neotoma magister</i>				
Parasitism	Native species	2	1	
Habitat destruction	Municipal development	2	1	
Cotton mouse <i>Peromyscus gossypinus</i>				
Habitat destruction	Other land management	U	U	
Hydrologic regime alteration	Other land management	U	U	
Competition	Native species	U	U	
Pungo white-footed mouse <i>Peromyscus leucopus easti</i>				
Habitat destruction	Municipal development	4	4	
Delmarva fox squirrel <i>Sciurus niger cinereus</i>				
Habitat destruction	Municipal development	3	4	
Habitat destruction	Forestry	3	4	
Habitat destruction	Forest pests	3	4	
Habitat destruction	Sea level rise	3	4	
Habitat fragmentation	Municipal development	3	3	
Habitat fragmentation	Agriculture	3	3	
Habitat fragmentation	Forestry	3	3	
Habitat fragmentation	Roadways	3	3	
Other organism stressors (vehicle strikes)	Roadways	2	2	
Intentional take	Recreational use of species	1	1	misidentification of species by hunters
predation	Native species	1	1	
Other organism stressors (disease)	Unknown	U	1	
Southeastern fox squirrel <i>Sciurus niger niger</i>				
Habitat destruction	Forestry	4	3	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Long-tailed shrew <i>Sorex dispar</i>				
Similar to rock voles in terms of habitat, not much known about threats				
Dismal Swamp southeastern shrew <i>Sorex longirostris fisheri</i>				
Habitat destruction	Municipal development	3	2	
Habitat fragmentation	Municipal development	3	2	
Habitat destruction	Roadways	2	2	
Habitat fragmentation	Roadways	2	2	
Habitat fragmentation	Forestry	2	2	
Hydrologic regime alteration	Forestry	2	2	
Southern water shrew <i>Sorex palustris punctulatus</i>				
Food supply or trophic structure changes	Forestry	4	3	
Habitat degradation	Forestry	4	3	somewhat unknown: general declines in water quality affecting habitat, food supply, hydrologic regime
Hydrologic regime alteration	Climate alteration or atmospheric change	4	3	
Eastern spotted skunk <i>Spilogale putorius</i>				
Competition	Native species	3	3	Habitat alteration allows invasion of striped skunks
Appalachian cottontail <i>Sylvilagus obscurus</i>				
Natural succession	Other land management	2	2	
Competition	Native species	2	2	
Marsh rabbit <i>Sylvilagus palustris</i>				
Habitat destruction	Municipal development	3	4	
Habitat destruction	Agriculture	2	4	
Competition	Native species	U	U	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Southern bog lemming <i>Synaptomys cooperi</i>				
Natural succession	Other land management	2	3	
Predation	Exotic or introduced species	2	2	

Appendix H5. Stresses on Virginia's aquatic mollusks as identified by Mussel TAC (2004). See Chapter 2 for descriptions of scope and severity ("U" indicates "unknown", "?" indicates a questionable value, generally for a stress or source that is poorly known). The Mussel TAC also identified the interbasin transfer of species through water withdrawal as a general concern for all species.

Stress	Source of Stress	Scope	Severity	Comments
Clinch River				
Sediment load alteration	Agriculture	4	2	
Channel or shoreline alteration	Agriculture	4	2	
Turbidity alteration	Agriculture	4	2	
Loss of ecological functions		4	2	Loss of fish hosts (particularly abundance)
Habitat fragmentation	Industrial: mineral extraction	3	3	Disjunct populations caused by water quality issues
Organic pollutants	Industrial: mineral extraction	3	3?	
Sediment load alteration	Industrial: mineral extraction	3	2	
Turbidity alteration	Industrial: mineral extraction	3	2	
Habitat fragmentation	Industrial: power generation	2	3	
Organic pollutants	Industrial: rights-of-way	2	2	Roads and rails
Sediment load alteration	Forestry	2	1	
Nutrient input regime alteration	Agriculture	2	1	
Nutrient input regime alteration	Municipal development	2	1	Waste water treatment plants, straight pipes
Organic matter input regime alteration	Agriculture	2	1	
Turbidity alteration	Forestry	2	1	
Toxins	Industrial: other	1	4	Spills (roadway and rails), accidents at industrial sites
Channel or shoreline alteration	Municipal development	1	3	
Metals	Industrial: power generation	1	3	
Channel or shoreline alteration	Other land management	1	3	Landowner in streams
Turbidity alteration	Municipal development	1	2	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Habitat fragmentation	Municipal development	1	2	Waste water treatment plants
Habitat fragmentation	Industrial: other	1	2	Remnant mill dams
Predation	Native species	1	2	Muskrats
Organic matter input regime alteration	Forestry	1	1	
Hydrologic regime alteration	Industrial: mineral extraction	1	1	Stream subsidence: purple bean, Tennessee heelsplitter; tan riffleshell
Other toxins	Industrial: mineral extraction	1	U	Products of coal processing
Metals	Industrial: mineral extraction			
Complications due to small populations				Species-specific
Other toxins		U	U	Pharmaceuticals, drugs, etc.
Holston River				
Sediment load alteration	Agriculture	4	3	
Loss of ecological functions		4	2	Loss of fish hosts (particularly abundance)
Turbidity alteration	Agriculture	4	2	
Metals	Industrial: other	3	3	Past industry at Saltville
Channel or shoreline alteration	Agriculture	3	2	
Other organismal stressor		3	2?	Bacterial infection
Parasitism	Native species	3	2?	Increased infestation/load
Channel or shoreline alteration	Other land management	2	3	Landowner in streams
Biocides	Agriculture	2	2	Pesticides and herbicides (row crops)
Channel or shoreline alteration	Municipal development	2	2	
Habitat fragmentation	Industrial: other	2	2	Remnant mill dams; TVA dam on South Holston
Organic pollutants	Industrial: rights-of-way	2	2	Roads and rails
Sediment load alteration	Forestry	2	2	
Turbidity alteration	Municipal development	2	2	
Nutrient input regime alteration	Agriculture	2	1	
Nutrient input regime alteration	Municipal development	2	1	Waste water treatment plants
Organic matter input regime alteration	Agriculture	2	1	
Turbidity alteration	Forestry	2	1	
Other toxins	Industrial: other	2	U	Small industry, unknown impacts

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Toxins	Industrial: other	1	4	Spills (roadway and rails), accidents at industrial sites
Habitat fragmentation	Municipal development	1	2	Waste water treatment plants
Predation	Native species	1	2	Muskrats
Sediment load alteration	Industrial: mineral extraction	1	2	Mining of landscape rock (unknown impacts)
Organic matter input regime alteration	Forestry	1	1	
Complications due to small populations				Species-specific
New River				
Sediment load alteration	Agriculture	4	3	Livestock
Turbidity alteration	Agriculture	4	3	Livestock
	Dam for water use and water withdrawal	4	2	
Hydrologic regime alteration	Agriculture	3	3	Livestock
Nutrient input regime alteration	Agriculture	3	3	
Sediment load alteration	Municipal development	3	3	
Turbidity alteration	Municipal development	3	3	
Channel or shoreline alteration	Agriculture	3	2	
Hydrologic regime alteration	Municipal development	3	2	
Hydrologic regime alteration	Industrial: power generation	3	2	Claytor dam
Nutrient input regime alteration	Municipal development	3	2	Wastewater treatment
Insecticides	Agriculture	2	2	Row crops, tree farming
Toxins	Industrial: other	2	2	Radford arsenal
Toxins	Industrial: other	2	2	Celanese factory at narrows
Toxins	Industrial: power generation	1	1	Glen Lyn power plant
Powell River				
Sediment load alteration	Industrial: mineral extraction	4	3	
Loss of ecological functions		4	2	Loss of fish hosts (particularly abundance)
Sediment load alteration	Agriculture	3	2	
Turbidity alteration	Agriculture	3	2	
Turbidity alteration	Industrial: mineral extraction	3	2	
Other toxins	Industrial: mineral extraction	2	U	Products of coal processing

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source of Stress	Scope	Severity	Comments
Channel or shoreline alteration	Municipal development	2	2	
Channel or shoreline alteration	Agriculture	2	2	
Metals	Industrial: mineral extraction	2	2	
Nutrient input regime alteration	Municipal development	2	2	Waste water treatment plants, straight pipes
Organic pollutants	Industrial: mineral extraction	2	2	
Organic pollutants	Industrial: rights-of-way	2	2	Roads and rails
Nutrient input regime alteration	Agriculture	2	1	
Turbidity alteration	Municipal development	2	1	
Toxins	Industrial: other	1	4	Spills (roadway and rails), accidents at industrial sites
Channel or shoreline alteration	Other land management	1	3	Landowner in streams
Organic pollutants	Forestry	1	2	Processing (sawdust leachate)
Predation	Native species	1	2	Muskrats
Sediment load alteration	Forestry	1	2	
Organic matter input regime alteration	Forestry	1	1	
Turbidity alteration	Forestry	1	1	
Complications due to small populations				Species-specific
Other toxins		U	U	Drugs, pharmaceuticals, etc.
Southeastern Coastal Plain and Lower Piedmont				
Sediment load alteration	Agriculture	3	2	Row crops
Insecticides	Agriculture	2	3	Row crops
Complications due to small populations		2	2	<i>L. cariosa</i> most impacted
Hydrologic regime alteration	Municipal development	2	2	
Sediment load alteration	Municipal development	2	2	
Sediment load alteration	Forestry	2	2	
Toxins	Industrial: other	1	4	Spills from trucks or industrial accidents
Toxins	Industrial: other	1	4	General discharge
	Dam for water use and water			
Hydrologic regime alteration	withdrawal	1	2	Possible habitat destruction
Nutrient input regime alteration	Agriculture	1	1	Livestock

Appendix H5 continued. Aquatic mollusk species of greatest conservation need with individual threats.

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source	Scope	Severity	Comments
Dwarf wedgemussel <i>Alasmidonta heterodon</i>				
Complications due to small populations		4	3	
Sediment load alteration	Agriculture	3	3	
Sediment load alteration	Municipal development	3	3	
Toxins	Roadways	3	1	Most populations affected by roadway crossings to some degree
Habitat fragmentation	Municipal development	2	2	
Hydrologic regime alteration	Municipal development	2	2	Particularly along middle of Po River and in headwaters of Aquia Creek
Hydrologic regime alteration	Other sources of stress	2	2	Dams (Nottoway and Po rivers)
Nutrient input regime alteration	Agriculture	2	2	Primarily from cattle, especially in lower Po River
Toxins	Municipal development	2	2	
Triangle floater <i>Alasmidonta undulata</i>				
Sediment load alteration	Agriculture	3	2	
Turbidity alteration	Forestry	3	2	
Turbidity alteration	Agriculture	3	2	
Hydrologic regime alteration	Municipal development	2	2	
Sediment load alteration	Forestry	2	2	
Sediment load alteration	Municipal development	2	2	
Channel or shoreline alteration	Agriculture	1	1	
Toxins	Roadways	1	1	
Toxins	Municipal development	1	1	
Brook floater <i>Alasmidonta varicosa</i>				
Channel or shoreline alteration	Agriculture	4	3	Significant impact in the Shenandoah drainage
Sediment load alteration	Agriculture	3	4	Significant impact in the Shenandoah drainage
Habitat fragmentation	Municipal development	3	3	
Habitat fragmentation	Agriculture	3	3	
Hydrologic regime alteration	Municipal development	3	3	More of an impact in the Potomac drainage

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source	Scope	Severity	Comments
Nutrient input regime alteration	Agriculture	3	3	Mainly in Shenandoah drainage with large-scale farming operations
Toxins	Roadways	3	1	
Sediment load alteration	Municipal development	2	3	
Insecticides	Agriculture	2	2	
Sediment load alteration	Forestry	2	2	
Toxins	Municipal development	2	2	
Turbidity alteration	Agriculture			Mainly in Shenandoah drainage with large-scale farming operations
Carolina lance mussel <i>Elliptio angustata</i> and Atlantic spike <i>Elliptio producta</i>				
Hydrologic regime alteration	Municipal development	4	2	
Sediment load alteration	Municipal development	3	3	
Toxins	Municipal development	3	3	
Sediment load alteration	Agriculture	3	2	
Sediment load alteration	Forestry	3	2	
Turbidity alteration	Forestry	3	2	
Turbidity alteration	Agriculture	3	2	
Water temperature regime alteration	Municipal development	3	2	
Hydrologic regime alteration	Municipal development	2	2	
Sediment load alteration	Municipal development	2	2	
Sediment load alteration	Agriculture	2	2	
Toxins	Roadways	2	2	
Turbidity alteration	Agriculture	2	2	
Channel or shoreline alteration	Agriculture	1	1	
Sediment load alteration	Forestry	1	1	
Toxins	Roadways	1	1	
Toxins	Municipal development	1	1	
Turbidity alteration	Forestry	1	1	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source	Scope	Severity	Comments
Northern lance mussel <i>Elliptio fisheriana</i>				
Hydrologic regime alteration	Municipal development	4	2	Hydrologic regime alteration
Sediment load alteration	Municipal development	3	3	Sediment load alteration
Toxins	Municipal development	3	3	Toxins
Water temperature regime alteration	Municipal development	3	2	Water temperature regime alteration
Sediment load alteration	Agriculture	2	2	Sediment load alteration
Toxins	Roadways	2	2	Toxins
Turbidity alteration	Agriculture	2	2	Turbidity alteration
Sediment load alteration	Forestry	1	1	Sediment load alteration
Turbidity alteration	Forestry	1	1	Turbidity alteration
Yellow lance <i>Elliptio lanceolata</i>				
Sediment load alteration	Municipal development	3	2	
Sediment load alteration	Agriculture	3	2	
Toxins	Roadways	3	2	
Hydrologic regime alteration	Municipal development	2	3	
Toxins	Municipal development	2	3	
Channel or shoreline alteration	Agriculture	2	2	
Organic matter input regime alteration	Agriculture	2	1	
Sediment load alteration	Forestry	2	1	
Atlantic pigtoe <i>Fusconaia masoni</i>				
Habitat fragmentation	Agriculture	3	2	
Sediment load alteration	Forestry	3	2	
Sediment load alteration	Agriculture	3	2	
Turbidity alteration	Forestry	3	1	
Turbidity alteration	Agriculture	3	1	
Habitat fragmentation	Municipal development	2	2	
Hydrologic regime alteration	Municipal development	2	2	
Insecticides	Agriculture	2	2	
Insecticides	Municipal development	2	2	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source	Scope	Severity	Comments
Nutrient input regime alteration	Agriculture	2	2	
Sediment load alteration	Municipal development	2	2	
Toxins	Roadways	2	2	
Organic matter input regime alteration	Forestry	2	1	
Hydrologic regime alteration	Industrial: other	1	2	Dams - old mill dams
Tennessee heelsplitter <i>Lasmigona holstonia</i>				
Sediment load alteration	Agriculture	4	3	Livestock
Turbidity alteration	Agriculture	4	3	Livestock
Nutrient input regime alteration	Agriculture	3	3	Livestock
Sediment load alteration	Municipal development	3	3	
Channel or shoreline alteration	Agriculture	3	2	
Nutrient input regime alteration	Municipal development	3	2	Wastewater treatment
Green floater <i>Lasmigona subviridis</i>				
Complications due to small populations		4	U	
Sediment load alteration	Agriculture	3	2	
Turbidity alteration	Agriculture	3	2	
Hydrologic regime alteration	Municipal development	2	2	
Sediment load alteration	Forestry	2	2	
Toxins	Municipal development	2	2	
Turbidity alteration	Forestry	2	2	
Toxins	Roadways	2	1	
Water temperature regime alteration		1	1	
Virginia pigtoe <i>Lexingtonia subplana</i>				
Sediment load alteration	Forestry	4	2	
Habitat fragmentation	Agriculture	3	2	
Sediment load alteration	Agriculture	3	2	
Organic matter input regime alteration	Forestry	3	1	
Turbidity alteration	Forestry	3	1	

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source	Scope	Severity	Comments
Turbidity alteration	Agriculture	3	1	
Hydrologic regime alteration	Municipal development	2	2	
Nutrient input regime alteration	Agriculture	2	2	
Toxins	Roadways	2	2	
Round peaclam <i>Pisidium equilaterale</i>				
No review possible				
James spinymussel <i>Pleurobema collina</i>				
Nutrient input regime alteration		4	4	
Hydrologic regime alteration	Municipal development	4	3	
Salinity regime alteration	Agriculture	3	2	Livestock
Sediment load alteration	Forestry	3	2	
Sediment load alteration	Agriculture	3	2	
Toxins	Roadways	3	2	
Turbidity alteration	Forestry	3	2	
Turbidity alteration	Agriculture	3	2	
Toxins	Dam for water use and water withdrawal	2	4 dam, 2 withdrawal	Possible habitat destruction
Hydrologic regime alteration	Municipal development	2	3	
Toxins	Municipal development	2	3	
Hydrologic regime alteration	Municipal development	2	2	
Sediment load alteration	Municipal development	2	2	
Nutrient input regime alteration	Municipal development	2	1	
Sediment load alteration	Municipal development	2	1	Could be molluscicides (slugs)
Organic pollutants	Roadways	2	1?	
Hydrologic regime alteration	Industrial: other	1	4	Spills from trucks or industrial accidents
Channel or shoreline alteration	Municipal development	1	3	
Complications due to small populations	Native species	1	1	Beaver activity, reduces amount of habitat available
Water temperature regime alteration	Municipal development	1	1	
Insecticides	Roadways	1	1?	Creosote

VIRGINIA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY
Appendix H — Threats to Species of Greatest Conservation Need

Stress	Source	Scope	Severity	Comments
Creeper <i>Strophitus undulatus</i>				
Sediment load alteration	Forestry	3	2	
Sediment load alteration	Agriculture	3	2	
Toxins	Roadways	3	2	
Turbidity alteration	Forestry	3	2	
Turbidity alteration	Agriculture	3	2	
Toxins	Municipal development	2	3	
Hydrologic regime alteration	Municipal development	2	2	
Sediment load alteration	Municipal development	2	2	
Nutrient input regime alteration	Municipal development	2	1	
Channel or shoreline alteration	Municipal development	1	3	
Water temperature regime alteration	Municipal development	1	1	
Notched rainbow <i>Villosa constricta</i>				
Sediment load alteration	Agriculture	3	2	
Sediment load alteration	Forestry	3	2	
Turbidity alteration	Forestry	3	2	
Turbidity alteration	Agriculture	3	2	
Hydrologic regime alteration	Municipal development	2	2	
Sediment load alteration	Municipal development	2	2	
Channel or shoreline alteration	Agriculture	1	1	
Toxins	Roadways	1	1	
Toxins	Municipal development	1	1	