

Appendix N. Most relevant conservation actions for SGCN according to responses to the Species Survey free-response questions from the statewide Species Survey. Note: All actions were derived from survey respondents only with no suggested actions from the survey team.

Table N-1. Most relevant conservation actions for SGCN according to responses to the Species Survey free-response questions from the statewide Species Survey. Note: All actions were derived from survey respondents only with no suggested actions from the survey team.

Species	Relevant Actions	Effective Actions	Major Barriers
Whooping Crane	<ul style="list-style-type: none"> · Continued management of wetlands (e.g., control of invasive plants) · Restoring wetlands that provide important stopover and roosting habitat · Provide secure wintering habitat · Education of general public to reduce illegal shooting 	<ul style="list-style-type: none"> · Protection and restoration of large wetland complexes · Reintroduction of migratory populations · Restoration of Goose Pond Fish and Wildlife Area and Patoka National Wildlife Refuge (NWR) 	<ul style="list-style-type: none"> · Funding · Cost of delivery and location of projects · Lack of personnel · Illegal shootings
Sandhill Crane	<ul style="list-style-type: none"> · Wetland protection and restoration · Public education · Conservation easements on farm land surrounding protected areas · Resist establishment of hunting season · Buffers around suitable habitat 	<ul style="list-style-type: none"> · Wetlands Reserve Program · Partners for Wildlife program · Creation of Goose Pond · Restoration at Muscatatuck NWR · Wetland restoration · Wildlife preservation areas, particularly Jasper-Pulaski · Healthy Rivers Initiative 	<ul style="list-style-type: none"> · Competition with agriculture for land area · Political will · Funding · Cost of implementation and location of projects · Property values; landowners unwilling to sell land
Great Egret	<ul style="list-style-type: none"> · Maintain availability of shallow water feeding habitats · Cleaning of polluted areas such as the Calumet River · Wetland protection 	<ul style="list-style-type: none"> · Construction of wetlands (e.g., Goose Pond) · Development of Eagle Marsh at Ft. Wayne 	<ul style="list-style-type: none"> · Competition with recreational uses for Indiana reservoirs/lakes · Cooperation of industry and land owners

Species	Relevant Actions	Effective Actions	Major Barriers
<i>American Bittern</i>	<ul style="list-style-type: none"> · Acquire and restore large wetland complexes · Control invasive wetland plants · Habitat preservation 	<ul style="list-style-type: none"> · Creation of Goose Pond FWA · Development of Eagle Marsh at Ft. Wayne 	<ul style="list-style-type: none"> · Budget · Limited wetland availability
<i>Least Bittern</i>	<ul style="list-style-type: none"> · Acquire and restore large wetland complexes · Control invasive wetland plants · Habitat preservation · Restoration of hemi-marsh · Protection from road kills where marshes are bisected by roads 	<ul style="list-style-type: none"> · Creation of Goose Pond · Restoration of wetlands at Patoka River 	<ul style="list-style-type: none"> · Budget · Lack of land for restoring marshes
<i>Yellow-crowned Night-heron</i>	<ul style="list-style-type: none"> · Reduce recreational overuse of habitats · Statewide survey to assess status 	<ul style="list-style-type: none"> · Restoration and acquisition of large wetland complexes like Goose Pond FWA 	<ul style="list-style-type: none"> · Lack of adequate budget to manage for invasive plant control and water levels at Goose Pond and similar large wetland complexes
<i>Black-crowned Night-Heron</i>	<ul style="list-style-type: none"> · Reduce disturbance at breeding sites · Cleanup of polluted areas 	<ul style="list-style-type: none"> · Production of suitable foraging habitat (e.g., Goose Pond) · Restoring the Grand Calumet River 	<ul style="list-style-type: none"> · Political support · Cooperation with private industrial landowners where current colonies exist
<i>Eastern Whip-poor-will</i>	<ul style="list-style-type: none"> · Educate public about value of vegetative disturbance · Removal of understory invasive plants · Targeted surveys · Management of large tracts of mature forest 	<ul style="list-style-type: none"> · Surveys of nocturnal birds · Management of young forest habitat 	<ul style="list-style-type: none"> · Uneducated public · Expense of invasive plant removal · Lack of species knowledge
<i>Common Nighthawk</i>	<ul style="list-style-type: none"> · Increase gravel-surfaced sites for breeding · Provision of suitable rooftop habitat for nesting 	<ul style="list-style-type: none"> · Initiatives in Indianapolis have increased awareness 	<ul style="list-style-type: none"> · Changing architectural preferences for roofing · Cooperation by private building owners and roofing companies · Limited resources
<i>Common Gallinule</i>	<ul style="list-style-type: none"> · Preserve and restore large wetland complexes · Control invasive wetland plants · Long-term management of water levels in large wetlands 	<ul style="list-style-type: none"> · Creation of Goose Pond · Eagle Marsh restoration at Ft. Wayne 	<ul style="list-style-type: none"> · Inadequate budget for wetland management · Cooperation of private landowners · Lack of resources

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Black Rail</i>	<ul style="list-style-type: none"> · Large wetland restoration projects · Management for high-diversity marshes · Control of invasive wetland plants · Water control structures 	<ul style="list-style-type: none"> · Creation of Goose Pond · Restoration of Patoka River National Wildlife Refuge 	<ul style="list-style-type: none"> · Political will · Inadequate budget · Lack of land available for wetland restoration
<i>King Rail</i>	<ul style="list-style-type: none"> · Large wetland restoration projects · Control invasive plants · Manage water levels · Restoration of hemi-marsh · Management of ditch habitat adjacent to refuges 	<ul style="list-style-type: none"> · Creation of Goose Pond · Restoration at Limberlost Swamp Wetland Preserve · Establishment of additional habitat at Patoka River NWR 	<ul style="list-style-type: none"> · Political will · Inadequate budget · Lack of land suitable for restoration · Legal problems with water control structures
<i>Virginia Rail</i>	<ul style="list-style-type: none"> · Preserve marsh habitats · Control invasive wetland plants · Maintain natural water flow · Restore wetlands 	<ul style="list-style-type: none"> · Wetland Reserve Program · Creation of Goose Pond · Management of Pine Creek in Benton County · Wetland restoration at Eagle Marsh in Ft. Wayne · Restoration at Limberlost Swamp Wetland Preserve 	<ul style="list-style-type: none"> · Political will · Inadequate budget · Lack of land available for wetland restoration
<i>Sharp-shinned Hawk</i>	<ul style="list-style-type: none"> · Maintain large patches of contiguous forest · Resist housing development on forest lands · Maintain forest habitat along Lake Michigan shoreline · Restore forests 	<ul style="list-style-type: none"> · Creation of nature preserves, such as Goose Pond 	<ul style="list-style-type: none"> · Loss and fragmentation of mature forests · Inadequate funding

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Short-eared Owl</i>	<ul style="list-style-type: none"> · Maintain restored grasslands and hayfields · Reduce mowing of grasslands · Reduce conversion of grasslands to coal mines · Maintain CRP lands · Restore grasslands 	<ul style="list-style-type: none"> · CRP enrollments · Restoration of grasslands at Goose Pond 	<ul style="list-style-type: none"> · Cooperation of private landowners · Cooperation of coal mine companies · Unwillingness to use fire as management tool · Inadequate funding
<i>Red-shouldered Hawk</i>	<ul style="list-style-type: none"> · Preserve large contiguous mature forests, especially riparian areas · Resist housing development on forest lands · Restore forested wetlands 	<ul style="list-style-type: none"> · Reforestation of bottomland forests in southern Indiana · Creation of wildlife management areas, such as Goose Pond 	<ul style="list-style-type: none"> · Political will · Cooperation of private landowners · Cooperation of timber companies · Inadequate funding · Pressures from development
<i>Broad-winged Hawk</i>	<ul style="list-style-type: none"> · Protect large forest patches · Forest habitat restoration 	<ul style="list-style-type: none"> · Proposed purchase of new protected forests near Muscatatuck and along the Wabash River · Creation of wildlife management areas, such as Goose Pond 	<ul style="list-style-type: none"> · Political will · Zoning regulations · Pressures from development · Inadequate funding
<i>Northern Harrier</i>	<ul style="list-style-type: none"> · Restore grasslands · Restore wetlands 	<ul style="list-style-type: none"> · Creation of Kankakee Sands Restoration · Creation of wildlife management areas, such as Goose Pond 	<ul style="list-style-type: none"> · Inadequate funding · Large scale of habitat required for breeding
<i>Peregrine Falcon</i>	<ul style="list-style-type: none"> · Minimize disturbance during nesting season · Continue active management · Public education in urban areas 	<ul style="list-style-type: none"> · Reintroduction/hacking programs · Artificial nest boxes · Continued active management · Nest monitoring · Rescue of injured birds 	<ul style="list-style-type: none"> · Industrial activity (possible contamination) · Collisions with buildings or vehicles · Budget for monitoring · Cooperation of private landowners
<i>Bald Eagle</i>	<ul style="list-style-type: none"> · Maintain bottomland floodplain habitat · Protection of individual nest sites 	<ul style="list-style-type: none"> · Strong state agency action · Public education campaigns 	<ul style="list-style-type: none"> · Cooperation among state and federal agencies · None currently; species

Species	Relevant Actions	Effective Actions	Major Barriers
	<ul style="list-style-type: none"> · Manage water levels in rivers and lakes · Improve water quality 	<ul style="list-style-type: none"> · Protection of nesting areas · Restoration of wetland habitat, such as Goose Pond 	<ul style="list-style-type: none"> · is recovered and doing well
Mississippi Kite	<ul style="list-style-type: none"> · Preserve large continuous riparian woodlands · Forest habitat restoration 	<ul style="list-style-type: none"> · Protection of forest habitat at state and city parks · Restoration of Patoka River National Wildlife Refuge 	<ul style="list-style-type: none"> · Conversion of forest habitat to housing and agriculture
Osprey	<ul style="list-style-type: none"> · Maintain habitat · Improve water quality · Preserve nest sites 	<ul style="list-style-type: none"> · Reintroduction program · Provision of nesting platforms · Population monitoring 	<ul style="list-style-type: none"> · Inadequate funding · Cooperation of owners of large manmade towers used for nesting
Barn Owl	<ul style="list-style-type: none"> · Protect and restore grasslands · Preserve suitable nest sites · Increase CRP grasslands 	<ul style="list-style-type: none"> · CRP enrollment · Provision of nest boxes · Population monitoring 	<ul style="list-style-type: none"> · Agricultural economics · Other priorities · Urban sprawl
Ruddy Turnstone	<ul style="list-style-type: none"> · Protect and restore migratory stopover sites, especially along Lake Michigan shoreline 	<ul style="list-style-type: none"> · Restoration of Goose Pond FWA and Patoka River NWR 	<ul style="list-style-type: none"> · Development/contamination issues along Lake Michigan · Lack of available land for habitat restoration projects along Lake Michigan
Upland Sandpiper	<ul style="list-style-type: none"> · Preserve grasslands · Reduce mowing of grasslands 	<ul style="list-style-type: none"> · Kankakee Sands restoration efforts 	<ul style="list-style-type: none"> · Cooperation of farmers
Buff-breasted Sandpiper	<ul style="list-style-type: none"> · Maintain open areas with short grass, such as sod farms · Maintain shallow-water areas · Create new shorebird management areas · Control invasive plants in non-agricultural wetlands 	<ul style="list-style-type: none"> · Creation of Goose Pond and other large wetland complexes 	<ul style="list-style-type: none"> · Cooperation of private landowners · Political will · Budget constraints
Piping Plover	<ul style="list-style-type: none"> · Maintain shallow-water areas · Protect suitable nesting sites · Protect areas along Lake Michigan with 	<ul style="list-style-type: none"> · Cane Ridge management area · Creation of Goose Pond 	<ul style="list-style-type: none"> · Development/contamination issues along Lake Michigan · Human disturbance · Political will · Inadequate budget

Species	Relevant Actions	Effective Actions	Major Barriers
	<ul style="list-style-type: none"> · sandbars, pools for foraging · Reintroduction 		<ul style="list-style-type: none"> · High cost associated with location of projects
<i>Short-billed Dowitcher</i>	<ul style="list-style-type: none"> · Maintain shallow-water areas · Preserve large wetland complexes · Control invasive wetland plants 	<ul style="list-style-type: none"> · Development and management of Goose Pond · Purchase of large wetland projects 	<ul style="list-style-type: none"> · Political will · Inadequate budget for active habitat management
<i>Wilson's Phalarope</i>	<ul style="list-style-type: none"> · Maintain shallow-water areas · Reintroduce light grazing into wetland/grassland systems · Control invasive plants 	<ul style="list-style-type: none"> · Kankakee Sands restoration · Creation and management of Goose Pond and Patoka River NWR 	<ul style="list-style-type: none"> · Political will · Management attitudes · Drainage on agricultural fields · Insufficient budgets
<i>American Golden-plover</i>	<ul style="list-style-type: none"> · Maintain wet-soil areas · Preserve large wetland complexes · Reduce conversion of farm land to development · Encourage no-till soybean production · Education of ag community · Assess impacts of wind farm development · Provide incentives to farmers to increase landowner participation 	<ul style="list-style-type: none"> · Conservation initiatives such as the Important Bird Area program and the Audubon Society · Pine Creek habitat area · Designation of Union Township in Benton County as an IBA · Willingness of wind-energy companies to work with IBA constraints 	<ul style="list-style-type: none"> · Drainage on agricultural fields · Political will · Management attitudes · Insufficient budgets for active management · Cooperation of farmers
<i>Greater Yellowlegs</i>	<ul style="list-style-type: none"> · Maintain shallow-water areas · Restore large wetland complexes · Create new shorebird management areas · Incentivize farmers to restore seasonal wetlands on their lands · Control invasive plants 	<ul style="list-style-type: none"> · Creation and management of Goose Pond · Planned acquisitions of large-scale state properties that include wetland management and restoration 	<ul style="list-style-type: none"> · Political will · Budget constraints · Cooperation of private landowners · Cooperation of DOT

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Solitary Sandpiper</i>	<ul style="list-style-type: none"> · Maintain shallow-water areas · Restore large wetland complexes · Control invasive plants · Create new shorebird management areas · Restore ephemeral wetlands in forests and agricultural lands 	<ul style="list-style-type: none"> · Creation and management of Goose Pond · Planned acquisitions of large-scale state properties that include wetland management and restoration 	<ul style="list-style-type: none"> · Political will · Budget constraints · Cooperation of private landowners · Cultural change in the agricultural community
<i>Henslow's Sparrow</i>	<ul style="list-style-type: none"> · Increase CRP grasslands · Implement fire regimes · Control woody encroachment · Restore grasslands on reclaimed coal mines · Conservation easements · Maintain large grassland tracts · Minimize disturbance during nesting season · Improve grazing practices · Prevent conversion of grassland to row crops · Incentivize landowners to maintain grasslands in early successional stage 	<ul style="list-style-type: none"> · LRWP's Arrowhead Prairie restoration · CRP enrollment · CRP SAFE program · Grassland management at Prophetstown, Big Oaks, Pine Creek · Enforcement of no disturbance during the primary nesting season · Kankakee Sands restoration · Reclaiming strip mines · Land acquisition programs such as HRI, NAWCA partnerships, Patoka NWR 	<ul style="list-style-type: none"> · High commodity prices · Urban sprawl · Cooperation of private landowners · Budget constraints for active management · Increasing ownership fragmentation · Lack of manpower · Difficulty of acquiring new land for management · CRP enrollment caps · Inadequate financial incentives

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Marsh Wren</i>	<ul style="list-style-type: none"> · Encourage wetland enrollment in protection programs for private lands · Habitat preservation and restoration · Improve water quality · Control invasive plants in wetlands 	<ul style="list-style-type: none"> · Creation of Goose Pond · LRWP's Eagle Marsh restoration · Removal of invasive species 	<ul style="list-style-type: none"> · Cooperation of private landowners · Funds for restoration of wetlands
<i>Sedge Wren</i>	<ul style="list-style-type: none"> · Prevent conversion of habitat to row crops · Reclaim coal mine grasslands · Maintain grassland habitat on marginal lands, CRP lands, and reclaimed coal mines · Implement fire regimes · Control woody encroachment · Maintain wet meadows 	<ul style="list-style-type: none"> · Creation and maintenance of large-scale grasslands at Prophetstown, Goose Pond, Big Oaks NWR and state gamebird habitat areas 	<ul style="list-style-type: none"> · Cooperation of private landowners · Budget constraints · Resources for habitat acquisition
<i>Worm-eating Warbler</i>	<ul style="list-style-type: none"> · Implement best management practices in forestry · Protect large blocks of contiguous forest · Limit forest conversion to non-forest uses 	<ul style="list-style-type: none"> · The Nature Conservancy (TNC) efforts to consolidate forest protection in the greater Brown County region 	<ul style="list-style-type: none"> · Urban sprawl · Domestic cats · Political will · Cooperation of private landowners and timber industry · Zoning restrictions · Land values
<i>Loggerhead Shrike</i>	<ul style="list-style-type: none"> · Reduce conversion of habitat to farmland · Protect reclaimed grasslands · Engage with private landowners to maintain suitable habitat, especially fencerows 	<ul style="list-style-type: none"> · Population monitoring 	<ul style="list-style-type: none"> · Cooperation of private landowners · Cooperation of coal companies · Agricultural economics
<i>Black-and-white Warbler</i>	<ul style="list-style-type: none"> · Limit conversion of forest to non-forest land uses 	<ul style="list-style-type: none"> · TNC efforts to consolidate forest protection in the greater Brown County region 	<ul style="list-style-type: none"> · Urban/suburban development · Domestic cats · Willingness of private landowners to maintain large blocks of forest · Land values
<i>Cerulean Warbler</i>	<ul style="list-style-type: none"> · Create small openings in forests · Retain large trees · Moderate levels of timber harvest within actively managed 	<ul style="list-style-type: none"> · Research into timber harvest effects on habitat quality 	<ul style="list-style-type: none"> · Cowbird nest predation · Forest fragmentation · Cooperation of public and private forest land managers · Difficulty in restoring

Species	Relevant Actions	Effective Actions	Major Barriers
	forests that retain some large diameter oaks and hickories along the edges of retained forest <ul style="list-style-type: none"> · Woodland restoration · Remove brown-headed cowbirds · Limit conversion of forest to non-forest land uses 		forests <ul style="list-style-type: none"> · Land values
<i>Kirtland's Warbler</i>	<ul style="list-style-type: none"> · Maintain stopover habitat in natural vegetation along Lake Michigan shoreline · Reduce conversion of forests to housing development 	<ul style="list-style-type: none"> · Identify stopover habitat, especially along Lake Michigan shoreline 	<ul style="list-style-type: none"> · Zoning regulations · Political will
<i>Hooded Warbler</i>	<ul style="list-style-type: none"> · Reduce development in forest lands · Maintain and increase the amount of large forested properties · Restore bottomland forests · Reduce forest fragmentation · Limit conversion of forests to non-forest land uses 	<ul style="list-style-type: none"> · TNC efforts to consolidate forest protection in the greater Brown County region 	<ul style="list-style-type: none"> · Cooperation of private landowners · Cooperation of timber companies · Willingness of public land managers to adopt forestry best management practices · Budget constraints · Availability of land for woodland restoration
<i>Western Meadowlark</i>	<ul style="list-style-type: none"> · Increase CRP grasslands · Reduce loss of reclaimed coal mine grasslands 	<ul style="list-style-type: none"> · Maintain grasslands in western counties 	<ul style="list-style-type: none"> · Cooperation of private landowners · Cooperation of coal companies with reclaimed grasslands
<i>Golden-winged Warbler</i>	<ul style="list-style-type: none"> · Maintain forested wetlands · Protect stopover habitat · Conserve small private woodlots 	<ul style="list-style-type: none"> · Identify stopover habitat 	<ul style="list-style-type: none"> · Cooperation of private landowners to maintain forest cover on their lands · Willingness of public land managers to manage for diversity of habitats on their properties
<i>Yellow-headed Blackbird</i>	<ul style="list-style-type: none"> · Restore and maintain large wetland complexes, especially in northern part of the state 	<ul style="list-style-type: none"> · Wetland restorations at Goose Pond FWA, Eagle Marsh in Ft. Wayne, Limberlost Swamp Wetland Preserve, Patoka River NWR 	<ul style="list-style-type: none"> · Lack of funding · Lack of land available near Lake Michigan for large wetland restoration

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Black Tern</i>	<ul style="list-style-type: none"> · Maintain large wetland complexes · Active water management · Control invasive plants · Restore hemi-marsh 	<ul style="list-style-type: none"> · Wetland restoration at Goose Pond · Management at Pine Creek Gamebird Habitat Area · Potential acquisition of lands that might include large wetland complexes 	<ul style="list-style-type: none"> · Inadequate budget for active management · Selecting suitable sites to manage
<i>Least Tern</i>	<ul style="list-style-type: none"> · Restrict recreational overuse on rivers · Reduce disturbance at power plants · Control predator access · Control invasive plants · Establish permanent nesting habitat · Improve water quality 	<ul style="list-style-type: none"> · Habitat creation programs such as Cane Ridge, Gibson Lake, and Goose Pond · Active management · Working with power companies 	<ul style="list-style-type: none"> · Political will · Budget constraints to continue management activities · Unwillingness to change water quality standards
<i>Trumpeter Swan</i>	<ul style="list-style-type: none"> · Do not reopen active coal mines · Collaborate with coal companies on land use · Re-establish traditional breeding habitat · Remove non-native mute swans · Protection and restoration of wetlands, especially in the northern part of the state 	<ul style="list-style-type: none"> · Wetland restoration of Goose Pond FWA 	<ul style="list-style-type: none"> · Cooperation with private landowners · Cooperation with coal companies · Finding good locations for projects · Property values
<i>Rafinesque's Big-eared Bat</i>	<ul style="list-style-type: none"> · Continue monitoring efforts · Protect caves · Limit recreational caving · Protect mature forests · Protect riparian areas · Retain large hollow trees 	<ul style="list-style-type: none"> · Protection and monitoring of caves · Promoting mature forests 	<ul style="list-style-type: none"> · Time constraints · Funding · Resistance from public caving community · Limited public ownership of caves · Poor understanding of hibernation locations

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Silver-haired Bat</i>	<ul style="list-style-type: none"> · Education and awareness · Reduce fatalities at wind energy facilities · Protect caves · Limit recreational caving · Continue monitoring efforts · Manage forests to provide roost trees 	<ul style="list-style-type: none"> · Raising cut-in speeds of wind turbines · Cave gating · Promoting forest cover 	<ul style="list-style-type: none"> · Costs associated with needed actions · Limited understanding of which caves are being used for hibernation · Cooperation from recreational caving organizations · Limited number of caves currently in public ownership · Lack of information about species' status · Removal of forest cover
<i>Eastern Red Bat</i>	<ul style="list-style-type: none"> · Reduce fatalities at wind energy facilities · Preserve intact forest habitat · Reduce urban sprawl and commercial property expansion · Reduce forest conversion to other land uses 	<ul style="list-style-type: none"> · Raising cut-in speeds at wind-energy facilities · Monitoring at wind energy sites · Research and mitigation efforts at wind farms 	<ul style="list-style-type: none"> · Disinterest in environmental issues · Land values · Wind farms · Increasing cost of energy
<i>Hoary Bat</i>	<ul style="list-style-type: none"> · Reduce fatalities at wind energy facilities · Protect forests · Learn more about the species' ecology 	<ul style="list-style-type: none"> · Feathering wind turbine blades below cut-in speeds · Monitoring at wind energy sites · Research and mitigation efforts at wind farms 	<ul style="list-style-type: none"> · Costs associated with lost production and turbine warranties that prevent blade feathering · Land values · No legal nexus to control wind energy facilities
<i>Southeastern Myotis</i>	<ul style="list-style-type: none"> · Protect caves · Monitoring to determine species' distribution (may be extirpated) · Re-establish older-growth bottomland hardwood forests 	<ul style="list-style-type: none"> · Cave gating · Monitoring efforts · Protection of roosts 	<ul style="list-style-type: none"> · Poor understanding of where species hibernates · Cooperation from recreational caving organizations · White-nose syndrome
<i>Gray Myotis</i>	<ul style="list-style-type: none"> · Protect caves · Restrict recreational caving · Population monitoring 	<ul style="list-style-type: none"> · Cave gating · Monitoring efforts · Roost protection 	<ul style="list-style-type: none"> · Cooperation from recreational caving organizations · Limited number of caves in public ownership · Limited understanding of caves where species hibernates/roosts · White-nose syndrome

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Eastern Small-footed Myotis</i>	<ul style="list-style-type: none"> · Protect rocky habitat · Protect caves · Education and awareness · Inventory and monitoring 	<ul style="list-style-type: none"> · Cave gating · Locating populations 	<ul style="list-style-type: none"> · Lack of funding · Need better understanding of where species hibernates · cooperation from recreational caving organizations · Different ecology than other bats
<i>Little Brown Myotis</i>	<ul style="list-style-type: none"> · Protect roost trees · Decrease human visitation to caves used by bats · WNS research · Disease management · Protect intact forests · Reduce collisions with wind turbines · Preserve wetlands and riparian corridors · Public education and awareness · Population monitoring · Protect caves 	<ul style="list-style-type: none"> · Protection of caves · Contributions to national WNS implementation plan · Cave gating · Land acquisition projects 	<ul style="list-style-type: none"> · Lack of funding · No definitive methods for managing WNS · Disinterest in environmental issues · Pesticide use · Spread of WNS · Time constraints · Cooperation from wind energy
<i>Northern Long-eared Myotis</i>	<ul style="list-style-type: none"> · Prevent spread of WNS · Preserve intact forest · Protect wetlands and riparian corridors · Reduce mortalities from wind turbines · Public awareness and education · Protect caves · Restrict recreational cave use 	<ul style="list-style-type: none"> · Contributions to national WNS implementation plan · Cave gating · Research on species' ecology 	<ul style="list-style-type: none"> · Lack of funding · No clear solution to WNS · Disinterest in environmental issues · Time constraints
<i>Indiana Myotis</i>	<ul style="list-style-type: none"> · Control impacts of WNS · Protect roost trees · Decrease human visitation to caves · Protect hibernacula · Public education and awareness · Protect caves · Protect forests · Reduce pesticide use 	<ul style="list-style-type: none"> · Cave gating · WNS guidelines · Forest management · Contributions to national WNS implementation plan · identification/prot ection of maternity colonies 	<ul style="list-style-type: none"> · Limited knowledge of WNS · Lack of funding · Disinterest in environmental issues · Pesticide use
<i>Evening Bat</i>	<ul style="list-style-type: none"> · Limiting forest conversaion to non-forest uses · Locate populations and study ecology 	<ul style="list-style-type: none"> · Funding supporting other bat work 	<ul style="list-style-type: none"> · Land values · Public sentiment

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Tri-colored Bat</i>	<ul style="list-style-type: none"> · Protect roost trees · Decrease human visitation to caves · Mitigate WNS · Protect forests · Protect wetlands and riparian corridors · Reduce mortality from wind turbines · Public education and awareness 	<ul style="list-style-type: none"> · Contributions to national WNS implementation plan · Cave gating · Funding for WNS research 	<ul style="list-style-type: none"> · No clear solution to WNS · Disinterest in environmental issues · Funding · Time constraints
<i>Least Weasel</i>	<ul style="list-style-type: none"> · Establish and monitoring and research program · Cut more timber to provide downed woody debris · Reduce loss of habitat connectivity · Expand grasslands and shrub lands 	<ul style="list-style-type: none"> · Forest management · Kankakee Sands restoration · Seasonal burns promote prey diversity 	<ul style="list-style-type: none"> · Funding · Lack of awareness · Difficulty of trapping · Lack of knowledge
<i>American Badger</i>	<ul style="list-style-type: none"> · Protect and restore grasslands · Enhance connectivity of habitat 	<ul style="list-style-type: none"> · CRP enrollment · Prairie restoration efforts at Kankakee 	<ul style="list-style-type: none"> · Farmer and landowner cooperation · Agricultural practices
<i>Swamp Rabbit</i>	<ul style="list-style-type: none"> · Restore bottomland hardwood forests · Create corridors between habitat patches · Reintroduction program · Enroll lands in WRP 	<ul style="list-style-type: none"> · Acquiring large blocks of habitat · Long-term research program 	<ul style="list-style-type: none"> · Land values · Cooperation of coal industry · Lack of funding · Lack of interest in the species
<i>Plains Pocket Gopher</i>	<ul style="list-style-type: none"> · Restore prairies · Establish populations through translocation 	<ul style="list-style-type: none"> · Kankakee Sands restoration · Restoration of non-game habitats by groups such as NICHES, TNC and Division of Nature Preserves · Recent inventory of current distribution 	<ul style="list-style-type: none"> · Lack of funding and staff · Cooperation of farmers · Public disinterest

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Allegheny Woodrat</i>	<ul style="list-style-type: none"> · Land acquisition · Reintroduction program · Establish corridors between habitat · Reduce exposure to raccoon roundworm · Supplement genetic diversity · Forest management · Continue population monitoring 	<ul style="list-style-type: none"> · Identification and protection of habitats · Monitoring program · Raccoon roundworm baiting program · translocation program · captive breeding program · genetic analysis 	<ul style="list-style-type: none"> · Cooperation of landowners · Quarry industry · Raccoon population levels · Lack of public interest · Small population size
<i>Franklin's Ground Squirrel</i>	<ul style="list-style-type: none"> · Restore grassland habitat · Improve connectivity of grasslands · Translocation program 	<ul style="list-style-type: none"> · Land acquisition and management efforts · Grassland habitat restoration 	<ul style="list-style-type: none"> · Limited population size · Lack of knowledge about habitat suitability · Lack of funding · Public disinterest
<i>Star-nosed Mole</i>	<ul style="list-style-type: none"> · Basic population surveys 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Little known about abundance and distribution · Limited funding
<i>Smoky Shrew</i>	<ul style="list-style-type: none"> · Basic population surveys · Maintain upland hardwood forests 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Lack of funding · Lack of interest
<i>American Pygmy Shrew</i>	<ul style="list-style-type: none"> · Basic population surveys · Research habitat suitability 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Cost and staffing · Lack of interest
<i>Hellbender</i>	<ul style="list-style-type: none"> · Restore riparian buffers · Improve water quality · Limit by-catch · Captive breeding and reintroduction · Public education and awareness · Continue population monitoring 	<ul style="list-style-type: none"> · Wastewater treatment · Land acquisition · Captive breeding and head starting · Translocations from West Virginia 	<ul style="list-style-type: none"> · Lack of funding · Coordination with landowners and farmers · Small population size
<i>Common Mudpuppy</i>	<ul style="list-style-type: none"> · Gather baseline population data · Improve water quality · Protect aquatic systems 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Cost of improving sewage treatment facilities · Other priorities

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Northern Cricket Frog</i>	<ul style="list-style-type: none"> · Conduct range wide survey · Research causes of decline, especially in northern Indiana · Protect wetlands · Establish new populations 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Time constraints · Funding · Droughts · Lack of interest · Lack of knowledge · Conflicting land use needs
<i>Crawfish Frog</i>	<ul style="list-style-type: none"> · Repatriation · Establish no-plow zones · Captive breeding · Restore grasslands · Restore wetlands · Manage grasslands (burning and mowing) · Reclaim mine lands 	<ul style="list-style-type: none"> · No-plow zones around breeding wetlands · Wetland construction · Predator removal · Cattail removal · Captive rearing · Grassland and wetland restoration at Hillenbrand FWA · Translocations at Big Oaks · Reclaiming strip mines · Buffers around burrows 	<ul style="list-style-type: none"> · Funding · Conflicting land use needs · Education of landowners and managers · High cost of captive breeding · Disease
<i>Plains Leopard Frog</i>	<ul style="list-style-type: none"> · Protect wetlands · Protect grasslands · Assess abundance and range in Indiana 	<ul style="list-style-type: none"> · Habitat restoration at Kankakee Sands 	<ul style="list-style-type: none"> · Coordination with landowners · Lack of interest · Lack of knowledge
<i>Northern Leopard Frog</i>	<ul style="list-style-type: none"> · Increase wetland breeding areas · Protect buffers around wetlands · Improve water quality 	<ul style="list-style-type: none"> · Wetlands protected in land reserve programs 	<ul style="list-style-type: none"> · Cost of land acquisition · Ag and urban expansion · Cost of building wetlands
<i>Streamside Salamander</i>	<ul style="list-style-type: none"> · Protect streams · Protect forested riparian zones · Improve water quality · Survey to determine abundance and range 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Funding · Personnel · Mismanagement of streams
<i>Blue-spotted Salamander</i>	<ul style="list-style-type: none"> · Protect/create vernal pools · Protect large wooded areas · Protect buffers around wetlands · Determine abundance and distribution (hybridization issues) 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Funding · Cost of land acquisition · Cooperation of private landowners · Political will

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Mole Salamander</i>	<ul style="list-style-type: none"> · Manage Twin Swamps Nature Preserve for habitat · Acquire habitat adjacent to Twin Swamps 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Very limited range · Cost of land acquisition
<i>Green Salamander</i>	<ul style="list-style-type: none"> · Protect rocky cliff habitat · Protect forests adjacent to habitat · Population inventory 	<ul style="list-style-type: none"> · Increased survey efforts 	<ul style="list-style-type: none"> · Cooperation of agencies · Cooperation of private landowners · Very limited range
<i>Four-toed Salamander</i>	<ul style="list-style-type: none"> · Protect wetlands and upland habitat · Acquire land where species occurs · Incentivize landowners to protect woodlands and wetlands 	<ul style="list-style-type: none"> · Surveys · Protection of wetland and riparian habitat · Land acquisition at Muscatatuck Bottoms 	<ul style="list-style-type: none"> · Cost of land acquisition · Cooperation of landowners · Conflicting land use needs
<i>Red Salamander</i>	<ul style="list-style-type: none"> · Survey to determine whether species exists in Indiana · Protect stream quality 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Funding · Personnel · Forestry practices
<i>Cottonmouth</i>	<ul style="list-style-type: none"> · Protect and restore river corridors · Restore floodplains · Reduce road barriers · Protect from poachers 	<ul style="list-style-type: none"> · Acquiring habitat · Expansion and improvement of Patoka River NWR 	<ul style="list-style-type: none"> · Cost of land acquisition · Poachers · Roads · Unwillingness to sell land
<i>Scarlet snake</i>	<ul style="list-style-type: none"> · Glade restoration and preservation via prescribed burning and selective cutting · Acquire glades where species occurs · Glade vegetation management 	<ul style="list-style-type: none"> · Acquisition of land in the Knob region 	<ul style="list-style-type: none"> · Urban sprawl · Limited population size · Cost of land acquisition
<i>Kirtland's Snake</i>	<ul style="list-style-type: none"> · Preserve low, wet woods and fields where burrowing crayfish are abundant · Proper habitat management (burns, mowing) · Remove trash and debris from habitat · Keep out of pet trade · Rangewide survey 	<ul style="list-style-type: none"> · Purchases at Muskatatuck Bottoms · Protection from development 	<ul style="list-style-type: none"> · Funding · Personnel · Pet trade

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Timber Rattlesnake</i>	<ul style="list-style-type: none"> · Preserve large forest tracts · Mitigate road barriers · Limit development in forested areas · Protect den locations · Communication with public 	<ul style="list-style-type: none"> · HEE research to understand response to timber harvest · Land acquisition in southern Indiana 	<ul style="list-style-type: none"> · Lack of knowledge · Resistance from land developers · Unwillingness to protect venomous species · Roads
<i>Red-bellied Mudsnake</i>	<ul style="list-style-type: none"> · Determine whether extirpated status is correct · Protect suitable habitat 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Willingness to preserve remaining habitat
<i>Copper-bellied Watersnake</i>	<ul style="list-style-type: none"> · Restore and protect habitat · Expand floodplain and upland habitat with multiple wetlands · Mitigate roads as barriers · Restrict clearing of forested bottomlands 	<ul style="list-style-type: none"> · Restoration of potential habitat in northeast Indiana · WRP and Healthy Forests programs · Outreach programs · Conservation agreements in coal industry 	<ul style="list-style-type: none"> · Lack of incentives to maintain woodlands and wetlands · Concerns about flooding · Roads · Lack of interest
<i>Rough Greensnake</i>	<ul style="list-style-type: none"> · Protect wetland and riparian habitat · Better population survey · Manage for healthy forest edge habitats · Limit mowing along roads · Restrict pesticide use 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Public awareness
<i>Smooth Greensnake</i>	<ul style="list-style-type: none"> · Survey to determine remaining populations · Reduce burning during active season · Restrict herbicide use · Protect grasslands and edge habitat 	<ul style="list-style-type: none"> · Protection of lands through TNC, land trusts, and DNR Nature Preserves 	<ul style="list-style-type: none"> · Economic interests of land developers
<i>Massasauga</i>	<ul style="list-style-type: none"> · Acquire and manage habitat · Reduce shrub encroachment · Restore habitats adjacent to occupied areas · Maintain open habitats · Repatriation/translocation 	<ul style="list-style-type: none"> · Land acquisition and management · Fen conservation · Educational programs 	<ul style="list-style-type: none"> · Cost of land acquisition · Fear of snakes · Lack of interest · Funding · Unwillingness to sell land

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Southeastern Crowned Snake</i>	<ul style="list-style-type: none"> · Acquire and manage habitat (forested knobs) · Maintain glade habitats (fire regimes) 	<ul style="list-style-type: none"> · Land acquisition and management 	<ul style="list-style-type: none"> · Manpower · Access to sites in private ownership · Unwillingness to sell land · Funding
<i>Butler's Gartersnake</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Western Ribbonsnake</i>	<ul style="list-style-type: none"> · Conserve wetlands · Rangewide survey to determine status and management needs 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Funding · Lack of incentives to protect habitat
<i>Spotted Turtle</i>	<ul style="list-style-type: none"> · Conserve wetlands and small lakes · Improve water quality · Mitigate road barriers · Police pet trade · Incentivize landowners to retain wetland habitats 	<ul style="list-style-type: none"> · Wetland conservation and management 	<ul style="list-style-type: none"> · Funding · Unwillingness to sell land · Lack of resources · Roads · Cost of land acquisition
<i>Blanding's Turtle</i>	<ul style="list-style-type: none"> · Manage mesopredators · Protect large wetlands · Minimize nest disturbance · Mitigate road hazards · Surveys to determine status 	<ul style="list-style-type: none"> · Wetland restoration and management 	<ul style="list-style-type: none"> · Funding · Roads · Lack of resources · Unwillingness to sell land · Time constraints
<i>Eastern Mud Turtle</i>	<ul style="list-style-type: none"> · Accurately assess status of species · Preserve and restore bottomland hardwoods and floodplain swamps 	<ul style="list-style-type: none"> · Initiatives to preserve land along the Wabash River 	<ul style="list-style-type: none"> · Funding · Lack of knowledge · Cost of land acquisition
<i>Alligator Snapping Turtle</i>	<ul style="list-style-type: none"> · Survey to determine whether species is extirpated · Educate fishers 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · None
<i>River Cooter</i>	<ul style="list-style-type: none"> · Survey to determine population extent · Improve water quality · Eliminate construction of levees where practicable 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Scale of water quality issues · Resistance from ag community
<i>Eastern Box Turtle</i>	<ul style="list-style-type: none"> · Educate landowners and citizens · Enhance forest connectivity · Protect large forest 	<ul style="list-style-type: none"> · Educational efforts · Land acquisition · Legislation protecting them 	<ul style="list-style-type: none"> · Cost of road crossing construction · Pet trade · Development in forests · Funding

Species	Relevant Actions	Effective Actions	Major Barriers
	<ul style="list-style-type: none"> tracts Control invasive woody plants Remove mesopredators Mitigate road hazards Restrict collection for pet trade 	<ul style="list-style-type: none"> from collection HEE research on response to forest practices 	<ul style="list-style-type: none"> Citizen attitudes
<i>Ornate Box Turtle</i>	<ul style="list-style-type: none"> Reduce mesopredators Maintain grassland habitat Mitigate road hazards Implement fire regimes Conserve ephemeral wetlands Supplement populations (headstarting) 	<ul style="list-style-type: none"> Land acquisition Population surveys Kankakee Sands restoration Habitat management 	<ul style="list-style-type: none"> Unwillingness to sell land Funding Other priorities Cost of habitat acquisition Cooperation with landowners
<i>Redside Dace</i>	<ul style="list-style-type: none"> Protect riparian corridors along small order streams Control water withdrawal Control take of bait Understand effects of climate change Write watershed management plans Inform stakeholders Keep streams cool Maintain stream substrates 	<ul style="list-style-type: none"> Introduction to second watershed Investigation into population genetic structure 	<ul style="list-style-type: none"> Coordination with landowners Climate change Lack of interest in BMPs Drainage and irrigation practices Funding
<i>Pallid Shiner</i>	<ul style="list-style-type: none"> No responses 	<ul style="list-style-type: none"> No responses 	<ul style="list-style-type: none"> No responses
<i>Pugnose Shiner</i>	<ul style="list-style-type: none"> No responses 	<ul style="list-style-type: none"> No responses 	<ul style="list-style-type: none"> No responses
<i>Bigmouth Shiner</i>	<ul style="list-style-type: none"> No responses 	<ul style="list-style-type: none"> No responses 	<ul style="list-style-type: none"> No responses
<i>Longnose Dace</i>	<ul style="list-style-type: none"> Reduce flashiness in watersheds Wetland restoration Conservation tillage Reduce pollution Implement BMPs Remove dams 	<ul style="list-style-type: none"> The Elkhart County surveyors office has implemented instream restoration projects in Baugo Creek which have helped stabilize some areas of the stream and create habitat 	<ul style="list-style-type: none"> Coordination with landowners Increases in agriculture production

Species	Relevant Actions	Effective Actions	Major Barriers
		<ul style="list-style-type: none"> Survey to determine distribution 	
<i>Northern Madtom</i>	<ul style="list-style-type: none"> Implement BMPs Survey deep water habitats of the Ohio River Restrict urban development 	<ul style="list-style-type: none"> None taken directly 	<ul style="list-style-type: none"> Funding Social importance
<i>Hoosier Cavefish</i>	<ul style="list-style-type: none"> Protect karst systems Implement BMPs Education of landowners Concentrated nutrient management Develop tools to limit septic system failures Implement monitoring program 	<ul style="list-style-type: none"> Purchasing caves 	<ul style="list-style-type: none"> Funding Lack of interest in karst systems Resistance to ordinance and policy changes Coordination with landowners
<i>Northern Brook Lamprey</i>	<ul style="list-style-type: none"> Protect habitat from dredging Reduce non-point source pollution 	<ul style="list-style-type: none"> Survey to determine current distribution 	<ul style="list-style-type: none"> Unwillingness to implement BMPs
<i>Western Sand Darter</i>	<ul style="list-style-type: none"> Reduce point and non-point source pollution Restore riparian buffers along large rivers Reduce bank erosion 	<ul style="list-style-type: none"> No responses 	<ul style="list-style-type: none"> No responses
<i>Spotted Darter</i>	<ul style="list-style-type: none"> Reduce point and non-point source pollution Stabilize banks Storm water policies and education Incentives to slow water from urban and residential areas Remove dams Implement Best Management Practices 	<ul style="list-style-type: none"> Work by TNC on Blue River to educate public in conservation 	<ul style="list-style-type: none"> Coordination with landowners Resistance to change agricultural practices Mining industry
<i>Cypress Darter</i>	<ul style="list-style-type: none"> Reconnect floodplains to river Protect oxbow lakes and sloughs 	<ul style="list-style-type: none"> Acquisition of floodplain lands in Wabash River and Ohio River 	<ul style="list-style-type: none"> Agricultural land prices Levee systems

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Tippecanoe Darter</i>	<ul style="list-style-type: none"> · Reduce point and non-point source pollution in large rivers · Restore and maintain riparian buffers · Education of stakeholders on best practices 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Coordination with landowners · Dam operations
<i>Variagate Darter</i>	<ul style="list-style-type: none"> · Reduce point and non-point source pollution · Restore and maintain riparian buffers · Protect current habitat · Dam management · Education for proper recreational use of rivers 	<ul style="list-style-type: none"> · None taken directly 	<ul style="list-style-type: none"> · Dam operations · Coordination with landowners
<i>Channel Darter</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Gilt Darter</i>	<ul style="list-style-type: none"> · protect riffle habitats in the Tippecanoe River from sedimentation · implement best management practices in the Tippecanoe River watershed 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Coordination with landowners · Willingness to implement BMPs
<i>Ohio River Muskellunge</i>	<ul style="list-style-type: none"> · Create stocking plan if the subspecies still exists 	<ul style="list-style-type: none"> · Establishing populations in suitable lakes has helped to popularize public interest in muskellunge 	<ul style="list-style-type: none"> · Doubtful availability of the Ohio River subspecies for propagation · Funding
<i>Banded Pygmy Sunfish</i>	<ul style="list-style-type: none"> · Protect floodplain lands in Ohio and Wabash River drainages · Reconnect floodplains and rivers · Restrict draining of floodplain lakes · Conserve aquatic vegetation · Maintain natural water regime · Protect habitat from dredging 	<ul style="list-style-type: none"> · Acquisition of floodplain land in Wabash and Ohio River drainages 	<ul style="list-style-type: none"> · Coordination with agencies and landowners · Agricultural land prices
<i>Slimy Sculpin</i>	<ul style="list-style-type: none"> · Control invasive species in Lake Michigan · Control round goby · Public education 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Funding · Political will · Manpower

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Lake Sturgeon</i>	<ul style="list-style-type: none"> · Dam removal · Protect water quality · Improve agricultural techniques · Install fish ladder · Reduce sediment and nutrient loads · Reduce mortality due to anglers · maintain important spawning habitat below Williams Dam · restore riparian buffer zones 	<ul style="list-style-type: none"> · Denoting the species as endangered · making possession illegal · annual monitoring · limited propagation 	<ul style="list-style-type: none"> · Public awareness · Political support · Funding · High agricultural prices · Compliance with fishing regulations · Social support
<i>Longnose Sucker</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Greater Redhorse</i>	<ul style="list-style-type: none"> · Protect water quality · Dam removal · Reduce point and non-point source pollution · Implement BMPs · Restore riparian corridors · Reduce siltation and nutrient inputs · Maintain/increase flows and flow volumes 	<ul style="list-style-type: none"> · Agricultural BMPs · Dam removal on the Eel River 	<ul style="list-style-type: none"> · Funding · Social support · Farming industry · Willingness to implement BMPs
<i>Bantam Sunfish</i>	<ul style="list-style-type: none"> · Acquire land in floodplains of Ohio and Wabash Rivers · Connect floodplains to rivers 	<ul style="list-style-type: none"> · Land acquisition in Wabash and Ohio River floodplains 	<ul style="list-style-type: none"> · Agricultural land prices · Levees
<i>Trout-perch</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses

Species	Relevant Actions	Effective Actions	Major Barriers
Cisco	<ul style="list-style-type: none"> · Protect watershed from nutrient impacts · Control vegetation in lakes · Increase agricultural BMPs · Limit high-speed boating · Create cost-share program for lake residents · Public education · Reintroductions · Manage adjacent lands · Protect natural shoreline habitats · Limit seawall construction 	<ul style="list-style-type: none"> · Bio-engineered seawall installed on South Twin Lake (LaGrange Co.) in 2012 · DNR worked with the University of Notre Dame and Purdue University to test environmental DNA (eDNA) techniques to determine the presence of cisco in several cold-water lakes in 2013 · DNR re-assessed the status (presence, catch rates, sex ratios, size- and age-structures) of cisco among lakes historically containing cisco (2012--14) · North Region Fisheries Section (DNR) is currently vetting new vegetation control guidelines (2012-14) for cold-water lakes to limit nutrient recycling and sustain water quality 	<ul style="list-style-type: none"> · Communication issues · Political will · Funding · Lack of resources · Public disinterest · Manpower · High agricultural commodity prices
Lake Whitefish	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
Fanshell	<ul style="list-style-type: none"> · Protect current habitats · Reduce point and non-point source pollution · Restore and maintain riparian buffer zones · Prohibit take of mussels · Investigate life history 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Lack of funding · Lack of landowner buy-in

Species	Relevant Actions	Effective Actions	Major Barriers
<i>White Catspaw</i>	<ul style="list-style-type: none"> · Address hydrologic alteration of headwater streams · Captive breeding if possible 	<ul style="list-style-type: none"> · Restoration efforts at Fish Creek NRDA 	<ul style="list-style-type: none"> · Likely extinct
<i>Northern Riffleshell</i>	<ul style="list-style-type: none"> · Address altered hydrology in headwaters to decrease flashiness downstream · Non-point source strategies to limit nutrients and sediments from moving downstream 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Scale of agricultural industry
<i>Tubercled Blossom</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Snuffbox</i>	<ul style="list-style-type: none"> · Protect current habitats · reduce point and nonpoint source pollution · restore and maintain riparian buffer zones · augment populations · improve water quality · reduce siltation from ag practices · reduce flood peaks from storm water runoff and ditches · maintain instream habitat stability · Farm Bill programs and policy changes to maintain native cover 	<ul style="list-style-type: none"> · propagation of snuffbox from the Salamonie River to augment Tippecanoe River population 	<ul style="list-style-type: none"> · Lack of funding · Lack of landowner buy-in · Lack of public understanding
<i>Longsolid</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Pink Mucket</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Wavyrayed Lampmussel</i>	<ul style="list-style-type: none"> · Identify habitat requirements and current populations · Augment populations · Improve water quality · Reduce point and non-point source pollution · Restore and maintain buffer zones 	<ul style="list-style-type: none"> · Laws prohibiting take of mussels 	<ul style="list-style-type: none"> · Resistance to change · Cost · Lack of public knowledge · Lack of landowner buy-in

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Round Hickorynut</i>	<ul style="list-style-type: none"> · Determine life history attributes · Improve water quality · Reduce point and non-point source pollution · Refine propagation techniques 	<ul style="list-style-type: none"> · 	<ul style="list-style-type: none"> · Funding · Limited source populations for propagation
<i>White Wartyback</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Orangefoot Pimpleback</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Sheepnose</i>	<ul style="list-style-type: none"> · Protect current habitats · Reduce point and non-point source pollution · Restore and maintain riparian buffer zones 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Lack of funding · Lack of landowner buy-in
<i>Clubshell</i>	<ul style="list-style-type: none"> · Improve water quality · Refine propagation techniques · Determine life history attributes · Determine watersheds for reintroduction · Improve ditch maintenance practices · Landowner education · Augment populations 	<ul style="list-style-type: none"> · Restoration efforts at Fish Creek NRDA 	<ul style="list-style-type: none"> · Cost constraints · Resistance to change · Lack of knowledge · Lack of landowner buy-in
<i>Ohio Pigtoe</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Rough Pigtoe</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Pyramid Pigtoe</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Fat Pocketbook</i>	<ul style="list-style-type: none"> · Improve water quality · Protect current habitats 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Lack of funding · Scale of water quality issues
<i>Kidneyshell</i>	<ul style="list-style-type: none"> · Protect current habitats · Improve water quality · Determine reasons for decline · Find habitats for reintroduction · Improve ditch maintenance · Dam removal 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Lack of funding · Lack of public support · Lack of landowner buy-in · Poor understanding of issues

Species	Relevant Actions	Effective Actions	Major Barriers
<i>Rabbitsfoot</i>	<ul style="list-style-type: none"> · Protect current habitats · Improve water quality · Public education · Find habitats for reintroduction · Species monitoring · Genetic modelling 	<ul style="list-style-type: none"> · Listing as federally threatened 	<ul style="list-style-type: none"> · Lack of funding · Lack of public buy-in · Lack of knowledge
<i>Salamander Mussel</i>	<ul style="list-style-type: none"> · Improve water quality · Protect current habitats · Restore riparian buffers · Investigate life history attributes · Determine streams for reintroductions 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Lack of funding · Lack of landowner buy-in
<i>Purple Lilliput</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Ellipse</i>	<ul style="list-style-type: none"> · Improve water quality · Restore riparian buffer zones · Determine watersheds for species restoration 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · Lack of funding · Lack of landowner buy-in · Lack of public support
<i>Rayed Bean</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Little Spectaclecase</i>	<ul style="list-style-type: none"> · Reduce point and non-point source pollution · Refine propagation techniques · Determine watershed for species reintroduction · Public education 	<ul style="list-style-type: none"> · Listing as federally endangered 	<ul style="list-style-type: none"> · Lack of funding · Lack of landowner buy-in · Lack of public understanding
<i>Pointed Campeloma</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses
<i>Swamp Lymnaea</i>	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses 	<ul style="list-style-type: none"> · No responses