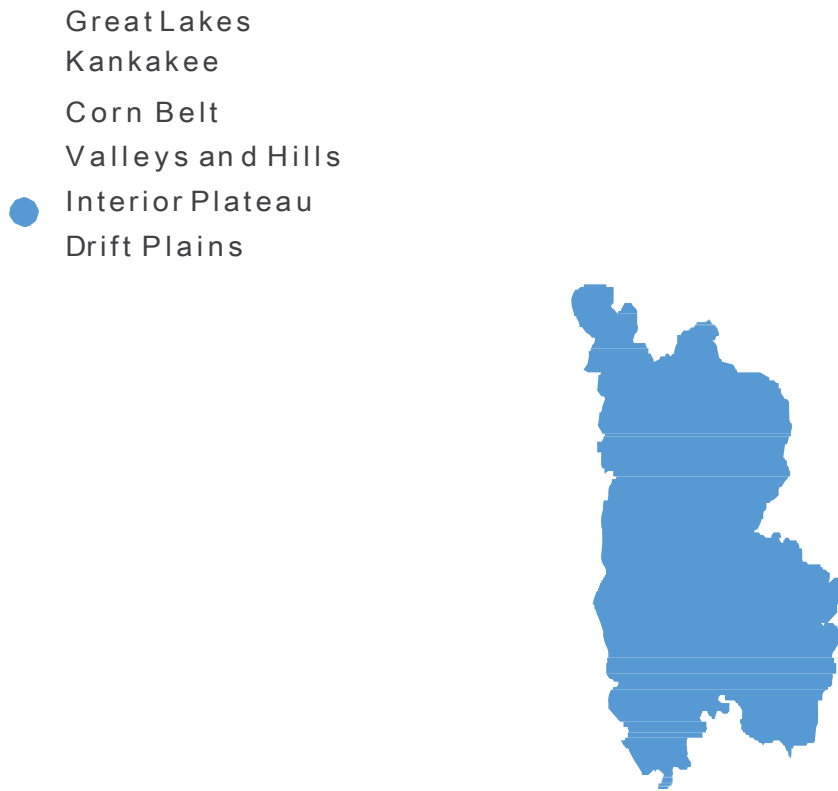


## E. INTERIOR PLATEAU REGION



**Figure 6-21.** Outline of the Interior Plateau Region in Indiana for the SWAP.

## Introduction

This section summarizes habitat conditions, threats to SGCN and their habitats, and conservation actions for species and habitats in the Interior Plateau Region. This section also reviews land cover changes over the past decade and identifies unique habitat types in this region. Summaries of threats to and conservation actions for SGCN and their habitats that were generated from two surveys can be found at the end of this section.

In addition to the threats and actions identified in the Habitat Survey and the Species Survey, the DFW recognized the need to identify threats aligned with specific actions. Several threats and actions were identified as ubiquitous across all six regions. These include:

- **Habitat Loss:** Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
- **Invasive Species:** Build external capacity (form and facilitate partnerships, alliances, and networks of organizations to address invasive species)
- **Law and Policy:** Develop, change, influence and help implement formal legislation, regulations and voluntary standards
- **Dams and Water Management and Use:** Remove unnecessary dams and utilize necessary dams with effective fish passage structures

The DFW also identified specific threats and actions for each SWAP region based on DFW priorities. These threats were identified due to their high level of relevancy to the specific region and the workability of the associated actions. These threats and actions for the Interior Plateau Region include:

- **Habitat Degradation to Karsts:** Restricting access
  - Education of landowners (e.g. sewer, trash, and recreational users)
  - Acquiring and managing lands to buffer karst features
- **Habitat Loss of Early Successional Forest:** Land management (e.g. timber cutting, fire, girdling, and mechanical and chemical treatments)
- **Habitat Degradation to Forests:** Controlling problematic native wildlife
  - Land management (e.g. timber cutting, fire, girdling, and mechanical and chemical treatments)

### Current Habitat Conditions

During the Species Survey, respondents were asked to identify SGCN within the Interior Plateau Region. A full summary of the Species Survey results can be found in Appendix O.

**Table 6-13:** Species of Greatest Conservation Need present in the Interior Plateau Region.

Taxa	Scientific Name	Common Name
Amphibians	<i>Cryptobranchus alleganiensis</i>	Hellbender
Amphibians	<i>Necturus maculosus</i>	Common Mudpuppy
Amphibians	<i>Ambystoma barbouri</i>	Streamside Salamander
Amphibians	<i>Hemidactylum scutatum</i>	Four-toed Salamander
Amphibians	<i>Pseudotriton ruber</i>	Red Salamander
Amphibians	<i>Aneides aeneus</i>	Green Salamander
Amphibians	<i>Acris blanchardi</i>	Blanchard's Cricket Frog
Birds	<i>Cygnus buccinator</i>	Trumpeter Swan
Birds	<i>Colinus virginianus</i>	Northern Bobwhite
Birds	<i>Bonasa umbellus</i>	Ruffed Grouse
Birds	<i>Chordeiles minor</i>	Common Nighthawk
Birds	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will
Birds	<i>Rallus elegans</i>	King Rail
Birds	<i>Gallinula galeata</i>	Common Gallinule
Birds	<i>Grus canadensis</i>	Sandhill Crane
Birds	<i>Grus americana</i>	Whooping Crane
Birds	<i>Pluvialis dominica</i>	American Golden-plover
Birds	<i>Charadrius melodus</i>	Piping Plover
Birds	<i>Bartramia longicauda</i>	Upland Sandpiper
Birds	<i>Arenaria interpres</i>	Ruddy Turnstone
Birds	<i>Calidris subruficollis</i>	Buff-breasted Sandpiper
Birds	<i>Limnodromus griseus</i>	Short-billed Dowitcher
Birds	<i>Scolopax minor</i>	American Woodcock
Birds	<i>Tringa solitaria</i>	Solitary Sandpiper
Birds	<i>Tringa melanoleuca</i>	Greater Yellowlegs
Birds	<i>Phalaropus tricolor</i>	Wilson's Phalarope
Birds	<i>Sternula antillarum athalassos</i>	Interior Least Tern
Birds	<i>Chlidonias niger</i>	Black Tern
Birds	<i>Botaurus lentiginosus</i>	American Bittern
Birds	<i>Ixobrychus exilis</i>	Least Bittern
Birds	<i>Ardea alba</i>	Great Egret
Birds	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron
Birds	<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron
Birds	<i>Pandion haliaetus</i>	Osprey

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Taxa	Scientific Name	Common Name
Birds	<i>Ictinia mississippiensis</i>	Mississippi Kite
Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle
Birds	<i>Circus cyaneus</i>	Northern Harrier
Birds	<i>Accipiter striatus</i>	Sharp-shinned Hawk
Birds	<i>Buteo platypterus</i>	Broad-winged Hawk
Birds	<i>Tyto alba</i>	Barn Owl
Birds	<i>Asio flammeus</i>	Short-eared Owl
Birds	<i>Falco peregrinus</i>	Peregrine Falcon
Birds	<i>Lanius ludovicianus</i>	Loggerhead Shrike
Birds	<i>Cistothorus platensis</i>	Sedge Wren
Birds	<i>Cistothorus palustris</i>	Marsh Wren
Birds	<i>Ammodramus henslowii</i>	Henslow's Sparrow
Birds	<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird
Birds	<i>Sturnella neglecta</i>	Western Meadowlark
Birds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler
Birds	<i>Vermivora chrysoptera</i>	Golden-winged Warbler
Birds	<i>Mniotilta varia</i>	Black-and-white Warbler
Birds	<i>Setophaga citrina</i>	Hooded Warbler
Birds	<i>Setophaga cerulea</i>	Cerulean Warbler
Fish	<i>Acipenser fulvescens</i>	Lake Sturgeon
Fish	<i>Anguilla rostrata</i>	American Eel
Fish	<i>Hybopsis amnis</i>	Pallid Shiner
Fish	<i>Noturus stigmosus</i>	Northern Madtom
Fish	<i>Amblyopsis hoosieri</i>	Hoosier Cavefish
Fish	<i>Percina copelandi</i>	Channel Darter
Fish	<i>Ammocrypta clara</i>	Western Sand Darter
Fish	<i>Etheostoma maculatum</i>	Spotted Darter
Mammals	<i>Sorex fumeus</i>	Smoky Shrew
Mammals	<i>Sorex hoyi</i>	American Pygmy Shrew
Mammals	<i>Myotis austroriparius</i>	Southeastern Myotis
Mammals	<i>Myotis grisescens</i>	Gray Myotis
Mammals	<i>Myotis leibii</i>	Eastern Small-footed Myotis
Mammals	<i>Myotis lucifugus</i>	Little Brown Myotis
Mammals	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis
Mammals	<i>Myotis sodalis</i>	Indiana Myotis
Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired Bat
Mammals	<i>Perimyotis subflavus</i>	Tri-colored Bat
Mammals	<i>Nycticeius humeralis</i>	Evening Bat
Mammals	<i>Lasiurus borealis</i>	Eastern Red Bat
Mammals	<i>Lasiurus cinereus</i>	Hoary Bat
Mammals	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat
Mammals	<i>Neotoma magister</i>	Allegheny Woodrat

Taxa	Scientific Name	Common Name
Mammals	<i>Ursus americanus</i>	Black Bear
Mammals	<i>Mustela nivalis</i>	Least Weasel
Mammals	<i>Taxidea taxus</i>	Badger
Mollusks	<i>Cyprogenia stegaria</i>	Fanshell
Mollusks	<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel
Mollusks	<i>Obovaria subrotunda</i>	Round Hickorynut
Mollusks	<i>Plethobasus cyphus</i>	Sheepnose
Mollusks	<i>Pleurobema cordatum</i>	Ohio Pigtoe
Mollusks	<i>Pleurobema plenum</i>	Rough Pigtoe
Mollusks	<i>Ptychobranchus fasciolaris</i>	Kidneyshell
Mollusks	<i>Simpsonaias ambigua</i>	Salamander Mussel
Mollusks	<i>Villosa lienosa</i>	Little Spectaclecase
Reptiles	<i>Macrochelys temminckii</i>	Alligator Snapping Turtle
Reptiles	<i>Terrapene carolina</i>	Eastern Box Turtle
Reptiles	<i>Pseudemys concinna</i>	River Cooter
Reptiles	<i>Thamnophis proximus</i>	Western Ribbonsnake
Reptiles	<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake
Reptiles	<i>Clonophis kirtlandii</i>	Kirtland's Snake
Reptiles	<i>Opheodrys aestivus</i>	Rough Greensnake
Reptiles	<i>Cemophora coccinea</i>	Scarletsnake
Reptiles	<i>Tantilla coronata</i>	Southeastern Crowned Snake
Reptiles	<i>Agkistrodon piscivorus</i>	Cottonmouth
Reptiles	<i>Crotalus horridus</i>	Timber Rattlesnake

During the Habitat Survey, respondents were asked to evaluate the overall quality of fish and wildlife habitats in the Interior Plateau Region (Fig. 6-22), estimate changes in overall quality since 2005 (Fig. 6-23), and predict changes in overall quality over the next ten years (Fig. 6-24). Each respondent was asked to respond for one or more of the eight major habitat types within the region and results were aggregated at the regional level. A full list of the Habitat Survey results can be found in Appendix P.

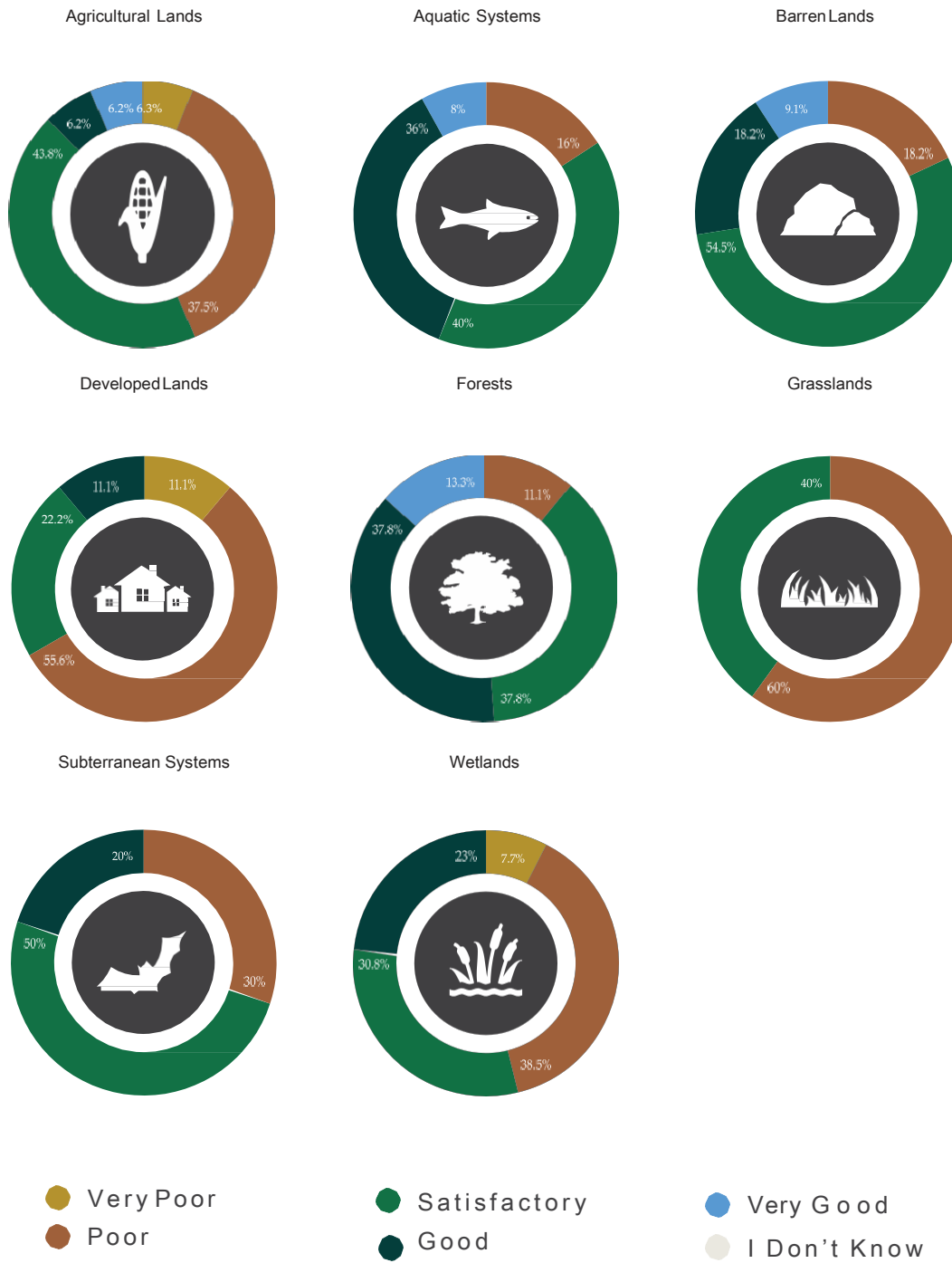
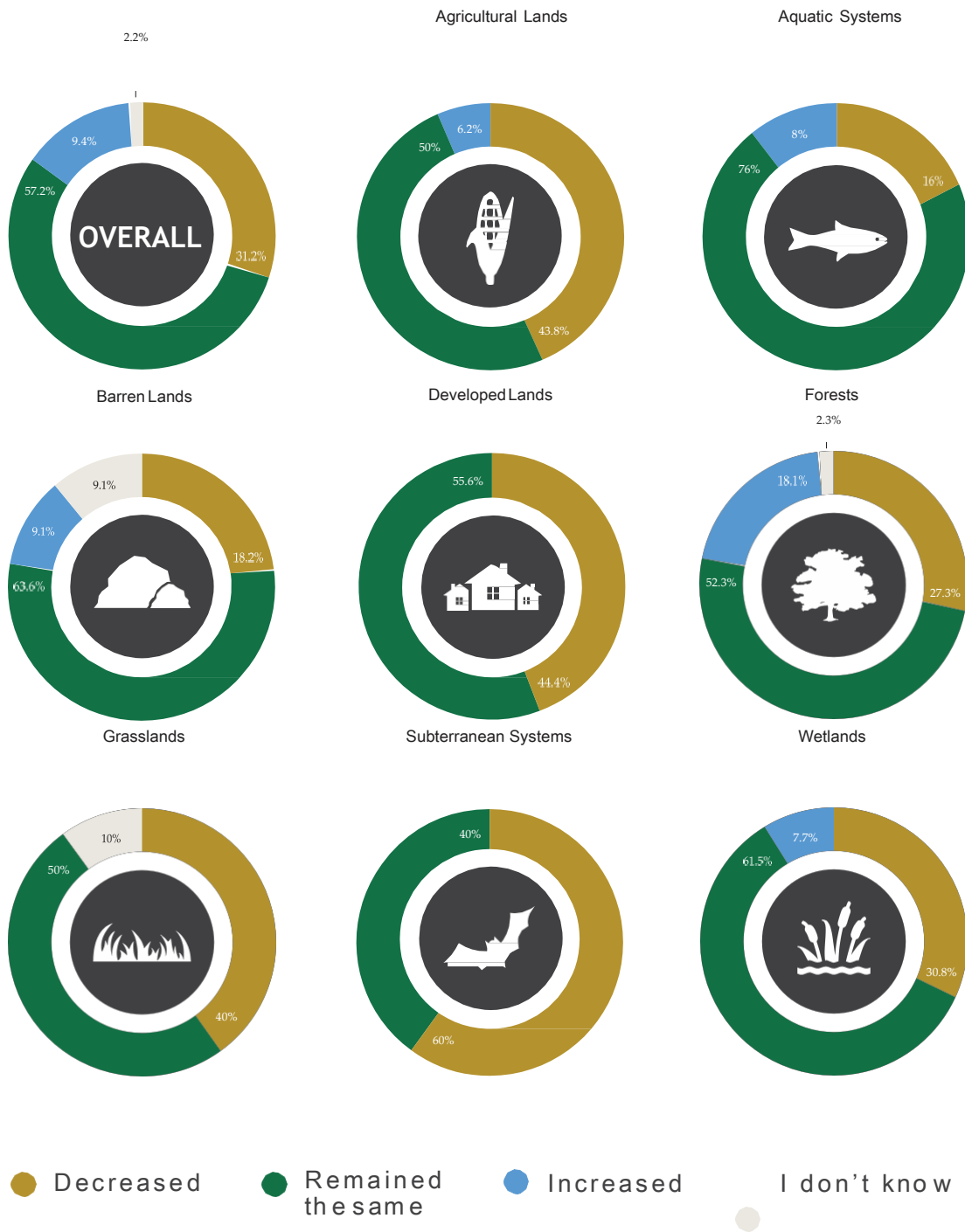
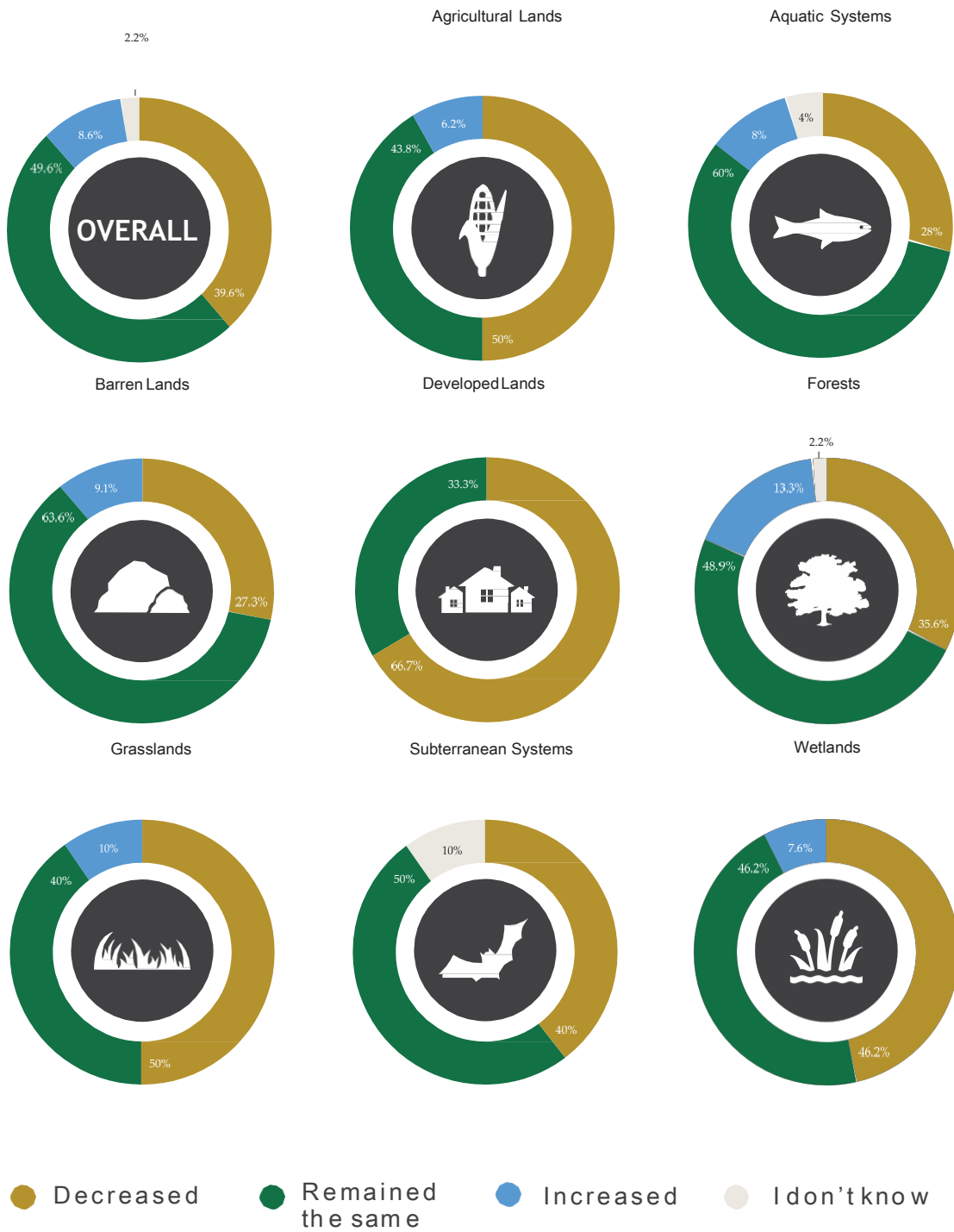


Figure 6-22. Overall quality of fish and wildlife habitats in the Interior Plateau Region in 2014.



**Figure 6-23.** Estimated change in the overall quality of fish and wildlife habitats from 2005 to 2014 for each of the major habitat types in the Interior Plateau Region.



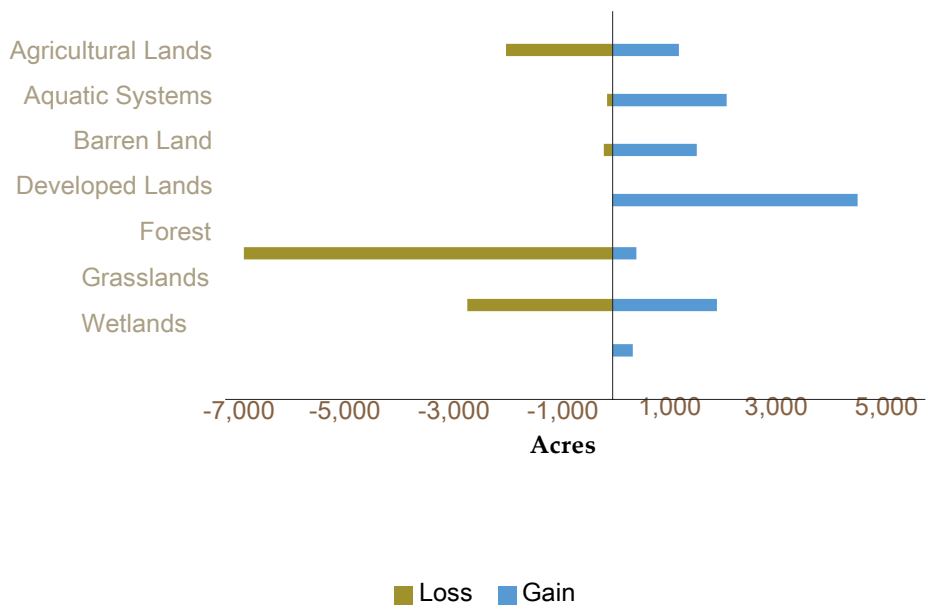
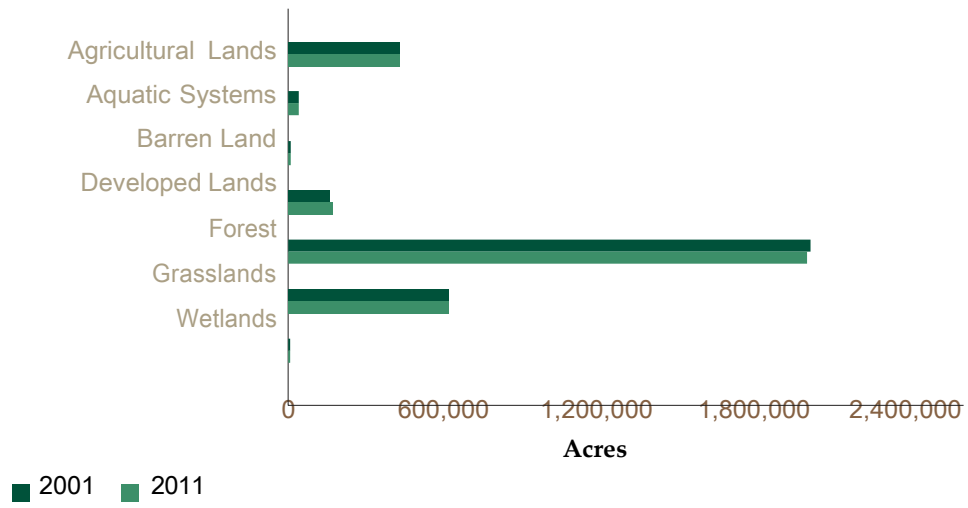
**Figure 6-24.** Predicted changes in overall quality of fish and wildlife habitats over the next ten years for each major habitat type in the Interior Plateau Region.



### Changes in Land Cover

Unlike other regions of the state dominated by agriculture, most land cover in the Interior Plateau Region consists of forested land, followed by grasslands (Fig. 6-25). Compared to other Indiana regions, the Interior Plateau Region has the lowest percentage of agricultural lands at 13.1% and developed lands at 5.1%. It is the most forested region in the state and has the highest percentage of grasslands. The region is also home to most of Indiana's karst subterranean systems.

The Interior Plateau Region has experienced changes in habitat coverage over the past ten years. Aquatic systems, barren lands, developed lands, and wetlands increased, and agricultural lands, grasslands, and forests decreased. These habitats were mostly lost to urban development (Fig. 6-25). Percentage-wise, the greatest net losses were seen in forests (0.3%) and agricultural lands (0.2%). The greatest net increases were seen in barren lands (40.4%), wetlands (6.1%), and aquatic systems (4.6%).



**Figure 6-25.** Distribution of land cover and losses and gains in land cover in the Interior Plateau Region between 2001 and 2011 from NLCD.

## Threats Affecting Habitats

### Top Threat Categories

The third element requires the description of threats to SGCN and their habitats. The SWAP identifies a habitat perspective in order to manage for the conservation of species in Indiana. This section utilizes the same hierarchical method of identifying and rating threats based on Salafsky et al. (2008) that was outlined in Chapter V. Category rankings and specific threat rankings for habitats in this region are outlined below (Table 6-14). A full summary of the Habitat Survey results for the Great Lakes Region can be found in Appendix P.

For first-level threat categories, both residential and commercial development and invasive and other problematic species were rated as significant to moderate threats, while the remaining categories were rated as moderate to minor threats. The invasive and other problematic species and genes category was identified as the top-ranking threat at the regional level. Invasive and alien species was rated as a significant to moderate specific second-level threat, receiving an average rating closer to significant for all habitat types.

Other specific threats in this category were only rated moderate to minor for the region. Residential and commercial development was rated highly for the region and first in developed lands and subterranean systems. Housing and urban areas was rated as the most significant threat for this region and was rated as a significant to moderate threat for the region. Respondents also wrote in free-response threats that connect to transportation and service corridors.

Agriculture and aquaculture received a mean rating very close to the significant to moderate threshold threat for the entire region. This category was additionally rated as the most significant for aquatic systems in the region. Conversion of habitat to annual crops was rated as a significant to moderate specific threat for the entire region. The pollution category also identified effluents from various sources, including agriculture, as the only significant to moderate threat within this category for the entire region.

Conversion of habitat was rated as the most significant threat within the natural systems modification category for the entire region. Human intrusion and disturbance and recreational activities within the human intrusion and disturbance category received moderate to minor threat ratings within this region.

Transportation and service corridors was rated as a more significant threat for forests and grasslands within this region. Roads and service corridors as a specific threat was rated as a significant to moderate threat for these habitat types. While other stressors, climate change and severe weather, energy production and mining, and biological resource use were rated as moderate to minor threat categories, each contained specific threats that were rated as significant to moderate across the entire region. Both specific threats in other direct stressors, diseases and genetic diversity, were rated in this top threat threshold; however, the diseases category

was consistently rated above low genetic diversity in terms of threat significance across all habitat types. All specific threats within climate change and severe weather were classified as significant to moderate for the entire region. Generally, changing frequency, duration, and intensity of drought and shifting and alteration of habitats due to climate change were identified as the top ranked threats for habitats in this region. Increased flooding because of climate change may be more of a concern in subterranean systems and wetlands.

Shale gas development was rated as the most significant threat across habitat types within energy production and mining. Other fossil fuel production may be more significant in aquatic systems, developed lands, and grasslands specifically. Mining and quarrying is the top rated threat in barren lands, subterranean systems, and wetlands.

**Table 6-14.** Threat category ranking to habitats in the Interior Plateau Region. First-level threat categories are based on the hierarchical method of identifying threats outlined in Salafsky et al. (2008). Ranked threat categories are arranged for the entire region by each major habitat type (1 - highest threat).

Category	Regional Ranking	Aquatic Systems	Agricultural Lands	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Invasive and Other Problematic Species and Genes	1	2	1	1	3	1	1	4	2
Residential and Commercial Development	2	3	2	2	1	2	2	1	3
Agriculture and Aquaculture	3	1	3	6	4	3	5	5	6
Pollution	4	4	7	7	2	9	7	2	1
Natural Systems Modification	5	5	4	3	5	8	9	7	4
Human Intrusion and Disturbance	6	6	6	4	6	6	6	3	5
Transportation and Service Corridors	7	7	5	10	8	4	3	6	7
Other Stressors	8	9	9	5	7	7	4	8	10
Climate Change and Severe Weather	9	8	11	8	10	5	10	10	9
Energy Production and Mining	10	10	8	9	9	10	8	9	8
Biological Resource Use	11	11	10	11	11	11	11	11	11

### Top Specific Threats in Ranked Order

In the Habitat Survey, respondents were also asked to identify specific threats to major habitat types using the same threat category ranking system outlined in Salafsky et al. (2008). These second-level threats represent subcategories of threats within the major threat categories listed in the table above. The following are the top specific second-level threats to habitats in the Interior Plateau Region, aggregated across habitat types:

1. Invasive and alien species
2. Conversion of natural habitats to other land uses
3. Housing and urban areas
4. Conversion of habitat to annual crops
5. Agriculture, residential, and forestry effluents
6. Commercial and industrial areas
7. Household sewage and urban water waste
8. Runoff from roads and service corridors
9. Point source pollution from commercial and industrial sources
10. Annual and perennial non-timber crops

In the Species Survey, respondents were also asked to identify threats to individual SGCN using the same threat category ranking system. The following are the top specific second-level threats to SGCN occurring in the Interior Plateau Region, aggregated across all species:

1. Invasive and alien species
2. Natural habitat conversion
3. Housing and urban areas
4. Conversion of habitat to annual crops
5. Commercial and industrial areas
6. Annual and perennial non-timber crops
7. Dams and water management and use
8. Tourism and recreation areas
9. Recreation activities
10. Livestock farming and ranching

### Emerging/Anticipated Threats

Respondents were asked specifically to identify any emerging or anticipated threats over the next ten years for fish and wildlife habitats within the major habitat types for a region in a free-response question.

For forests in this region, respondents identified as fragmentation, especially as a result of road development, invasion of forest pests, and escape of genetically modified pesticide resistant species as potential invaders as anticipated threats. Lack of management for early successional species, as well as changes in dominant species of forests impacting ecological communities are expected to threaten forest habitats in this region. There is growing concern about potential for other invasive plant and animal species as well. Expansion of feral swine

populations in the southern part of the state was listed as a potential threat by respondents in this region. Additionally, loss of funding for habitat conservation programs such as CRP were identified as a potential threat.

## Conservation Actions Needed

### Top Action Categories

The fourth element requires that the SWAP describe conservation actions proposed to conserve identified species and habitats as well as outlining priorities for their implementation. This section outlines conservation actions identified at the regional level for each of the major habitat types. This section follows the same protocol to rate and rank actions in this region based on Salafsky et al. (2008) that was outlined in Chapter V. A full list of survey results can be found in Appendix P. Category rankings for actions and specific actions are outlined in Table 6-15.

Land and water protection, land, water, and species management, education and awareness, and law and policy as categories received ratings, on average, between very and moderately important for this region. Livelihood, economic, and other incentives as well as external capacity received average ratings between moderately important and somewhat important. No category received a mean ranking between somewhat important and not important, indicating the identification of a variety of threats important to conservation of fish and wildlife habitats within this region.

Land and water protection was ranked first regionally and within all land types except for forests. Top actions within this category identified an importance to acquire currently unprotected habitats as well as preserve currently existing corridors between fish and wildlife habitats. Acquiring conservation easements and strengthening CRP partnerships were also ranked as most important for fish and wildlife habitats in grasslands and barren lands respectively.

Land, water, and species management was ranked second regionally, first in forests, and tied for first in agricultural lands. High-ranking actions in this region reflect a need to link habitat blocks, control invasive species, and restore natural systems in a variety of habitat types. Reducing loss of habitat was also identified as a high-ranking action regionally; it also ranked first in aquatic systems, agricultural lands, barren lands, developed lands, and forests within this category. Protecting adjacent buffer zones was also identified as the top ranking action for habitats within subterranean systems.

Education and awareness was ranked third regionally; however, education in general, educational programs for K-12, and training programs for stakeholders were, on average, rated between very important and moderately important. These three actions were ranked first for at least one habitat type within this region, indicating that a combination of them is likely necessary for comprehensive habitat conservation.

Using planning and zoning to reduce urban sprawl was the top ranking action regionally within law and policy. Increasing regulations on invasive species was also identified as the most important specific action for barren lands and forests. Respondents rated compliance and enforcement of current regulations above changing of policies in general but also suggested changes to regulations for sewage and installation of septic systems to benefit aquatic and subterranean

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systems. Strengthening and enforcing mine reclamation regulations was also emphasized by respondents in the write-in section to be important for protecting fish and wildlife habitats in this region.

While livelihood, economic, and other incentives as well as external capacity building were ranked fifth and sixth regionally, all specific actions in this region were rated as very to moderately important or moderately to somewhat important. Developing both nonmonetary valuation and promoting conservation payments were identified as the highest ranking specific action for habitat types in livelihood, economic, and other incentives in this region. Strengthening conservation financing was also identified as important regionally and within habitat types, as well as promotion of use of research for decision-making for habitat within agricultural lands and development of partnerships and alliances, specifically for forests and wetlands.

**Table 6-15.** Action category ranking to habitats in the Interior Plateau Region. First-level categories are based on the hierarchical method of identifying actions outlined in Salafsky et al. (2008). Ranked action categories are arranged for the entire region by each major habitat type. (1 - highest threat).

Category	Regional Ranking	Aquatic Systems	Agricultural Lands	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Land/Water Protection	1	1	1	1	1	3	1	1	1
Land/Water/Species Management	2	2	1	2	2	1	2	3	2
Education and Awareness	3	3	4	4	3	2	3	2	3
Law and Policy	4	4	3	6	4	4	5	4	4
Livelihood, Economic, and Other Incentives	5	5	5	3	5	6	4	5	5
External Capacity Building	6	6	6	5	6	5	6	6	6
	Indicates a tie within this habitat type								

### Top Specific Actions in Ranked Order

In the Habitat Survey, respondents were also asked to identify specific actions for major habitat types using the same action category ranking system outlined in Salafsky et al. (2008). These second-level actions represent subcategories of actions within the major action categories listed in the table above.

The following are the top specific second-level conservation actions for habitats in the Interior Plateau Region, aggregated across habitat types:

1. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
2. Develop education programs specifically for K-12
3. Preserve currently existing corridors
4. Develop educational programs in general
5. Reduce urban sprawl through planning and zoning
6. Acquire conservation easements to protect important wildlife habitats
7. Increase regulations on invasive species
8. Establish training programs for stakeholders
9. Reduce conversion to cropland
10. Improve compliance with and enforcement of current policies



The following are top actions for SGCN occurring for the Interior Plateau Region, as summarized from the free-response questions about conservation actions for individual species:

1. Educate and engage with landowners and citizens (especially bat ecology and issues)
2. Implement agricultural practices that improve water quality
3. Control invasive plants
4. Protect subterranean systems and limit recreational caving
5. Enhance connectivity of habitats
6. Protect large contiguous forested areas and reduce forest fragmentation
7. Use burning and mowing as management techniques in grasslands
8. Protect and manage large wetland complexes
9. Implement best management practices in forestry
10. Protect and restore riparian buffer zones

### Prioritization of Actions

In order to prioritize these actions within an environment of limited resources, respondents were then asked to distribute hypothetical “effort points” to any action they had previously rated as “very important” for any of the major habitat types within a region. The effort ratings were averaged and then ranked to identify the top five actions for each region. A full list of these results can be found in Appendix

P. Priority actions for the Interior Plateau Region include:

1. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
2. Control invasive species in forests
3. Reduce conversion to cropland
4. Strengthen conservation financing
5. Acquire currently unprotected forests

Overall, land, water, and species management actions like reducing loss of habitat, controlling invasive species, and reducing conversion to cropland were identified as priority actions in this region and reflect an identification of invasive species, development, and agriculture as high-ranking threat categories within this region. Respondents also prioritized an emphasis on forest habitat protection in land/ water protection as well as strengthening conservation financing in order to facilitate the successful implementation of these land-based actions.

## Threats and Actions by Major Habitat Type

The following summaries break down threats and conservation actions in this region by major habitat type, based on responses to the Habitat Survey and the Species Survey. The SGCN that occur there, top threats to SGCN, top actions for SGCN, key threats to habitats, and priority actions for each major habitat type in this region are summarized below.

Threats and actions were only included in detail below if a majority of eligible survey respondents, greater than 50%, rated them, to avoid artificially elevating items, which were highly ranked but only by a few respondents. This approach left some threats and action lists with no items for certain habitats, which is illogical from a practical perspective. Therefore, in these situations, the top threats and actions are still listed but are denoted with an asterisk (\*) to signify that there may be some items, which seem out-of-place, reflecting a lack of sufficient response for a particular habitat in the survey. This approach and the survey design also caused for some disparities between threats and actions.

Approximately ten items are given for each list below. Lists may be shorter if fewer than ten items were rated by a majority of survey respondents, or longer if there were ties between items.

Top actions for SGCN were summarized from free-response questions about individual species and do not follow the same categorizations as actions for habitats. A full summary of the Habitat Survey responses can be found in Appendix P.



### Agricultural Lands

Agricultural lands are defined as lands devoted to commodity production. Examples of agricultural lands include: intensively managed non-native grasses, row crops, fruit and nut-bearing trees, confined feeding operations, and feedlots.

Top threats to SGCN occurring in agricultural lands in the Interior Plateau Region:

1. Conversion of habitat to annual crops
2. Annual and perennial non-timber crops

Top conservation actions for SGCN occurring in agricultural lands in the Interior Plateau Region:

1. Educate and engage with landowners and citizens (benefits all species)
2. Reduce conversion of farmland to development
3. Increase use of CRP partnerships
4. Implement agricultural practices that improve water quality
5. Maintain shallow-water areas for migrating shorebirds
6. Provide incentives to farmers to increase landowner participation

Top threats to fish and wildlife habitats in agricultural lands in the Interior Plateau Region:

1. Conversion of natural habitats to other land uses
2. Invasive and alien species
3. Housing and urban areas
4. Conversion of habitat to annual crops
5. Commercial and industrial areas
6. Air pollution
7. Roads and railroads
8. Runoff from roads and service corridors
9. Agriculture, residential, and forestry effluents

Top conservation actions for fish and wildlife habitats in agricultural lands in the Interior Plateau Region:

1. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
2. Promote use of research and science in conservation decision-making processes
3. Preserve currently existing corridors
4. Reduce conversion to cropland
5. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
6. Link existing habitat blocks through corridor enhancement in agricultural lands
7. Restore and integrate diversity of habitats into crop-production dominated landscapes
8. Acquire conservation easements to protect important wildlife habitats
9. Increase regulations on invasive species
10. Reduce urban sprawl through planning and zoning



### Aquatic Systems

Aquatic systems are defined as all water habitats, both flowing and stationary. Examples of aquatic systems include: manmade impoundments, natural lakes, rivers, streams, oxbows, sloughs, embayments, and backwaters (not including wetlands).

Top threats to SGCN occurring in aquatic systems in the Interior Plateau Region:

1. Natural habitat conversion
2. Conversion of habitat to annual crops
3. Dams and water management and use
4. Annual and perennial non-timber crops
5. Livestock farming and ranching

Top conservation actions for SGCN occurring in aquatic systems in the Interior Plateau Region:

1. Enhance public, stakeholder, and landowner education and awareness
2. Implement agricultural best management practices to improve water quality
3. Protect and restore riparian buffer zones
4. Reduce sediment and nutrient loads
5. Reduce point and non-point source pollution
6. Remove dams
7. Clean polluted areas
8. Reduce recreational overuse
9. Restore floodplains
10. Reduce bank erosion
11. Limit bycatch of Hellbenders
12. Prohibit take of mussels

Top threats to fish and wildlife habitats in aquatic systems in the Interior Plateau Region:

1. Conversion of natural habitats to other land uses
2. Invasive and alien species
3. Agriculture, residential, and forestry effluents
4. Household sewage and urban water waste
5. Changing frequency, duration, and intensity of drought
6. Point source pollution from commercial and industrial sources
7. Conversion of habitat to annual crops
8. Dams and water management and use
9. Runoff from roads and service corridors
10. Changing frequency, duration, and intensity of floods

Top conservation actions for fish and wildlife habitats in aquatic systems in the Interior Plateau Region:

1. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
2. Develop education programs in general
3. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
4. Reduce nutrient and toxin loads (e.g., heavy metals, pharmaceuticals, fertilizers, insecticides)
5. Preserve currently existing corridors
6. Develop education programs specifically for K-12
7. Establish training programs for stakeholders
8. Strengthen conservation financing
9. Improve compliance with and enforcement of current policies
10. Acquire conservation easements to protect important wildlife habitats



## Barren Lands

Barren lands are defined as lands dominated by exposed rock or minerals with sparse vegetation. Examples of barren lands include: sand/dunes, rock outcrops, cliffs, and bare rock.

Top threats to SGCN occurring in barren lands in the Interior Plateau Region:\*

1. Natural habitat conversion
2. Housing and urban areas
3. Conversion of habitat to annual crops
4. Tourism and recreation areas
5. Recreation activities
6. Dams and water management and use

Top conservation actions for SGCN occurring in barren lands in the Interior Plateau Region:

1. Educate public about Peregrine Falcon
2. Protect Bald Eagle nest sites
3. Protect rocky cliff habitat for the Eastern Small-footed Myotis and Green Salamander
4. Establish corridors between Allegheny Woodrat habitat

Top threats to fish and wildlife habitats in barren lands in the Interior Plateau Region:

1. Invasive and alien species
2. Problematic native species (e.g. overabundant native deer or algae)
3. Plant diseases
4. Housing and urban areas
5. Commercial and industrial areas

Top conservation actions for fish and wildlife habitats in barren lands in the Interior Plateau Region:

1. Establish training programs for stakeholders
2. Promote conservation payment programs (e.g., payment for ecosystem services, conservation easements)
3. Promote nonmonetary values of natural systems within the state
4. Manage recreational opportunities to be compatible with fish and wildlife habitats
5. Link existing habitat blocks through corridor enhancement in barren lands
6. Protect adjacent buffer zones
7. Re-establish natural disturbance regimes in barren lands
8. Restore habitats and natural systems in barren lands
9. Develop education programs specifically for K-12



## Developed Lands

Developed lands are defined as highly impacted lands intensively modified to support human habitation, transportation, commerce, and recreation. Examples of developed lands include: urban lands, suburban lands, industrial areas, commercial areas, towers for communication and wind power generation, and recreational areas such as golf courses and soccer fields.

Top threats to SGCN occurring in developed lands in the Interior Plateau Region:\*

1. Renewable energy production
2. Invasive and alien species
3. Diseases from domestic populations and unknown sources
4. Fossil fuel energy production
5. Mining and quarrying

Top conservation actions for SGCN occurring in developed lands in the Interior Plateau Region:

1. Public education and awareness regarding bat ecology and issues
2. Reduce urban sprawl and commercial property expansion
3. Manage urban areas for Peregrine Falcons; minimize disturbance during nesting
4. Increase gravel-surfaced rooftop habitat for breeding Common Nighthawks
5. Mitigate road hazards for wildlife
6. Limit mowing along roads

Top threats to fish and wildlife habitats in developed lands in the Interior Plateau Region:

1. Invasive and alien species
2. Conversion of natural habitats to other land uses
3. Conversion of habitat to annual crops
4. Housing and urban areas
5. Commercial and industrial areas
6. Problematic native species
7. Recreation activities (e.g., ATVs, trail use, horseback riding, high-speed boating, canoeing)
8. Plant diseases
9. Garbage and solid waste
10. Household sewage and urban water waste

Top conservation actions for fish and wildlife habitats in developed lands in the Interior Plateau Region:

1. Preserve currently existing corridors
2. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
3. Reduce urban sprawl through planning and zoning
4. Reduce nutrient and toxin loads
5. Restore and integrate diversity of habitats into developed landscapes
6. Increase acres enrolled in the Classified Forest and Wildlands Program
7. Develop education programs in general
8. Develop education programs specifically for K-12
9. Increase regulations on invasive species
10. Set private sector standards and codes



### Forests

Forests are defined as a plant community dominated by trees. Examples of forests include, but are not limited to, all stages of natural forest and plantations.

Top threats to SGCN occurring in forests in the Interior Plateau Region:\*

1. Housing and urban areas
2. Natural habitat conversion
3. Invasive and alien species
4. Commercial and industrial areas
5. Diseases from domestic populations and unknown sources
6. Tourism and recreation areas
7. Problematic native species
8. Over-mowing of natural areas

Top conservation actions for SGCN occurring in forests in the Interior Plateau Region:

1. Protect large contiguous forested areas and reduce forest fragmentation
2. Limit conversion of forests to non-forest land uses
3. Control invasive woody plants in the understory
4. Reduce development in forested areas
5. Protect roost trees for bat species
6. Restore forests and woodlands
7. Create small forest openings to increase diversity
8. Implement best management practices in forestry
9. Re-establish bottomland hardwood forests
10. Manage forests adjacent to rocky habitat
11. Manage for healthy forest edge habitats

Top threats to fish and wildlife habitats in forests in the Interior Plateau Region:

1. Invasive and alien species
2. Conversion of natural habitats to other land uses
3. Housing and urban areas
4. Conversion of habitat to annual crops
5. Roads and railroads
6. Plant diseases
7. Problematic native species

Top conservation actions for fish and wildlife habitats in forests in the Interior Plateau Region:

1. Preserve currently existing corridors
2. Control invasive species in forests
3. Acquire currently unprotected forests
4. Acquire conservation easements to protect important wildlife habitats
5. Restore habitats and natural systems in forests
6. Increase regulations on invasive species
7. Promote diversity of forest types and successional stages
8. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
9. Reduce urban sprawl through planning and zoning
10. Develop education programs specifically for K-12



### Grasslands

Grasslands are defined as an open area dominated by grass species. Examples of grasslands include: haylands, pasture, prairies, savannahs, or reclaimed mine lands.

Top threats to SGCN occurring in grasslands in the Interior Plateau Region:

1. Conversion of habitat to annual crops
2. Annual and perennial non-timber crops



Top conservation actions for SGCN occurring in grasslands in the Interior Plateau Region:

1. Restore and improve connectivity of grasslands
2. Maintain large tracts of grasslands
3. Reduce woody encroachment on grasslands
4. Increase CRP grasslands
5. Implement burning regimes
6. Minimize disturbance to nesting grassland birds (e.g., Henslow's Sparrow)
7. Mow properly (reduce mowing for shorebirds and owls)
8. Acquire conservation easements.
9. Improve grazing practices
10. Protect low, wet fields, and meadows

Top threats to fish and wildlife habitats in grasslands in the Interior Plateau Region:

1. Housing and urban areas
2. Commercial and industrial areas
3. Conversion of habitat to annual crops
4. Roads and railroads
5. Invasive and alien species
6. Annual and perennial non-timber crops
7. Livestock farming and ranching

Top conservation actions for fish and wildlife habitats in grasslands in the Interior Plateau Region:

1. Reduce urban sprawl through planning and zoning
2. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
3. Develop education programs in general
4. Develop education programs specifically for K-12
5. Acquire currently unprotected grasslands
6. Acquire conservation easements to protect important wildlife habitats
7. Re-establish natural disturbance regimes in grasslands
8. Restore habitats and natural systems in grasslands
9. Set private sector standards and codes
10. Improve compliance with and enforcement of current policies
11. Promote conservation payment programs (e.g., payment for ecosystem services, conservation easements)



## Subterranean Systems

Subterranean systems are defined as connecting underground rooms and passages beyond natural light penetration. Examples of subterranean systems include: underground waters, above and below the water table, and terrestrial air-filled habitats ranging from large caves to interstitial crevices below soil horizons.

Top Threats to SGCN Occurring in Subterranean Systems in the Interior Plateau Region:

1. Invasive and alien species

Top conservation actions for SGCN occurring in subterranean systems in the Interior Plateau Region:

1. Protect subterranean systems
2. Limit recreational caving
3. Protect bat hibernacula

Top threats to fish and wildlife habitats in subterranean systems in the Interior Plateau Region:

1. Invasive and alien species
2. Runoff from roads and service corridors
3. Conversion of natural habitats to other land uses
4. Agriculture, residential, and forestry effluents
5. Housing and urban areas
6. Commercial and industrial areas
7. Roads and railroads
8. Chemical spills
9. Household sewage and urban water waste

Top conservation actions for fish and wildlife habitats in subterranean systems in the Interior Plateau Region:

1. Develop education programs specifically for K-12
2. Protect adjacent buffer zones
3. Acquire currently unprotected subterranean systems
4. Develop education programs in general
5. Control invasive species in subterranean systems
6. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
7. Acquire conservation easements
8. Strengthen conservation financing
9. Reduce nutrient and toxin loads
10. Promote nonmonetary values of natural systems within the state



## Wetlands

Wetlands are defined as either ephemeral or permanently flooded habitat. Examples of wetlands include: swamps, marshes, bogs, fens, potholes, wetlands of farmed areas, and mudflats.

Top threats to SGCN occurring in wetlands in the Interior Plateau Region:

1. Invasive and alien species
2. Natural habitat conversion
3. Conversion of habitat to annual crops
4. Annual and perennial non-timber crops
5. Dams and water management and use

Top conservation actions for SGCN occurring in wetlands in the Interior Plateau Region:

1. Protect and maintain large wetlands complexes
2. Restore wetlands
3. Improve water quality
4. Protect buffers around wetlands
5. Control invasive plants in wetlands
6. Mitigate road hazards to amphibians and reptiles when roads cross over wetlands
7. Minimize disturbance to nesting turtles
8. Provide stopover and roosting habitat for cranes and shorebirds
9. Conserve ephemeral wetlands
10. Connect wetlands with surrounding upland habitat

Top threats to fish and wildlife habitats in wetlands in the Interior Plateau Region:

1. Conversion of natural habitats to other land uses
2. Invasive and alien species
3. Housing and urban areas
4. Commercial and industrial areas
5. Conversion of habitat to annual crops
6. Point source pollution from commercial and industrial sources
7. Annual and perennial non-timber crops
8. Air pollution
9. Agriculture, residential, and forestry effluents

Top conservation actions for fish and wildlife habitats in wetlands in the Interior Plateau Region:

1. Acquire currently unprotected wetlands
2. Reduce urban sprawl through planning and zoning
3. Restore habitats and natural systems in wetlands
4. Develop education programs specifically for K-12
5. Improve compliance with and enforcement of current policies
6. Reduce conversion to cropland
7. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
8. Improve drainage management
9. Protect adjacent buffer zones
10. Preserve currently existing corridors