

D. VALLEYS AND HILLS REGION

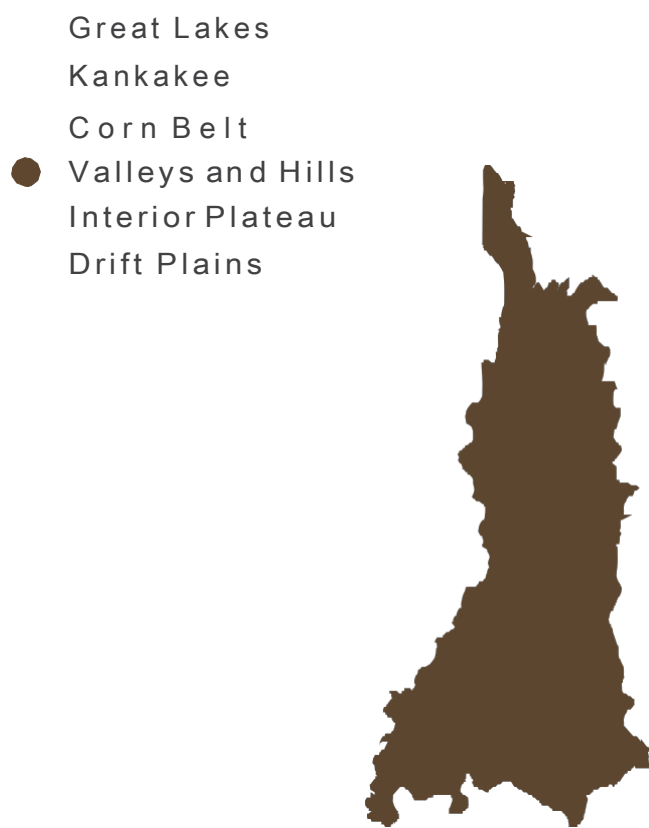


Figure 6-16. Outline of the Valleys and Hills Region in Indiana for the SWAP.

Introduction

This section summarizes habitat conditions, threats to SGCN and their habitats, and conservation actions for species and habitats in the Valleys and Hills 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 Valleys and Hills Region include:

- **Natural System Modifications:** Re-establish river floodplain connectivity
- **Habitat Degradation of Reclaimed Mine Lands Grasslands:** Build external capacity by forming partnerships and networks, raising and providing funds and resources for conservation organizations to maintain and protect grasslands
- **Habitat Degradation to Forests:** Control invasive species

Current Habitat Conditions

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

Table 6-10. Species of Greatest Conservation Need present in the Valleys and Hills Region.

Taxa	Scientific Name	Common Name
Amphibians	<i>Necturus maculosus</i>	Common Mudpuppy
Amphibians	<i>Ambystoma talpoideum</i>	Mole Salamander
Amphibians	<i>Acris blanchardi</i>	Blanchard's Cricket Frog
Amphibians	<i>Lithobates areolatus</i>	Crawfish Frog
Amphibians	<i>Lithobates blairi</i>	Plains Leopard Frog
Birds	<i>Cygnus buccinator</i>	Trumpeter Swan
Birds	<i>Colinus virginianus</i>	Northern Bobwhite
Birds	<i>Chordeiles minor</i>	Common Nighthawk
Birds	<i>Antrastomus vociferus</i>	Eastern Whip-poor-will
Birds	<i>Laterallus jamaicensis</i>	Black Rail
Birds	<i>Rallus elegans</i>	King Rail
Birds	<i>Rallus limicola</i>	Virginia 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
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

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Taxa	Scientific Name	Common Name
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>Noturus stigmosus</i>	Northern Madtom
Fish	<i>Lepomis symmetricus</i>	Bantam Sunfish
Fish	<i>Percina copelandi</i>	Channel Darter
Fish	<i>Elassoma zonatum</i>	Banded Pygmy Sunfish
Fish	<i>Ammocrypta clara</i>	Western Sand Darter
Fish	<i>Etheostoma maculatum</i>	Spotted Darter
Mammals	<i>Myotis grisescens</i>	Gray 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>Sylvilagus aquaticus</i>	Swamp Rabbit
Mammals	<i>Mustela nivalis</i>	Least Weasel
Mammals	<i>Taxidea taxus</i>	American Badger
Mollusks	<i>Cyprogenia stegaria</i>	Fanshell
Mollusks	<i>Obovaria subrotunda</i>	Round Hickorynut
Mollusks	<i>Plethobasus cyphus</i>	Sheepnose
Mollusks	<i>Pleurobema cordatum</i>	Ohio Pigtoe
Mollusks	<i>Potamilus capax</i>	Fat Pocketbook
Mollusks	<i>Ptychobranchus fasciolaris</i>	Kidneyshell
Mollusks	<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot

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Taxa	Scientific Name	Common Name
Mollusks	<i>Villosa lienosa</i>	Little Spectaclecase
Reptiles	<i>Macrochelys temminckii</i>	Alligator Snapping Turtle
Reptiles	<i>Kinosternon subrubrum</i>	Eastern Mud 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>Farancia abacura</i>	Red-bellied Mudsnake
Reptiles	<i>Agkistrodon piscivorus</i>	Cottonmouth

During the Habitat Survey, respondents were asked to evaluate the overall quality of fish and wildlife habitats in the Valleys and Hills Region (Fig. 6-17), estimate changes in overall quality since 2005 (Fig. 6-18), and predict changes in overall quality over the next ten years (Fig. 6-19). 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.

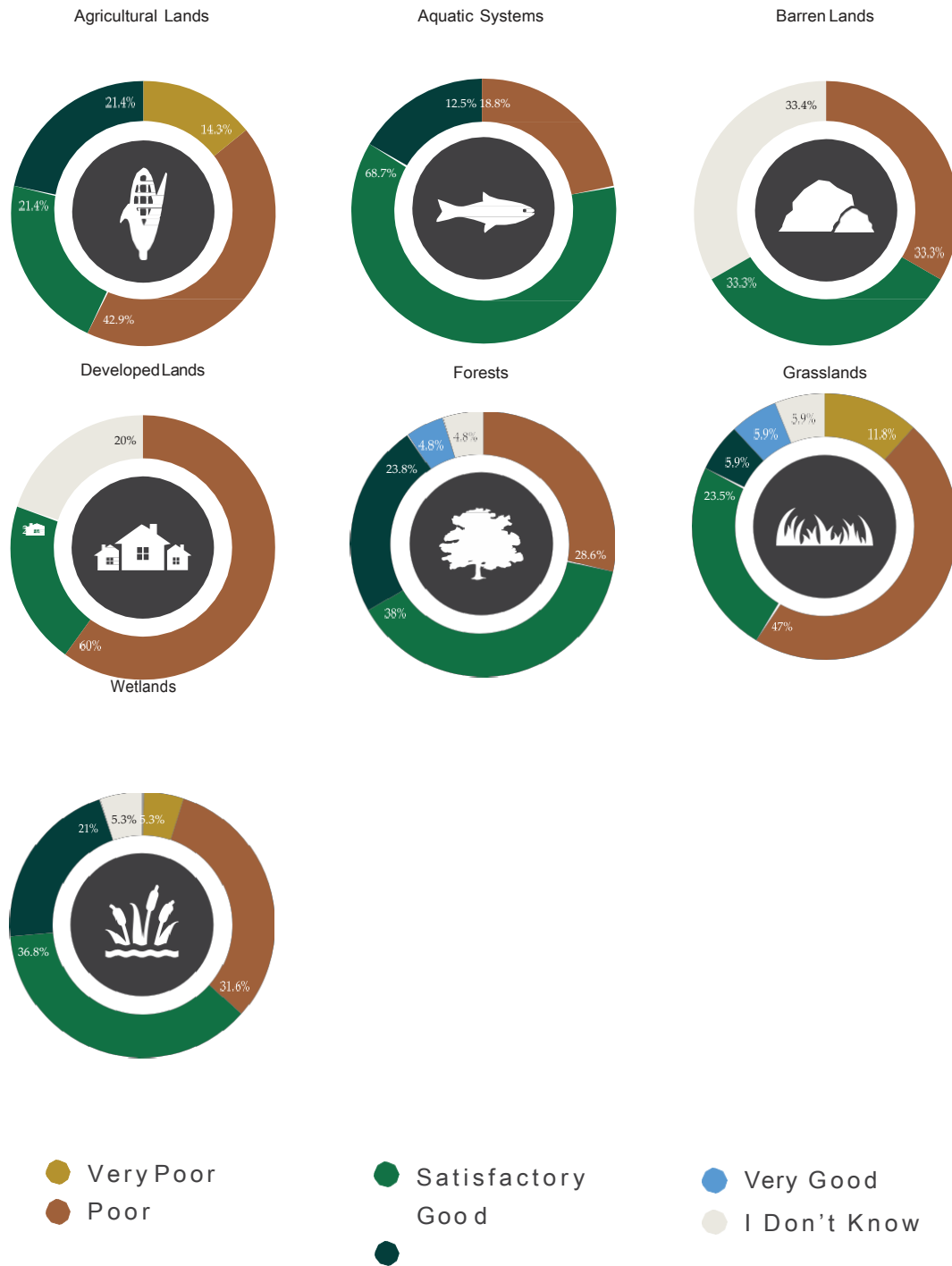


Figure 6-17. Overall quality of fish and wildlife habitats in the Valleys and Hills Region in 2014.

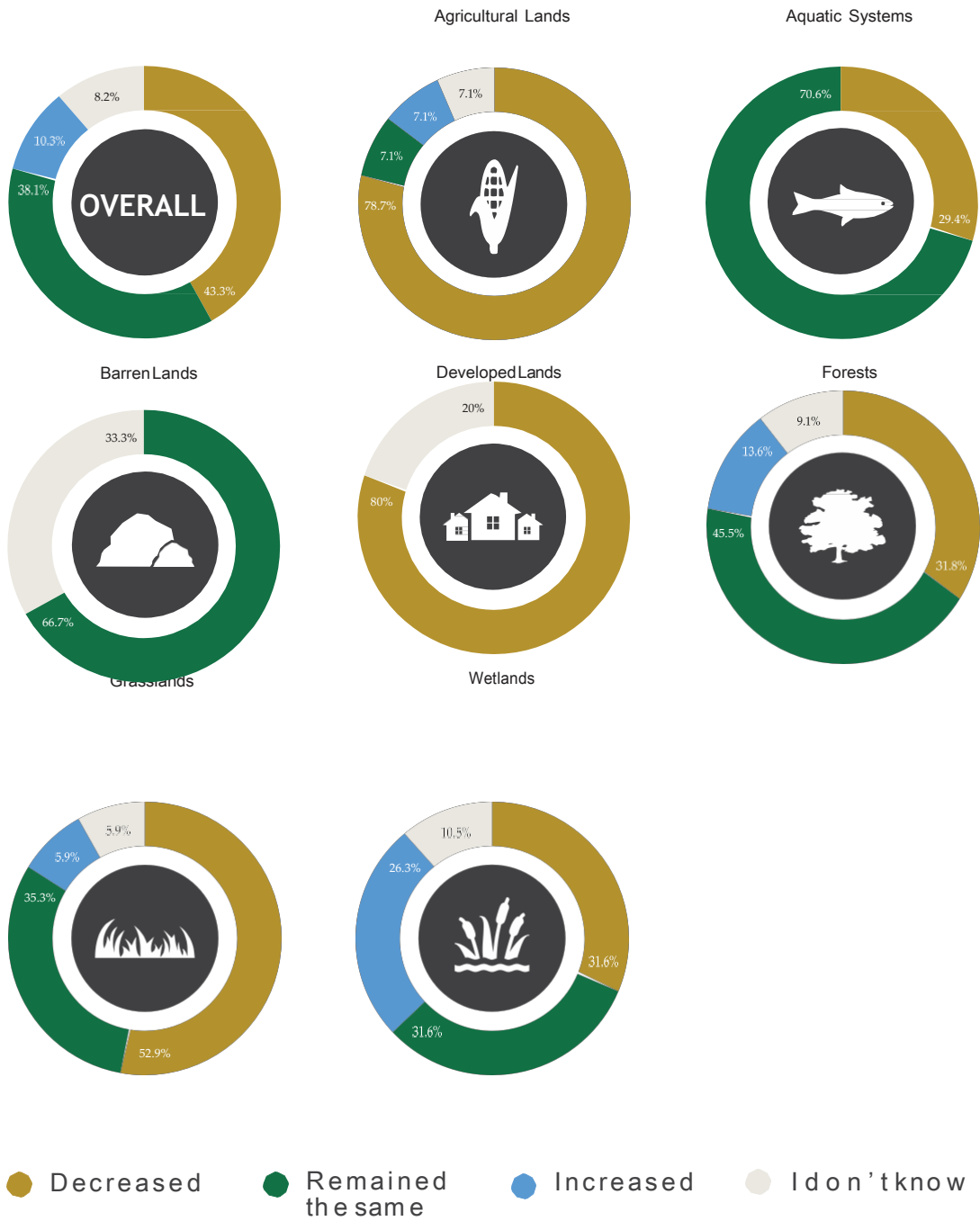


Figure 6-18. Estimated change in the overall quality of fish and wildlife habitats from 2005 to 2014 for each of the major habitat types in the Valleys and Hills Region.

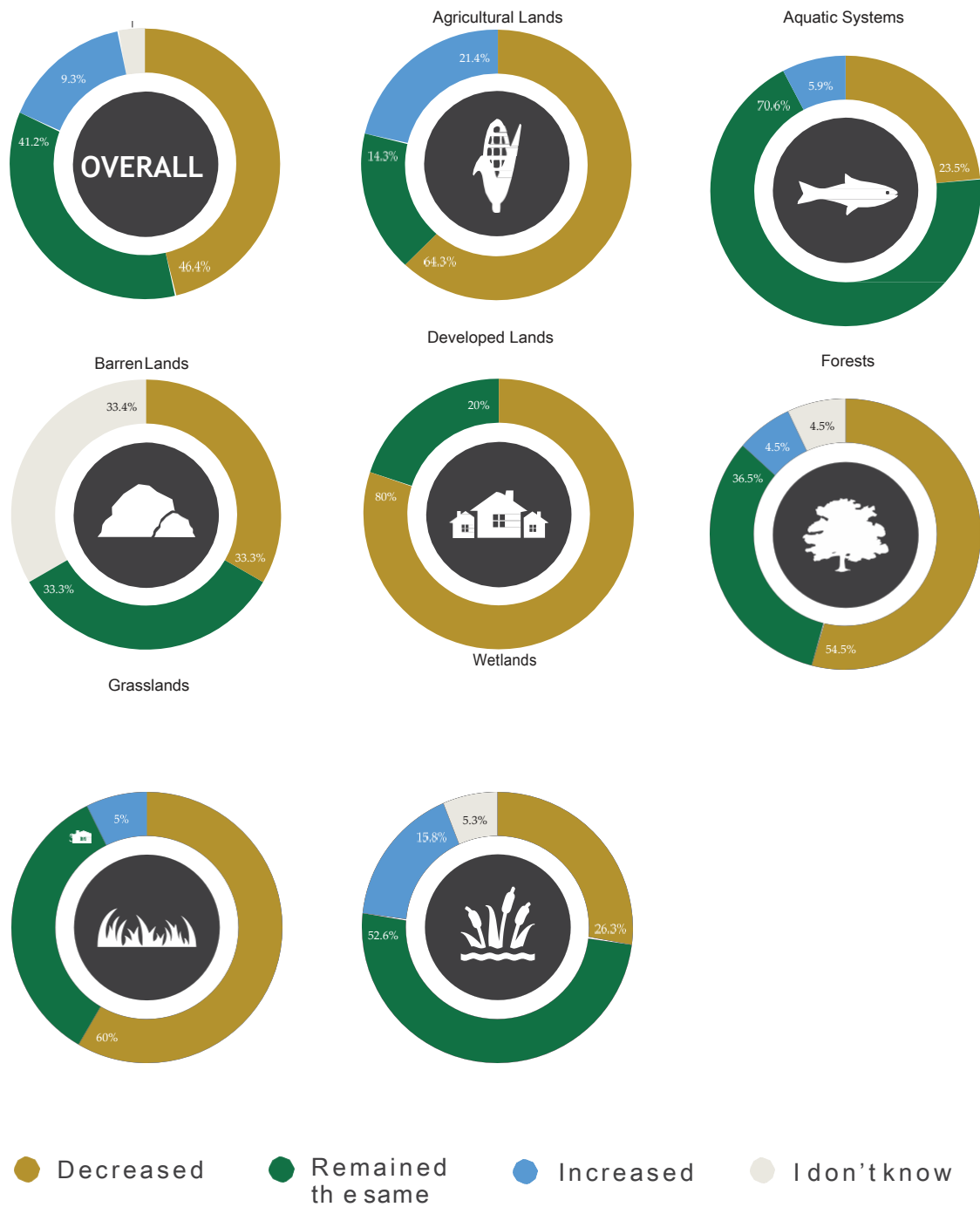


Figure 6-19. Predicted changes in overall quality of fish and wildlife habitats over the next ten years for each major habitat type in the Valleys and Hills Region.

Changes in Land Cover

Most land cover in the Valleys and Hills Region consists of agricultural lands, followed by forests, developed lands, and grasslands (Fig. 6-20). Compared to other Indiana regions, with the exception of the Great Lakes Region, the Valleys and Hills Region has the highest percentage of aquatic systems at 2.1%. This region is comprised of more forests than other northern Indiana regions at 24.9%, but is the least forested region in southern Indiana. Wetlands are more abundant at 1.4% than other regions in southern Indiana.

The Valleys and Hills Region has experienced changes in habitat coverage over the past ten years. Aquatic systems, barren lands, developed lands, grasslands, and wetlands increased, while agriculture and forests decreased (Table 6-11). These habitats were mostly lost to urban development, and agriculture lost the most cover in terms of total acreage (Fig. 6-20). Percentage-wise, the greatest net losses were seen in forests (1.2%) and agricultural lands (0.6%). The greatest net increases were seen in barren lands (232.3%), aquatic systems (4.4%), and developed lands (3.4%). This increase may be due to expansion of surface mining, which is prevalent in the Valleys and Hills Region.

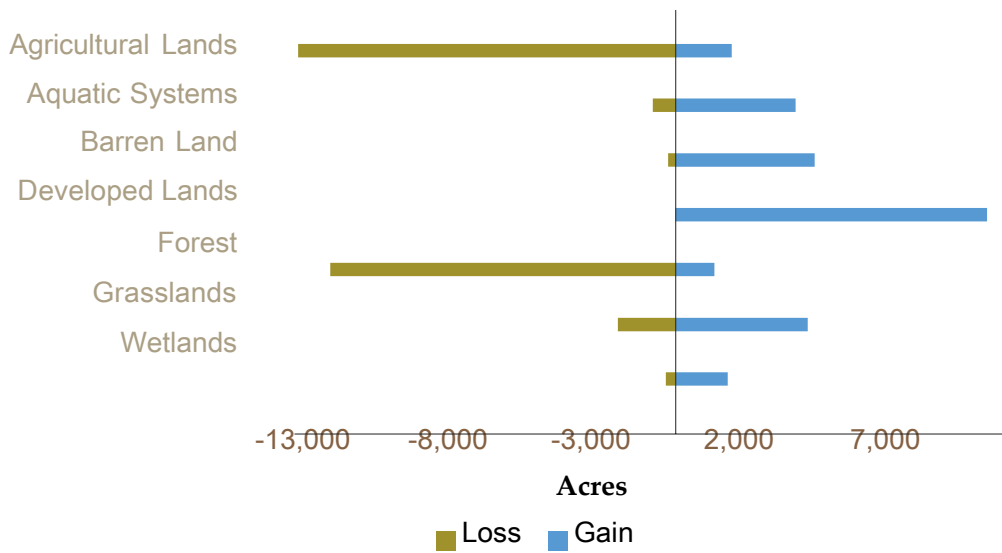
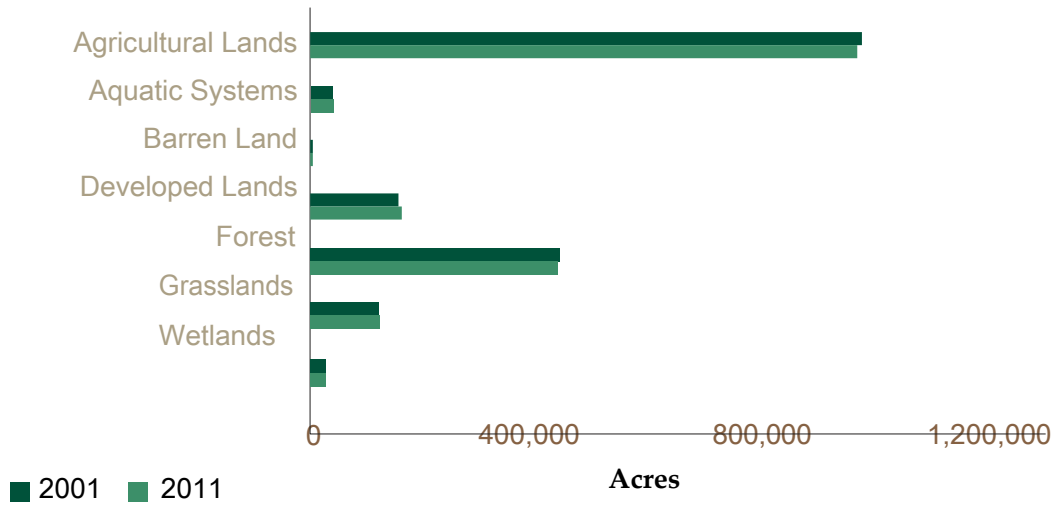


Figure 6-20. Distribution of land cover and losses and gains in land cover in the Valleys and Hills Region between 2001 and 2011 from NLCD.

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 6-11). A full summary of the Habitat Survey results for the Great Lakes Region can be found in Appendix P.

For first-level threat categories, agriculture and aquaculture, invasive and other problematic species and genes, and residential and commercial development received mean ratings as categories between significant and moderate threats. All other threat categories, with the exception of biological resource use were, on average, rated between a moderate and minor threat. Biological resource use was rated as minor to not a threat as a category.

Agriculture and aquaculture was the top ranked first-level threat regionally and within each habitat type with the exception of developed lands. Conversion of habitat to agriculture as well as annual and perennial non-timber crops in general were identified as the most significant specific second-level threats in this area. Respondents noted particular threats may stem from the draining and destruction of wetlands for agricultural purposes. Livestock was rated as a moderate to minor threat, while both aquaculture and wood and pulp plantations were not identified above a minor threat across habitat types.

The invasive and other problematic species and genes category was rated relatively high across habitat types, but especially highly in grasslands and wetlands. Alien species was identified as the most significant threat across habitat types within this region. Problematic native species, introduced genetic material, and plant diseases were only ranked as moderate to minor threats.

Residential and commercial development was rated third overall but first for habitats in developed lands. Both housing and urban areas and commercial development were specifically rated within this category as significant to moderate threats, while development associated with tourism and recreation areas was identified as a moderate to minor threat.

Energy production and mining was rated slightly higher as a threat in barren lands compared to other habitat types. Both mining and fossil fuel production were identified as significant threats within this category for barren lands and aggregated across all habitat types. Oil and gas drilling and shale gas development were identified as moderate to minor in this region. Renewable energy production was identified as minor to not a threat to fish and wildlife habitats.

Pollution was rated as a more significant threat in aquatic systems and to habitats in agricultural lands compared to other habitat types. Agriculture, residential, and forestry effluents were identified as a significant to moderate threat in both of these habitat types. Point source pollution was additionally identified as a significant to moderate threat for habitats in agricultural lands.

Human intrusion and disturbance and recreational activities as a specific threat within this category were both rated as moderate to minor threats for this region across all habitat types. Natural systems modification as a category was also identified as moderate to minor. However, conversion of habitat to other uses was identified as a significant to moderate threat, reinforcing the significance of this issue as it was identified prior as conversion to agriculture.

Within transportation and service corridors, only roads and railroads were identified as significant to moderate specific threats across habitat types. Utility and service lines were rated as a moderate to minor threat. Both flight paths and shipping lanes were identified as minor to non-threats for this region.

While other stressors as a category was rated as a moderate to minor threat, both diseases and low genetic diversity were individually ranked as significant to moderate threats across habitat types. Climate change and severe weather similarly was ranked lower across habitats as a category, all of the specific threats within this category were identified as significant to moderate threat across all habitat types in this region.

Biological resource use was identified as a minor to non-threat for habitats within this region. However, forestry practices were rated as a moderate to minor threat, with one respondent pointing specifically to lack of sustainable timber management in natural systems modification as a point of stress for fish and wildlife habitats in this region.

Table 6-11. Threat category ranking to habitats in the Valleys and Hills Region. First-level threat categories are based on the hierarchical method of identifying threats outlined in Salafsky et al (2008). Ranked threats are arranged by each major habitat type (1 - highest threat).

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

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

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 Valleys and Hills Region, aggregated across all species:

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

Respondents anticipate a development “boom” associated with construction of an interstate in coming years, which may increase potential for introduction of exotic and invasive species on top of modifying natural systems. The construction may also lead to fragmentation. Loss of wetland habitat, exotic species establishing in wetland habitats, and mine reclamation areas not being converted to wetland habitat types were a concern for this region as well.

Conservation Actions Needed

Top Action Categories

The fourth element of the Congressional guidelines 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 on a regional basis 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 second-level actions are outlined in Table 6-12.

Within this region, land, water, and species management, land and water protection, and education and awareness received average category rankings between very and moderately important. Law and policy, external capacity building, and livelihood, economic, and other incentives received average category ratings between moderately and somewhat important. No action category was

rated between somewhat important and not important, indicating a general importance for a variety of actions within this region.

Land, water, and species management was ranked first regionally and within barren lands, forests, grasslands, and wetlands. Top actions within this region indicate an importance to restore natural systems, disturbance regimes, and diversity of successional stages in a variety of habitat types including grasslands and wetlands. Reducing loss of fish and wildlife habitat to agriculture and development was also identified as an important action, ranking first in developed lands and forests. Developing and promoting farming technologies and practices with conservation benefit ranked first for habitats within aquatic systems, agricultural lands, and wetlands. Mine reclamation was ranked first for barren lands.

Land and water protection was ranked second regionally, first within aquatic systems, and tied for first within barren lands. Acquiring unprotected systems and reducing conversion to cropland was identified important regionally as well as within most individual habitat types, ranking first in barren lands, developed lands, and wetlands. Acquiring easements was ranked first for fish and wildlife habitats within agricultural lands. Building and strengthening CRP partnerships was identified as most important for aquatic systems within this category.

Education and awareness was ranked third regionally as a category; however, it was ranked first for agricultural lands and developed lands. Within this category, educational programs specifically for K-12, educational programs in general, and training programs for stakeholders all received average ratings between very and moderately important.

Law and policy was ranked fourth regionally and varied between ranking fourth and sixth for various habitat types. Across the region, improvement of compliance and enforcement of current policies was ranked first. Some respondents suggested a need for changes to current policies to benefit fish and wildlife habitat within this region and suggested changes to regulations for energy production, including mining, oil, and gas laws.

Livelihood, economic, and other incentives was ranked fifth regionally but third for fish and wildlife habitats in agricultural lands. Promotion of conservation payment programs was ranked first regionally and within aquatic systems, agricultural lands, barren lands, developed lands, grasslands, and forests. Promotion of nonmonetary values of natural systems was ranked first within wetlands.

While external capacity building was ranked sixth regionally, five of the six specific actions were rated between very and moderately important. Developing alliances and partnerships was ranked first regionally and first for agricultural lands, barren lands, developed lands, forests, and grasslands. Strengthening conservation financing was ranked first in aquatic systems and wetlands.

Table 6-12. Action category ranking to habitats in the Valleys and Hills Region. First-level categories are based on the hierarchical method of identifying actions outlined in Salafsky et al. (2008). Ranked action categories for this region are arranged by major habitat type.

Category	Regional Ranking	Aquatic Systems	Agricultural Lands	Barren Lands	Developed Lands	Forests	Grasslands	Wetlands
Land/Water/Species Management	1	3	2	1	3	1	1	1
Land/Water Protection	2	1	5	1	2	2	2	2
Education and Awareness	3	2	1	3	1	3	3	3
Law and Policy	4	4	6	4	5	5	5	4
Livelihood, Economic, and Other Incentives	5	5	3	4	4	4	4	6
External Capacity Building	6	6	4	6	6	6	6	5
	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 Valleys and Hills Region, aggregated across habitat types:

1. Reduce conversion to cropland
2. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
3. Preserve currently existing corridors
4. Develop alliances and partnerships (e.g., between producers, landowners, and conservation professionals)
5. Acquire conservation easements to protect important wildlife habitats
6. Promote use of research and science in conservation decision-making processes
7. Develop education programs specifically for K-12
8. Develop education programs in general
9. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
10. Strengthen conservation financing

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

1. Educate and engage with landowners and citizens.
2. Enhance connectivity of habitats
3. Reclaim coal minegrasslands
4. Restore and protect bottomland hardwood forests and floodplain swamps
5. Protect and restore river corridors
6. Protect large contiguous forested areas
7. Protect and manage large wetland complexes
8. Control invasive plants
9. Use burning and mowing as grassland management techniques
10. Implement agricultural practices that improve water quality

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 a region. A full list of these results can be found in Appendix P. Priority actions for the Valleys and Hills region include:

1. Preserve currently existing corridors
2. Acquire currently unprotected wetlands
3. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
4. Reduce conversion to cropland
5. Acquire currently unprotected grasslands

While land, water, and species management actions were, on average, rated as most important, land and water protection-based actions, with an emphasis on acquiring wetland and grassland habitats within this region, were also ranked highly.

Promotion of farming technologies and practices that have conservation benefits and reduce conversion to cropland reflect the identification of agriculture as a large threat to fish and wildlife habitats within this region.

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 on the following pages.

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 Valleys and Hills 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 Valleys and Hills Region:

1. Educate and engage with landowners and citizens
2. Reduce conversion of farmland to development
3. Increase use of CRP partnerships
4. Increase use of conservation easements
5. Implement agricultural practices that improve water quality
6. Maintain shallow-water areas for migrating shorebirds
7. Establish no-plowzones

Top threats to fish and wildlife habitats in agricultural lands in the Valleys and Hills Region:

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

Top conservation actions for fish and wildlife habitats in agricultural lands in the Valleys and Hills Region:

1. Acquire conservation easements to protect important wildlife habitats
2. Reduce conversion of habitat to cropland
3. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
4. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
5. Preserve currently existing corridors
6. Increase acres of riparian buffers
7. Link existing habitat blocks through corridor enhancement in agricultural lands
8. Develop education programs in general
9. Establish training programs for stakeholders
10. Develop alliances and partnerships (e.g., between producers, landowners, and conservation professionals)
11. Promote use of research and science in conservation decision-making processes



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 Valleys and Hills Region:

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

Top conservation actions for SGCN occurring in aquatic systems in the Valleys and Hills Region:

1. Implement agricultural best management practices to improve water quality
2. Protect and restore river corridors
3. Enhance public, stakeholder, and landowner education and awareness
4. Reduce point and non-point source pollution
5. Protect/restore riparian buffer zones
6. Restore floodplains and connect to rivers
7. Remove dams
8. Reduce sediment and nutrient loads
9. Reduce bank erosion
10. Protect oxbow lakes and sloughs
11. Restrict draining of floodplain lakes
12. Improve ditch maintenance
13. Prohibit take of mussels

Top threats to fish and wildlife habitats in aquatic systems in the Valleys and Hills Region:

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

Top conservation actions for fish and wildlife habitats in aquatic systems in the Valleys and Hills Region:

1. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
2. Develop education programs in general
3. Reduce nutrient and toxin loads (e.g., heavy metals, pharmaceuticals, fertilizers, insecticides)
4. Acquire currently unprotected aquatic systems
5. Acquire conservation easements to protect important wildlife habitats
6. Develop education programs specifically for K-12
7. Preserve currently existing corridors
8. Reduce conversion of habitat to annual crops
9. Increase acres of riparian buffers
10. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
11. Develop alliances and partnerships (e.g., between producers, landowners, and conservation professionals)



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 Valleys and Hills Region:*

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

Top conservation actions for SGCN occurring in barren lands in the Valleys and Hills Region:

1. Educate public about Peregrine Falcon
2. Protect Bald Eagle nest sites

Top threats to fish and wildlife habitats in barren lands in the Valleys and Hills Region:

1. Conversion of habitat to annual crops
2. Mining and quarrying
3. Fossil fuel energy production
4. Conversion of habitat to other land uses
5. Annual and perennial non-timber crops
6. Livestock farming and ranching
7. Shale gas development
8. Household sewage and urban water waste
9. Agriculture, residential, and forestry effluents

Top conservation actions for fish and wildlife habitats in barren lands in the Valleys and Hills Region:

1. Preserve currently existing corridors
2. Reduce conversion to cropland
3. Build/Strengthen CRP partnerships
4. Mine reclamation
5. Promote conservation payment programs (e.g., payment for ecosystem services, conservation easements)
6. Promote nonmonetary values of natural systems within the state
7. Manage recreational opportunities to be compatible with fish and wildlife habitats



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 Valleys and Hills Region*:

1. Housing and urban areas
2. Commercial and industrial areas
3. Renewable energy production
4. Conversion of habitat to annual crops
5. Invasive and alien species
6. Diseases from domestic populations and unknown sources
7. Mining and quarrying
8. Fossil fuel energy production
9. Tourism and recreation areas
10. Wood and pulp plantations

Top conservation actions for SGCN occurring in developed lands in the Valleys and Hills Region:

1. Public education and awareness about 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. Limit mowing along roads

Top threats to fish and wildlife habitats in developed lands in the Valleys and Hills Region:

1. Invasive and alien species
2. Roads and railroads
3. Housing and urban areas
4. Runoff from roads and service corridors
5. Air pollution
6. Annual and perennial non-timber crops
7. Conversion of habitat to annual crops
8. Commercial and industrial areas

Top conservation actions for fish and wildlife habitats in developed lands in the Valleys and Hills Region:

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. Increase acres of riparian buffers
4. Link existing habitat blocks through corridor enhancement in developed lands
5. Develop alliances and partnerships (e.g., between producers, landowners, and conservation professionals)
6. Promote use of research and science in conservation decision-making processes
7. Preserve currently existing corridors
8. Acquire conservation easements to protect important wildlife habitats



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 Valleys and Hills Region:*

1. Conversion of habitat to annual crops
2. Natural habitat conversion
3. Housing and urban areas
4. Invasive and alien species
5. Commercial and industrial areas
6. Annual and perennial non-timber crops
7. Renewable energy production
8. Diseases from domestic populations and unknown sources
9. Fossil fuel energy production
10. Mining and quarrying
11. Tourism and recreation areas
12. Wood and pulp plantations
13. Fire and fire suppression

Top conservation actions for SGCN occurring in forests in the Valleys and Hills Region:

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

Top threats to fish and wildlife habitats in forests in the Valleys and Hills Region:

1. Invasive and alien species
2. Conversion of habitat to annual crops
3. Housing and urban areas
4. Mining and quarrying
5. Conversion of natural habitats to other land uses
6. Fossil fuel energy production
7. Annual and perennial non-timber crops
8. Problematic native species
9. Commercial and industrial areas
10. Oil and gas drilling

Top conservation actions for fish and wildlife habitats in forests in the Valleys and Hills Region:

1. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
2. Preserve currently existing corridors
3. Restore habitats and natural systems in forests
4. Promote diversity of forest types and successional stages
5. Reduce conversion to cropland
6. Control invasive species in forests
7. Link existing habitat blocks through corridor enhancement in forests
8. Re-establish natural disturbance regimes in forests
9. Develop education programs specifically for K-12
10. Promote conservation payment programs (e.g., payment for ecosystem services, conservation easements)



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 Valleys and Hills 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 Valleys and Hills Region:

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

Top threats to fish and wildlife habitats in grasslands in the Valleys and Hills Region:

1. Conversion of habitat to annual crops
2. Invasive and alien species
3. Housing and urban areas
4. Annual and perennial non-timber crops
5. Commercial and industrial areas
6. Livestock farming and ranching
7. Introduced genetic material (such as crop, seed stock, bio-control, stocked/released species, etc.)
8. Problematic native species
9. Tourism and recreation areas
10. Aquaculture

Top conservation actions for fish and wildlife habitats in grasslands in the Valleys and Hills Region:

1. Perform mine reclamation
2. Restore habitats and natural systems in grasslands
3. Acquire currently unprotected grasslands
4. Reduce conversion to cropland
5. Promote diversity of grassland types and successional stages
6. Preserve currently existing corridors
7. Acquire conservation easements to protect important wildlife habitats
8. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
9. Re-establish natural disturbance regimes in grasslands



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 Valleys and Hills 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 Valleys and Hills Region:

1. Protect and maintain large wetlands complexes
2. Restore wetlands
3. Control invasive plants in wetlands
4. Preserve and restore bottomland hardwood forests and floodplain swamps
5. Expand floodplain and upland habitat with multiple wetlands
6. In some cases, actively manage water levels (e.g., Black Tern, Common Gallinule)
7. Enroll lands in Wetlands Reserve Program (WRP)
8. Mitigate road hazards to amphibians and reptiles when roads cross over wetlands
9. Manage for high-diversity marshes
10. Provide stopover and roosting habitat for cranes

Top threats to fish and wildlife habitats in wetlands in the Valleys and Hills Region:

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

Top conservation actions for fish and wildlife habitats in wetlands in the Valleys and Hills Region:

1. Reduce conversion to cropland
2. Acquire currently unprotected wetlands
3. Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no-till, and soil health)
4. Reduce loss of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)
5. Develop education programs specifically for K-12
6. Restore habitats and natural systems in wetlands
7. Increase compliance of existing rules and regulations for aquatic systems.
8. Promote diversity in wetlands
9. Preserve currently existing corridors
10. Acquire conservation easements to protect important wildlife habitats