

XVIII. Appendices

The entire Appendices totals almost 3000 pages and thus are not included in this file. Please see <http://www.djcase.com/incws/appendices/appendices.htm> for access to these documents.

INDIANA COMPREHENSIVE WILDLIFE STRATEGY

We're Planning to Keep Indiana's Wildlife



The CWS
Our Strategy
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Indiana's Conservation Wildlife Strategy

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Appendix A: Complete list of Habitat definitions

Agriculture: Lands devoted to commodity production, including intensively managed nonnative grasses, row crops, fruit and nut-bearing trees.

2) Aquatic systems,

This habitat is comprised of all water, both flowing and stationary, habitats in Indiana.

Lake Michigan

Lake Michigan is Indiana's largest natural lake, although Indiana can only lay claim to about 1% (224 mi²) of its area and only 45 miles of its shoreline. The southern tip of Lake Michigan forms Indiana's extreme northwest border. Ecology of the lake is ruled by the massive amount of offshore, deep, cold water, wind seiches, and newly introduced exotic species.

Rivers and Streams by Order and Watershed

A. Great Lakes drainage (includes Lake Michigan and Lake Erie tributaries)

1). headwater (< 20 mi² drainage area) The Great Lakes drainage of Indiana includes waters that flow into Lake Michigan and Lake Erie and are located in extreme northern Indiana and northeast Indiana. Headwater streams are those having a drainage area of < 20 mi². Headwater streams of the Great Lakes drainage of Indiana are of low to medium gradient, with sandy/rocky bottoms and are highly associated with the extensive natural lakes and wetlands of the region. Many have been channelized and highly modified for drainage to maintain agricultural lands.

2). wadeable/large river (> 19 < 2,000 mi²) The Great Lakes drainage of Indiana includes waters that flow into Lake Michigan and Lake Erie and are located in extreme northern Indiana and northeast Indiana. Wadeable/large rivers are those having a drainage area of > 19 < 2,000 mi². Wadeable rivers and streams of the Great Lakes drainage of Indiana are of low to medium gradient, with sandy/rocky bottoms and are highly associated with the extensive natural lakes and wetlands of the region.

3). great river (> 1,999 mi²); this includes all of the St. Joseph River in St. Joseph and Elkhart counties, and the lower section of the Maumee River in Allen County The Great Lakes drainage of Indiana includes waters that flow into Lake Michigan and Lake Erie and are located in extreme northern Indiana and northeast Indiana. Great rivers are those having a drainage area of > 1,999 mi². This includes all of the St. Joseph River in St. Joseph and Elkhart counties (Lake Michigan drainage), and the lower section of the Maumee River in Allen County (Lake Erie drainage). Great Rivers of the Great Lakes drainage of Indiana are of low to medium gradient and characterized by sandy/rocky bottoms.

B. Kankakee River (Illinois River) drainage

1). headwater (< 20 mi² drainage area) Rivers and streams of the Kankakee River (Illinois River) drainage are those found in northwest Indiana that flow west into Illinois and eventually the Illinois River. Headwater streams are those having a drainage area of < 20 mi². Headwater streams of the Kankakee River drainage are

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now highly modified, often manmade, sandy/muck bottom, channelized ditches, maintained to drain agricultural lands and control flooding.

2). wadeable/large river ($> 19 < 2,000 \text{ mi}^2$) Rivers and streams of the Kankakee River (Illinois River) drainage are those found in northwest Indiana that flow west into Illinois and eventually the Illinois River. Wadeable/large rivers are those having a drainage area of $> 19 < 2,000 \text{ mi}^2$. Once a series of meandering streams through a huge wetland complex, most of the rivers and streams of the Kankakee River drainage are now highly modified, sandy/muck bottom, channelized ditches, maintained to drain agricultural lands and control flooding.

C. Ohio River drainage

1). great river ($> 1,999 \text{ mi}^2$); this includes the Ohio River, the Wabash River upstream to the Mississinewa River, the White River upstream on the West Fork to the Johnson/Morgan county line and on the East Fork to just south of Columbus (Bartholomew County) Rivers and streams of the Ohio River drainage include all waters of the lower half of Indiana and a large portion of the northern half of Indiana. Great rivers are those having a drainage area of $> 1,999 \text{ mi}^2$. This includes the Ohio River, the Wabash River upstream to the Mississinewa River, the White River upstream on the West Fork to the Johnson/Morgan county line and on the East Fork to just south of Columbus (Bartholomew County). The entire Ohio River drainage of Indiana culminates where the Wabash River meets the Ohio River in the extreme southwestern tip of Indiana.

2). eastern corn belt/interior plateau ecoregions

a. headwater ($< 20 \text{ mi}^2$ drainage area) Streams of the Ohio River drainage, Eastern Corn Belt ecoregion are found in central and east-central Indiana; Interior Plateau ecoregion streams are found in south-central and southeastern Indiana. Headwater streams are those having a drainage area of $< 20 \text{ mi}^2$. Many headwater streams of the Eastern Corn Belt ecoregion are constructed drainage ditches or channelized streams and are intermittent. The Interior Plateau ecoregion includes Indiana's karst region and the most rugged terrain of Indiana.

b. wadeable/large river ($> 19 < 2,000 \text{ mi}^2$)

Streams of the Ohio River drainage, Eastern Corn Belt ecoregion are found in central and east-central Indiana; Interior Plateau ecoregion streams are found in south-central and southeastern Indiana. Wadeable/large rivers are those having a drainage area of $> 19 < 2,000 \text{ mi}^2$. The streams of the Eastern Corn Belt ecoregion are highly influenced by the extensive agriculture that dominates the ecoregion. The Interior Plateau ecoregion includes Indiana's karst region and the most rugged terrain of Indiana.

3). interior river lowland

a. headwater ($< 20 \text{ mi}^2$ drainage area) Streams of the Ohio River drainage, Interior River Lowland ecoregion are found in southwestern Indiana. Headwater streams are those having a drainage area of $< 20 \text{ mi}^2$. Headwater streams of the Interior

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River Lowland have been heavily modified for agricultural purposes and many are intermittent.

b. wadeable/large river ($> 19 < 2,000 \text{ mi}^2$) Streams of the Ohio River drainage, Interior River Lowland ecoregion are found in southwestern Indiana. Wadeable/large rivers are those having a drainage area of $> 19 < 2,000 \text{ mi}^2$. Streams of the Interior River Lowland ecoregion are heavily impacted by the low, nearly level flood plains associated with the great rivers of the region.

Oxbows/Backwaters/Sloughs/Embayments

The oxbows/backwaters/sloughs/embayments of Indiana are for the most part restricted to the southwest portion of Indiana and along the Ohio River forming Indiana's southern boundary. These habitats vary highly in their structure and permanency, and are all associated with large river habitats. They characteristically have muck bottoms and function as important nursery areas for large river fish species. Although many of these habitats are natural, others are manmade. Embayments along the Ohio River are the result of the series of locks and dams that have been created along the Ohio River. Many oxbows are the result of stream channelization.

Natural Lakes

Eighteen counties in northern Indiana contain natural lakes, although Kosciusko, Lagrange, Noble and Steuben counties contain nearly 70% of the total surface acreage. Natural lakes vary widely in habitat and eutrophication. Less fertile lakes tend to be deep and well oxygenated with marl or sandy substrates. More fertile lakes tend to be shallow with muck bottoms and dense stands of aquatic vegetation.

Impoundments

Impoundments are artificially constructed or maintained standing or flowing water bodies.

River: A broad, deep inland body of water with a steady, directional current (Kusler 1983).

Kettle Lake: Lakes formed in depressions left by the melting of large blocks of glacial ice which remained after a glacier receded (Kusler 1983).

Barren Lands: Lands dominated by exposed rock or minerals with sparse vegetation.

Barren Lands Active Quarries: Vegetative cover removed to extract mineral, stone, gravel, or sand.

Barren Lands Bare Dunes: A hill, mound or ridge of wind deposited sand (Jackson 1997).

Barren Lands Cliffs: Abrupt steep sloped exposed rock face.

Appendix A: Complete list of Habitat definitions

Barren Lands Rock Outcrops: Large rock surfaces exposed along a predominantly soil covered slope.

Developed Lands: Highly impacted lands, intensively modified to support human habitation, transportation, commerce and recreation.

Developed Lands Golf Courses: Lands intensively managed, in whole or in part, for human use relative to the game of golf.

Developed Lands Industrial Lands: Areas supporting the production of manufactured goods materials and energy, for example, steel mills, petroleum refineries and electricity generating plants.

Developed Lands Roads/Rails/Bridges: Corridors, paved strips and connecting structures for the moving of goods, services and people by cars, trucks, and trains.

Forest Lands, A plant community extending over a large area and dominated by trees, the crowns of which form an unbroken covering layer or canopy.

pre-forest- This is the initial stage as an area begins to revert from a cleared condition to forest. It is typified with annual/ perennial herbs, forbs and grasses with some shrubs and intolerant tree seedlings.

early forest- Typified by tree seedlings (less than 1" diameter breast height [dbh]) and tree saplings (greater than 1" dbh but less than 5" dbh). The tree species often occur in combination with non-arborescent woody shrubs and perennial herbs/forbs.

pole stage- Typical dominant overstory vegetation is composed of pole sized trees (greater than 5" dbh but less than 9" dbh in softwoods or 11" dbh in hardwoods). Pole Stage forests may contain a higher percentage of intolerant or midtolerant species than later developmental stages. Canopy may be partially or completely closed, but is often at a lower height than later stages. Older forests that are heavily harvested or damaged by weather or fire will often have a structure that resembles the Pole Stage.

mature high canopy stage- Typical dominant overstory vegetation is composed primarily of sawtimber sized trees (greater than 9" dbh in softwoods and 11" dbh in hardwoods). The forest canopy is usually higher than in previous stages and predominantly closed with occasional canopy gaps. Older forests that are selectively harvested will usually remain in the Mature/High Canopy condition after harvest while those areas that are clear cut or contain regeneration openings will revert back to the Early Forest Stage.

old forest stage – Main overstory canopy trees are relatively old and relatively large for the represented species on that site. There are a significant number of standing snags and downed logs present. More frequent and larger canopy gaps occur as older trees die and the gaps revert to the Early Forest Stage.

Appendix A: Complete list of Habitat definitions

Forests Floodplain Forests: Forests in a nearly level alluvial plain that border a river and is subject to flooding (Jackson 1997).

Forests Forested Wetlands: Forest that develops on hydric soils and supports hydrophytic trees such as willow, pin oak, sycamore and cottonwood.

Forests Riparian Wooded Corridors/Streams: Forests associated with river and stream banks. Often utilized as travel corridors by wildlife and affects in-stream habitat.

Generalist: Species not strongly associated with any particular natural habitat.

Grasslands: Open area dominated by grass species, for example, prairies or reclaimed minelands.

Grasslands Early Successional Areas: Areas maintained by natural or anthropogenic means in vegetation dominated by grasses, annual and perennial forbs with a poorly developed tree and shrub component.

Grasslands Farm Bill Programs: Grasslands developed in a predominately agricultural landscape to promote soil and water conservation and wildlife habitat values.

Grasslands Fescue: Areas dominated by nonnative, cool season fescue grasses. This intensively planted grass is one of the most common plants in Indiana and is often planted to control erosion along highways and other developed areas. Fescue is also extensively used for hay and pasture for livestock.

Grasslands Haylands: Open areas maintained in mixed grass (low fescue content) and forb covers or predominated by legumes and periodically harvested during the growing season to produce forage for livestock.

Grasslands Pasture: Open areas predominated by grass species and utilized by grazing livestock.

Grasslands Prairies: An open, usually treeless area, with its vegetation composed primarily of native grasses, forbs, and wildflowers. (Jackson 1997)

Grasslands Reclaimed Minelands: Open areas created by total soil disturbance related to surface mining activities and revegetated with warm or cool season grasses.

Grasslands Savannah: An area of predominately prairie mixed with scattered individual trees or groves of trees. Vegetation is transitional in type between grassland and forest (Jackson 1997).

Appendix A: Complete list of Habitat definitions

Grasslands Vegetated Dunes and Swales: Ridge and valley topography developed by wind blown sand deposits. These deposits are near Lake Michigan. Vegetative cover progresses the further the dunes are from the lakeshore.

Shrub/Scrub: Transitional areas of mixed vegetation (i.e., grasses, small shrubs, trees and forbs) undergoing natural succession to forest.

Subterranean Systems Cave Entrances: Surface openings of subterranean features reaching as far as natural light can penetrate (i.e., twilight zone).

Subterranean Systems Caves: Connected underground rooms and passages beyond natural light penetration.

Wetlands Emergent: Areas shallowly flooded temporarily or permanently to cover the base of plants but not prolonged inundation of the entire plant.

Wetlands Ephemeral: Areas temporarily flooded often supporting aquatic plants and animals.

Wetlands Forested: Area temporarily or permanently flooded with woody vegetation taller than 6 meters.

Wetlands Herbaceous Marsh: Usually shallow wetlands dominated by non-woody plants such as cattail, reeds or rushes.

Wetlands Mudflats: Moist nonvegetated soil, often produced in shallow wetlands by advance and retreat of water levels.

Wetlands Permanent: Areas permanently flooded and often supporting aquatic plants and animals.

Wetlands Shrub/Scrub: Area flooded temporarily or permanently with woody vegetation shorter than 6 meters.

(Wetland categories were adapted from Cowardin 1979)

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Appendix A: Complete list of Habitat definitions

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**Indiana Division of Fish and Wildlife
Comprehensive Wildlife Strategy
Development Communications Plan
7-1-2005 Working Document**

Background

The Indiana Department of Natural Resources Division of Fish and Wildlife (DFW) is developing a Comprehensive Wildlife Strategy (CWS) focused on conserving the habitats and communities that sustain all wildlife species. The DFW approach will help prevent state and federal listing of additional species as threatened and endangered, recover populations of species that are already listed and efficiently use resources of the agency and its partners to implement cooperative conservation projects.

The completed strategy will be used by a wide range of partners, including state, federal, private and not-for-profit organizations to facilitate coordinated efforts to conserve the diversity of wildlife species and habitats in Indiana. The CWS will also meet the requirements of the enabling legislation for the State Wildlife Grants program and complementary but slightly different language for the Wildlife Conservation and Restoration Program, making the state eligible for federal funding for conservation.

A communications plan is needed to involve all partners (target audiences) to ensure successful *development* of the CWS. A separate (or expanded) communications plan will be needed to enhance *implementation* of the CWS after it is developed and approved by the U.S. Fish & Wildlife Service (FWS). The major components of the communications plan are goals, strategic approach, target audiences, tactics, action plan and evaluation. We have identified specific objectives, tactics and key messages for each target audience. Some of these objectives and key message are the same across audiences, yet some are very different. Success of the plan will be measured by evaluating if target audience objectives are achieved.

Goals

Goal statements should help answer the question: What results are expected from this communications effort? Following are the goals of the communications plan for development of the CWS.

As a result of this strategic communications effort:

1. Target audiences will be informed and excited about the development and implementation of the CWS.
2. Target audiences will understand why the CWS is being developed (to manage wildlife species of greatest concern by protecting the habitat needed for them to thrive).
3. Target audiences will understand that there is an opportunity to use the CWS to develop an integrated approach to conserve wildlife.
4. Target audiences will support the CWS development process (and participate in it, as appropriate).
5. Target audiences will participate in implementing the CWS when it is completed.

6. DFW will develop or maintain positive relationships with target audiences.
7. Target audiences will understand the role of the DFW Wildlife Diversity Section in developing and implementing the CWS.
8. DFW will begin developing a mechanism for creating and utilizing multi-disciplinary teams to protect and enhance wildlife habitat.

Strategic Approach

It is important to have a communications plan for the development of the CWS, so the audiences involved understand the goals of the CWS, the development process, how the identified audiences can be involved, and how the strategy will conserve Indiana's wildlife.

There are numerous diverse audiences that need to be involved in the development of the CWS. To be successful, each audience needs to know or do different things. DFW/DJCA will use the following strategies to engage audiences:

- Customize communications for each partner or target audience.
- List and define each target audience and the unique objectives, key messages and communications tactics that will be used to reach each audience.
- Survey conservation organizations to gather feedback about how to best communicate with this audience about the CWS **and to** determine how engaged they may be in development and implementation.
- Conduct one-on-one discussions and presentations, as appropriate. This is one of the most effective ways to communicate key messages. Since it is impossible to do this with all target audiences, DJCA and the survey responses will determine select keystone partners and other partners who can transmit information from the DFW to additional constituents.
- Develop customizable promotional pieces to communicate with target audiences.
- Develop and maintain a database of audiences involved with the CWS that includes existing DNR constituents and develops new contacts with nontraditional audiences. The database will be used to communicate with everyone involved in the process to:
 - a) Advise them of the process;
 - b) Gather information on existing conservation efforts and needs;
 - c) Facilitate comment on the CWS; and
 - d) Prepare them for involvement in implementation.

Target Audiences

There are five general audiences that we need to engage during the CWS development process. Each audience will make a different contribution to the success of the CWS, so each audience has unique objectives, key messages and communications tactics described later in this plan. Each target audience group is listed and defined below. In an attempt to include all audiences, we

have listed some example organizations within each target audience. See *Appendix A* for a complete list of identified organizations listed by target audience group.

1. Upper-level government – executive level staff working for the state of Indiana. Audience includes: the governor’s office, the DNR Director and administrators, etc. Support is needed from executive level staff to develop and implement the CWS.
2. IN DFW staff – the Division of Fish and Wildlife staff including but not limited to administrators, field staff and section heads. All staff must support the development of the CWS because the final plan will be a blueprint that guides DFW conservation projects at all levels.
3. Technical experts – wildlife biologists or other experts that have expertise in an IN habitat or species. These experts may work for the IN DNR or outside of the DNR with another conservation organization or institution. These are the experts who conduct “on-the-ground” habitat or species conservation work or research in Indiana.
4. Conservation organizations – any conservation organization that can assist in the development and/or implementation of the CWS. DJCA sent an electronic survey to a broad list of over 500 organizations or representatives from those organizations in the state. Survey responses will be used to place each in one of the following “Conservation organization” categories. Categories are necessary to define the level of involvement of each organization, and to help the DNR better target its communications efforts.
 - I. *Keystone Partners* – these organizations will need to be intricately involved in the development process and have all of the following:
 - Staff experts that will provide technical information through the technical expert survey or by reviewing the draft CWS document. Some staff might have expertise in a species and others might have expertise in a specific habitat. There is potential overlap with the technical expert audience, #3 above.
 - Buy into the development of the CWS so each will be more likely to assist with implementation.
 - Be willing to communicate with their members and other target audiences predisposed to a topic dealing with conservation about the CWS.
 - Mechanisms to communicate with segments of the other public target audience, #5 below.
 - II. *Partners* – these organizations will have all of the following:
 - Buy into the development of the CWS so each will be more likely to assist with implementation.
 - Be willing to communicate with their members and other target audiences predisposed to a topic dealing with conservation about the CWS.
 - Mechanisms to communicate with segments of the Other Publics target audience.

- III. *Stakeholders* – these organizations need to buy into the development of the CWS so each will be more likely to assist with implementation. However, this grouping of organizations will just need to be aware of the CWS effort—there is no need at this point for the organizations to be actively involved with the development of the CWS.

5. Other Publics

Most of the communications efforts will be focused on “Other Publics” who are predisposed to conservation, #I, II, III below.

- I. Traditional constituents: hunters, trappers and anglers
- II. Non-traditional constituents: wildlife viewers, nature study, photographers, etc.
- III. Recreational land users: boaters, hikers, and campers
- IV. John “Q” public: “Everybody in Indiana”

Objectives, tactics and key messages organized by target audience

Below each of the five target audiences are listed, followed by the unique objectives, key messages and tactics for each. The key messages are listed under the objective that it will be used to achieve. After the objectives and key messages, the tactics that will be used for each audience are listed.

Target Audience #1: Upper-Level Government

Objectives

For the communications plan to be successful, all of the following measurable objectives need to be achieved.

1. Present the CWS development process to IN DNR Director and executive staff – ask Director about meeting with Governor’s office.
 - Key Messages
 - a. IN DFW is developing a Comprehensive Wildlife Strategy. The goal is to prevent wildlife from becoming endangered.
 - b. This is not just a planning effort—the strategy provides economic benefits by helping to keep species off the endangered list, and should lead to new federal funding for conservation in the future.
 - c. This is an historic effort: this kind of comprehensive effort has never been done before in our state, and every other state is also doing it at the same time.
 - d. This is a rigorous science-based process to determine priorities for declining wildlife and habitat.
 - e. This effort is asking: What are the species and habitats in trouble? Why are they in trouble? Most importantly, what are we going to do about it?
 - f. We are working with a broad cross section of our state to get this done from wildlife experts to hunters and anglers to other environmentalists to farmers and ranchers.

3. Identify technical experts that can provide habitat and species information.
 - Key Messages
 - a. All the key messages for objective 1 & 2
 - b. Information for the strategy will be gathered through a conservation organization survey and technical expert input, focused on agencies and organizations that either conduct land, water and wildlife management or provide technical and financial assistance to those efforts.
 - c. We need your help identifying technical experts to provide species and habitat information for Indiana.

Tactics

- Presentations
- One-on-one discussions
- Press kit
- Website
- Electronic newsletter
- Databases
- E-mail
- Articles (?)

Target Audience #2: IN DFW Staff

Objectives

1. Record and report the number of IN DFW Chiefs/Section Heads supportive of developing an integrated approach to managing wildlife by improving habitats.
 - Key Messages
 - a. IN DFW is developing a Comprehensive Wildlife Strategy. The goal is to prevent wildlife from becoming endangered.
 - b. This is not just a planning exercise – the strategies will guide the existing State Wildlife Grants program and should lead to future additional money.
 - c. Research suggests that habitat quality and quantity are the primary factors affecting the conservation of wildlife throughout the state. The CWS will include information on the distribution and abundance of wildlife species, including low populations and declining species.
 - d. This is an historic effort that all fifty states and U.S. territories are simultaneously engaged in, presenting a tremendous opportunity for conservation at a landscape scale.
 - e. This is a rigorous science-based process to determine priorities for declining wildlife and habitat.
 - f. This effort is asking: What are the species and habitats in trouble? Why are they in trouble? Most importantly, what are we going to do about it?

- g. IN DFW is working with a broad cross section of our state to get this done from wildlife experts to hunters and anglers to other environmentalists to farmers and ranchers.
- h. This effort has emerged through the work of a broad national bipartisan wildlife conservation coalition, called Teaming with Wildlife. Teaming With Wildlife includes more than 3000 organizations nationwide.
- i. The task of conserving declining wildlife is challenging but we know success is possible from our history with wildlife conservation successes like the wild turkey, white-tailed deer, and striped bass.
- j. The CWS will emphasize the importance of habitat conservation, restoration and protection by identifying groups of species into guilds, that are associated with specific habitats, then selecting representative species from each guild. Division staff led and contributed to this effort.

2. Participate in and understand their role in the development of the CWS

- Key Messages
 - a. All key messages from objective #1
 - b. Technical expert information will be collected through an online expert questionnaire. Support of division supervisors will be essential to encourage staff participation in: a) filling out the expert questionnaire; and b) identifying other experts to participate, both within and external to DNR.
 - c. Conservation organization information will be gathered through an on-line survey, focused on agencies and organizations that either conduct land, water and wildlife management or provide technical and financial assistance to those efforts. Agency staff will be instrumental in identifying additional conservation organizations to fill out this survey.

3. Informed consent

- Key Messages
 - a. All key messages from objectives #1 and 2
 - b. Conservation organizations and the general public may request information about the CWS process from DFW staff. Information about the CWS is on the website. Progress updates will be provided through email correspondence and news articles (WildBulletin, etc). CWS website: <http://www.djcase.com/incws>.
 - c. The CWS process incorporates several opportunities for agency and public review. Your continued engagement will ensure that the CWS is an accurate representation of wildlife needs and opportunities and can be implemented effectively through collaborative efforts.

4. Describe multi-disciplinary opportunities for implementing CWS

- Key Messages
 - a. All key messages from objectives #1,2 and 3

- b. DFW can use the CWS development process to integrate long-range internal planning for protecting and enhancing wildlife habitat. The next round of strategic planning may be integrated through the CWS.
5. Staff will have sufficient understanding to be able to broadly explain CWS to agency constituents and conservation organizations.
 - All key messages listed above will be used

Tactics

-
- Presentations
- One-on-one discussions
- Press kit
- Website
- Electronic newsletter
- Databases
- Poster
- E-mail
- Conservation organization survey
- Technical expert questionnaire
- DNR consultation

Target Audience #3: Technical Experts

Objectives

1. Present the CWS development process to **all** identified technical experts.
 - Key Messages
 - a. IN DFW is developing a Comprehensive Wildlife Strategy. The goal is to prevent wildlife from becoming endangered.
 - b. This is not just a planning exercise – the strategies will guide the existing State Wildlife Grants program and should lead to future additional money.
 - c. This is a rigorous science-based process to determine priorities for declining wildlife and habitat.
 - d. This effort is asking: What are the species and habitats in trouble? Why are they in trouble? Most importantly, what are we going to do about it?
 - e. IN DFW is working with a broad cross section of our state to get this done from wildlife experts to hunters and anglers to other environmentalists to farmers and ranchers.
 - f. This effort has emerged through the work of a broad national bipartisan wildlife conservation coalition, called Teaming with Wildlife. Teaming With Wildlife includes more than 3000 organizations nationwide.

- b. Information about the CWS is on the website. Progress updates will be provided through email correspondence and news articles (WildBulletin, etc). CWS website: <http://www.djcase.com/incws>.
4. Obtain expert information for 100 percent of the representative species listed on the survey (or at least 100 percent of the habitats that have species of greatest conservation need in the guild).
 - Use all key messages above to meet objective

Tactics

- E-mail
- One-on-one discussions
- Website
- Technical expert questionnaire
- Electronic newsletter
- Databases
- On-line input

Target Audience #4: Conservation Organizations

Conservation organizations have been grouped into three levels. There are different objectives and communication tactics for each “conservation organization” level.

i. Keystone Partners

Objectives

- 1) Identify organizations with technical expertise to provide feedback on habitat narratives. Report and record organization.
- 2) Present the CWS and need for organizational involvement to large groups of the organizations. Focus on the organizations that request a presentation via the “Conservation organization” survey. Record and report the organizations that receive presentation.
- 3) Encourage organizations to present the CWS to their members and others with a predisposed interest in conservation activities. Record and report the organizations that utilize templates to present CWS to others.
- 4) Utilize organization communication mechanisms to reach segments of the “Other Publics” target audience. Record and report the organization and the type of communication that can be utilized to reach the “Other Publics” audience.
- 5) Obtain public comment from ___% of the Keystone Partners and Partners
- 6) Record the number of “Conservation organization” surveys filled-out and list the organizations that filled the surveys out
- 7) Request/record the number of gathered organizational strategic plans.

Tactics

- E-mail
- One-on-one discussions
- Website
- Conservation organization survey

- On-line input
- Electronic newsletter
- Databases
- Presentations
- PowerPoint Template
- Press kit
- Articles
- Press release

ii. *Partners*

Objectives – All of the Keystone Partner objectives except Objective #1

Tactics – All tactics listed for Keystone Partners except technical expert survey.

iii. *Stakeholders*

Objectives – Provide periodic communications about the process

Tactics

- Electronic newsletter
- E-mail
- Press release

Key Messages

Use all key messages throughout the process. Select messages as appropriate to communicate with audiences to reach objectives.

- a. IN DFW is developing a Comprehensive Wildlife Strategy. The goal is to prevent wildlife from becoming endangered.
- b. This is not just a planning exercise – the strategies will guide the existing State Wildlife Grants program and should lead to future additional money.
- c. This is a rigorous science-based process to determine priorities for declining wildlife and habitat.
- d. This effort is asking: What are the species and habitats in trouble? Why are they in trouble? Most importantly, what are we going to do about it?
- e. IN DFW is working with a broad cross section of our state to get this done from wildlife experts to hunters and anglers to other environmentalists to farmers and ranchers.
- f. This effort has emerged through the work of a broad national bipartisan wildlife conservation coalition, called Teaming with Wildlife. Teaming With Wildlife includes more than 3000 organizations nationwide.
- g. The task of conserving declining wildlife is challenging but we know success is possible from our history with wildlife conservation successes like the wild turkey, white-tailed deer, and striped bass.

- h. This is a historic effort: this kind of comprehensive effort have never been done before in our states, and every other state is also doing it the same time.
- i. Research suggests that habitat quality and quantity are the primary factors affecting the conservation of wildlife throughout the state
 - a. To develop a CWS focusing on habitat, DFW will identify and integrate a broad range of agency and organization efforts that conserve wildlife species of greatest concern and their habitats.
 - b. The CWS will include information on the distribution and abundance of wildlife species, including low populations and declining species. The strategy will consider the broad range of the state's wildlife species with priority placed on those species with greatest conservation need and their habitats.
 - c. The CWS will conserve wildlife through habitat conservation, restoration and protection. Wildlife will be categorized into guilds that are associated with specific habitats, and representative species will be selected from each guild. By conserving habitats, wildlife associated with the habitats will also be conserved.
 - d. Many agencies and organizations are involved with "on the ground" habitat conservation projects. DFW needs your help to identify these efforts by taking an electronic survey.
 - e. Many agencies and organizations are involved with "on the ground" habitat conservation projects. DFW wants to develop and strengthen partnerships with these organizations and agencies. Partnering agencies and organizations will be able to provide feedback about wildlife habitat and together conserve wildlife.
 - f. The CWS process provided several opportunities for agency and public review. Your continued engagement will ensure that the CWS is an accurate representation of wildlife needs and opportunities that can be implemented through collaborative efforts.
 - g. Information about the CWS is on the website. Progress updates will be provided through email correspondence and news articles (WildBulletin, etc). CWS website: <http://www.djcase.com/incws>.

Target Audience #5: Other Publics

Objectives

1. Obtain Other Publics comments during the CWS development process.
 - **Key Messages**
 - a. The goal is to prevent wildlife from becoming endangered.
 - b. This is a rigorous science-based process to determine priorities for declining wildlife and habitat.
 - c. This effort is asking: What are the species and habitats in trouble? Why are they in trouble? Most importantly, what are we going to do about it?

- d. This is an historic effort: this kind of comprehensive effort has never been done before in our state, and every other state is also doing it at the same time.
- e. We are working with a broad cross section of our state to get this done from wildlife experts to hunters and anglers to other environmentalists to farmers and ranchers.
- f. This is not just a planning exercise – the strategies will guide the existing State Wildlife Grants program and should lead to future additional money.
- g. The task of conserving declining wildlife is challenging but we know success is possible from our history with wildlife conservation successes like the wild turkey, white-tailed deer, and striped bass.

Tactics

- Databases
- PowerPoint through keystone partners and partners
- Website
- Press kit
- Electronic newsletter
- E-mail
- On-line input
- Press release
- Articles

Tactics Defined

Below the communications tactics that will be used to achieve the goals identified in this plan are defined.

- **Databases** – Develop databases grouped by target audience. Research existing databases that can be used to communicate with segments of the target audiences.
- **Presentations** – DFW/DJCA will present the CWS and process to groups of audiences. Each presentation will be customized for each audience.
- **PowerPoint** – A generic template will be developed to use during presentations. Templates will be customized for each presentation. IN DFW staff, Keystone Partners and Partners will be taught how to utilize presentations to communicate with other audiences about the CWS.
- **One-on-one discussions** - Whether in-person or over the phone, some audiences will need to hear the key messages numerous times. One of the most effective ways to communicate key messages is to have one-on-one discussions. It will be impossible to have one-on-one discussions with all target audiences, so we will have one-on-one discussions as opportunities are presented.
- **Press kit** – We will develop and distribute a press kit with customizable templates to distribute during discussions/interviews/presentations. The press kit will have a CWS fact sheet, press release, and FAQ. It will explain the process, how the selected audience can be involved and the kit will refer audiences to the website.

Each audience will want different information out of the press kit. Some audiences might want just a one-pager while other will want to review all available information. ID DFW, Keystone Partners and Partners will be taught how to use the Press kit template to communicate with audiences.

- **Indiana CWS website** – During all communications, target audiences will be directed to the CWS website. The website will describe the development process, connect to surveys, electronic newsletters, the drafts of the CWS and other relevant information.
- **Electronic newsletter** – The newsletter will be distributed via e-mail to all target audiences through the developed databases. This tool will be used to keep target audiences informed about the CWS process and how they can help.
- **Poster** – DFW will develop a 2-page legal size poster to display in areas where DFW employees typically have a few moments to review (i.e.: break rooms, bathrooms, etc.). The poster will have an overview explaining the CWS and a section that describes the 8 required elements of the strategy.
- **E-mail** – It would be ideal to have face-to-face discussions with each target audience. However, there are numerous audiences involved in development of the CWS. To gather feedback and to communicate with audiences that we cannot talk with input, we will utilize e-mail.
- **Technical Expert Questionnaire** – identified audiences will receive access to an electronic survey to provide expertise on a specific species or habitat.
- **“Conservation organization” Survey** – identified audiences will receive access and asked to fill-out a “conservation organization” information survey.
- **On-line Input** – Target audiences will have the opportunity to comment on the CWS and development process on-line. The draft CWS will be posted to the CWS website for easy review and input. Target audiences need to understand the value of the CWS and potential opportunities for collaboration. Input is needed from all audiences for successful implementation of the CWS. Target audiences need to know that we are including their input. By including input, target audiences will buy into the CWS development process and support the CWS.
- **Articles** – We will place articles in identified publications (magazines, newsletters, newspapers, others) about how the CWS development process and how target audiences can be involved.
- **Press release to radio, television and print publications** – We will send press releases to media through the Wild Bulletin listserv to let target audiences know that the DFW is developing the CWS and will need participation (Indianapolis, Ft. Wayne, South Bend and Evansville). Follow-up with key media representatives after distributing.
- **IN DFW consultation** – DFW section heads will be consulted to evaluate their knowledge of CWS. During the interviews, we can discuss with section heads the benefits of developing the CWS. The CWS has the potential to allow the DFW to start developing an integrated habitat approach to the division’s strategic planning process. Instead of having a strategic plan for the fishing program, one for the wildlife diversity program and another for the aquatic nuisance species; the CWS

could allow the sections to work together for the benefit of conserving and protecting Indiana's fish and wildlife habitat.

Action Plan

We need to communicate with target audiences throughout the CWS development process. Each target audience is needed to make the development process of the CWS a success. The following action plan will be used to reach the goals identified in this communications plan.

Date	Action	Assignment
Aug. 2004	DJCA/DFW develop CWS website	Complete
Sept.	DJCA/DFW identify "conservation organizations" and begin to categorize into levels	Complete
	DJCA develop database of technical experts	Complete
	DJCA/DFW select meetings that a large number of IN DFW staff attend	Complete
	DJCA develop "Conservation organizations" and "Technical Expert" surveys	Complete
Sept. 23	DJCA meet with DFW about CWS and the communications plan	Complete
Oct.	DFW hang posters in selected areas for staff to read	Complete
Oct. 12	CWS presentation at DNR Directors meeting	Complete
Oct. 19	CWS briefing at DNR Advisory Council Meeting	Complete
Oct. 25	Announcement "press release" to technical experts describing the CWS and the development and asking them to fill-out an electronic survey	Complete
Oct. 25-Nov. 22	Technical experts fill-out surveys	Complete
	DJCA make presentations to DFW staff and upper-level government at selected meetings	Complete
Oct. -Nov.	DJCA/DFW create PowerPoint template	Complete
Nov. 11	Distribute "Press release"/announcement asking "Conservation organizations" to fill-out information survey.	
Nov. 23	CWS presentation at Landholders meeting.	Complete
Oct. -Dec.	Follow-up with technical experts via e-mail and phone reminders asking them to fill-out survey	Complete
Nov - Feb 2005	Follow-up phone calls to "conservation organizations" specifically those defined by DJCA and DFW as keystone and ask to fill-out survey and provide a strategic plan.	Complete
Jan. - Feb.	DJCA compile "Conservation organization" survey and "Technical Expert" questionnaire	Complete
	DJCA review "Technical Expert" questionnaire feedback	Complete
Feb.	Identify keystone partners	Complete
Feb. 2	CWS meeting with IN DNR DFW staff	Complete
Feb. 10	CWS presentation at DFW staff Annual Conference	Complete
Feb. 19	CWS presentation at Hoosier Outdoor Writers Conference	Complete - Jon
Feb-April	DJCA review "conservation organization" survey responses	Monica - Ongoing
	DJCA draft CWS habitat narratives from technical expert surveys	Complete
	Edit and complete technical expert habitat narratives	Complete
	Upload technical expert habitat narratives on website	Complete
Mar. 9	CWS meeting with DNR DWS	Complete
Mar. 29	CWS presentation to DNR Directors	Complete
April	Develop databases for communications	Complete
	Thank-you package to Hupfer	Complete
	Review media contact list to utilize for distribution of press kit materials	Complete

	Review keystone list and identify up to 15 that should be contacted about organization communications mechanisms and talk with them about the need for their organization to review the first draft of the strategy.	Complete
	Develop CWS "awareness" news release for press kit	Complete
	Develop CWS "awareness" fact sheet for press kit	Complete
	Develop CWS "awareness" print PSA for press kit	Complete
	Develop CWS "awareness" short article about CWS for press kit	Complete
	Meet with new "upper-level" government administration	Complete
	Draft 1 st issue of CWS electronic newsletter to audiences 1,2,3 and 4. Customize newsletter for each audience.	Complete
	Distribute newsletter electronically	Complete
	Send e-mail(s) to technical experts and keystone partners about providing feedback on the CWS narratives.	Complete
	Follow-up e-mail to keystones and technical experts.	Complete
	Post press kits materials on website	Jon and Jenny
	Presentations to groups of identified keystone partners	Complete
Apr. 5	CWS meeting with DNR DWF	Complete
May 19	CWS presentation to FWS administrators	Complete - Gwen
July	DJCA use survey input and feedback gathered through one-on-one discussions and other communications to develop first draft of CWS.	Complete
July	DJCA draft CWS for public comment.	Complete
August	First draft of CWS to DFW	Complete
July	Continue to call "Keystone Partners" to inquire about using existing communication channels to solicit public input	Complete
August	Develop "news release" Keystone Partners to distribute through communication channels.	Monica and Phil
August	Review feedback from keystone partners to prioritize large group meetings.	Complete
August	Communicate with "Keystone Partners" to get them to utilize communication channels to distribute public input press kit materials.	Monica
August	Develop database of conservation organizations with information from electronic surveys and communication mechanisms gathered through phone calls. The database will be utilized for implementation of CWS.	Tim, Phil, Gwen, Monica and Jon
August	DJCA make DFW edits	Tim
August	Send CWS draft to Kyle Hupfer two weeks prior to public comment	Complete
September	Draft CWS ready for public comment period (all audiences review and provide feedback)	Tim
	Send press release soliciting public input to Wild Bulletin and other media contacts in databases announcing the public comment period. Post CWS draft to the website for public comment period.	Monica, Phil and Jon
	Present CWS at Conservation Partnership meeting at NRCS offices	Gwen
	Follow-up with DFW media contacts to encourage them to announce the CWS public comment period.	Monica
	Public comment period	
	DJCA/DFW review public input and make adjustments to the CWS.	
October	CWS finalized and ready for NAAT review.	
	DJCA present final CWS to DFW	
	DJCA/DFW edit CWS after NAAT review.	
	DJCA/DFW meet to determine next steps for communicating about the implementation of the CWS.	

TBD	NAAT approves the CWS and is ready for implementation.	
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Evaluation

It will be important to evaluate the effectiveness of this communications plan to see if we reached our goals and should continue communications with target audiences when the CWS is ready for implementation. We will measure the effectiveness of this plan three ways:

1. Assess the objectives for each target audience to see if they were achieved.
Potential Action: one year after the plan is completed, DFW could review the objectives listed for each target audience and determine if each objective was achieved.
2. Assess database of target audiences and review qualitative information gathered from presentations and discussions.
Potential Action: Throughout the implementation of the communications plan, we will gather qualitative information from target audiences that will be tracked for each contact. This information could be used to assess developed relationships using qualitative database information.
3. Surveys.
Potential Action: At DNR's direction, we could send pre-surveys to Conservation organizations to gather information needed for the CWS. These surveys would ask target audiences questions about how to best communicate with them about the CWS, measure how much audiences currently know about CWS and how interested they are in CWS. Once the CWS is finalized, DNR could resurvey the audiences to re-assess their knowledge and solicit their opinion of the CWS development process and the final strategy.

Appendix A

1. Upper-level government
 - IN DNR Director and other executive level staff
 - IN DNR Division heads (see list of Divisions outlined for target audience #3)
 - State legislature?
 - Governor's Office (Agriculture Advisor/Dept?; Environment/Natural Resources Advisor)
 - Office of Commissioner of Agriculture
 - Indiana State Soil Conservation Board
 - IDEM
 - ISDH
 - State Chemists' Office
2. IN DFW staff
3. Technical experts (Identified previously or IN DNR staff selected because expert information missing for an identified species)
 - Technical experts outside DNR
 - a. Technical Advisory Committees
 - b. Other species and habitat experts outside DFW
 - c. Indiana State University project team
 - d. Professional societies (SAF, AFS, TWS, ASWCD)
 - e. Department of Transportation (biologists)
 - f. Indiana Academy of Sciences
 - g. IN Quail Unlimited
 - h. IN Ducks Unlimited
 - i. National Wild Turkey Federation
 - j. Pheasants Forever
 - k. Airport Animal Damage Control Group
 - l. Utilities
 - m. USFWS Ecological Services
 - n. USFWS Migratory Bird Office
 - o. Federal Law Enforcement
 - IN DNR technical experts in the following divisions
 - a. Entomology & Plant Pathology
 - b. Fish & Wildlife
 - c. Forestry
 - d. Law Enforcement
 - e. Nature Preserves
 - f. Outdoor Recreation
 - g. Public Info. & Education
 - h. Reclamation
 - i. Soil Conservation
 - j. State Parks & Reservoirs
 - k. Water
 - l. State Park Naturalists
4. Conservation organizations – (List organized by group)

- I. Keystone Partners
- II. Partners
- III. Stakeholders
 - Land Management Groups (list???)
 - [need examples]
 - State conservation partners
 - a. Hunting, trapping and fishing organizations
 - b. Wildlife viewing organizations
 - c. Recreational land user organizations
 - d. IN Teaming with Wildlife Coalition
 - e. Indiana Wetlands Conservation Plan TAT and WAG
 - f. Indiana Lake Management Work Group
 - g. Professional societies (SAF, AFS, TWS, IASWCD)
 - h. NRCS Field Staff
 - i. Purdue Extension
 - j. IN Farm Bureau
 - k. Indiana Department of Environmental Management (IDEM)
 - Federal land management
 - a. Bureau of Land Management
 - b. Department of Defense
 - c. U.S. Forest Service
 - d. U.S. Fish and Wildlife Service
 - e. U.S. Department of Agriculture
 - f. National Parks Service
 - Adjacent states connected by water or land management
 - Illinois
 - Michigan
 - Kentucky
 - Ohio
 - Existing multi-state collaborative partnerships
 - Great Lakes Commission
 - Great Lakes Fishery Commission
 - MICRA
 - ORSANCO
 - NAWMP
 - Partners in Flight
 - National conservation partners
 - IAFWA (Congress) – align state communications efforts with national outreach campaign.
6. Agricultural and forestry producers organizations
7. Development organizations
8. Regional and local planning, watershed management and parks departments
9. Indiana Association of Cities and Towns
10. Land trusts
11. Lake associations
12. Tourism organizations

13. Commerce organizations
 - Chambers of Commerce
 14. Regional or statewide utilities
 15. Natural resources, engineering and environmental law consulting firms
 16. Other businesses related to land and water use
 17. Environmental learning programs
-
5. Other Publics
 - Traditional constituents: hunters, trappers, anglers, Hoosier Outdoor Writers Association, retail conservation companies (Gander Mountain, Dicks, etc>)
 - Non-traditional constituents: wildlife viewers, Private land owners, Hoosier Association of Science Teachers, Environmental Educators Association of Indiana (EEAI), Wild Birds Unlimited
 - Recreational land users: boaters, hikers, and campers, Hiking Association, 4-Wheeling Associations, Equestrian Associations
 - John “Q” Public: “Everyone in Indiana”

Appendix C: Guilds by Habitat and Sub-habitat

Range (within state):

Statewide (I), North (N), South (S), West (W), East (E), Central (C) and various combinations.

Relative abundance (within state):

Abundant (A), Common (C), Occasional (O), Rare (R)

Status:

Extirpated (Ex), Exotic- accidentally or deliberately released species (X)

(Federal)

Federally Endangered (FE), Federally Threatened (FT), candidates for federal listing (FC)

(State)

State Endangered (SE), State Threatened (ST), Special Concern in need of further study (SC)

Seasonal Occurrence (for birds):

Summer resident (S), winter resident (W), year-round resident (R), migrant (M), accidental (A), hypothetical (H), and breeder (*), former breeders [*].

Additional:

Species Row (bold)- indicates Representative Species

Underlined Species and Scientific Name indicates Species of Greatest conservation need.

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Agriculture	<i>Cereal Grains</i>				Mammal	Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	NW	C		
Agriculture	<i>Feedlots</i>				Bird	Brown-Headed Cowbird	<i>Molothrus ater</i>	I	A	R*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Agriculture	Row Crops				Bird	Horned Lark	<i>Eremophila alpestris</i>	I	C	R*	
Agriculture	Row Crops				Bird	Killdeer	<i>Charadrius vociferous</i>	I	C	R*	
Agriculture					Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		
Agriculture					Amphibian	American Toad	<i>Bufo americanus</i>	N, C, SE	C		
Agriculture					Amphibian	Cricket Frog	<i>Acris crepitans</i>	I	C		
Agriculture					Amphibian	Fowler's Toad	<i>Bufo fowleri</i>	I	C		
Agriculture					Amphibian	Green Frog	<i>Rana clamitans</i>	I	C		
Agriculture					Amphibian	<u>Northern Leopard Frog</u>	<i>Rana pipiens</i>	N, E	C		SC
Agriculture					Amphibian	Tiger Salamander	<i>Ambystoma tigrinum</i>	I	C		
Agriculture					Amphibian	<u>Crawfish Frog</u>	<i>Rana areolata</i>	W	O		ST
Agriculture					Amphibian	Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	S	O		
Agriculture					Amphibian	<u>Plains Leopard Frog</u>	<i>Rana blairi</i>	W	R		SC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Agriculture					Bird	American Crow	<i>Corvus brachyrhynchos</i>	I	A	R*	
Agriculture					Bird	Barn Swallow	<i>Hirundo rustica</i>	I	A	S*	
Agriculture					Bird	Canada Goose	<i>Branta canadensis</i>	I	A	R*	
Agriculture					Bird	Common Grackle	<i>Quiscalus quiscula</i>	I	A	R*	
Agriculture					Bird	European Starling	<i>Sturnus vulgaris</i>	I	A	R*	X
Agriculture					Bird	House Sparrow	<i>Passer domesticus</i>	I	A	R*	X
Agriculture					Bird	Mourning Dove	<i>Zenaida macroura</i>	I	A	R*	
Agriculture					Bird	Red-Tailed Hawk	<i>Buteo jamaicensis</i>	I	A	R*	
Agriculture					Bird	Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	I	A	R*	
Agriculture					Bird	Rock Dove	<i>Columba livia</i>	I	A	R*	X
Agriculture					Bird	American Kestrel	<i>Falco sparverius</i>	I	C	R*	
Agriculture					Bird	Eastern Bluebird	<i>Sialia sialis</i>	I	C	R*	
Agriculture					Bird	Eastern Kingbird	<i>Tyrannus tyrannus</i>	I	C	S*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Agriculture					Bird	Field Sparrow	<i>Spizella pusilla</i>	I	C	R*	
Agriculture					Bird	Northern Bobwhite	<i>Colinus virginianus</i>	I	C	R*	
Agriculture					Bird	Turkey Vulture	<i>Cathartes aura</i>	I	C	R*	
Agriculture					Bird	American Golden-Plover	<i>Pluvialis dominica</i>	I	O	M	
Agriculture					Bird	Lapland Longspur	<i>Calcarius lapponicus</i>	I	O	W	
Agriculture					Bird	Ring-Necked Pheasant	<i>Phasianus colchicus</i>	N	O	R*	X
Agriculture					Bird	<u>Sandhill Crane</u>	<i>Grus canadensis</i>	I	O	M*	SC
Agriculture					Bird	Snow Bunting	<i>Plectrophenax nivalis</i>	I	O	W	
Agriculture					Bird	Snow Goose	<i>Chen caerulescens</i>	I	O	M	
Agriculture					Bird	Vesper Sparrow	<i>Pooecetes gramineus</i>	I	O	S*	
Agriculture					Bird	Wild Turkey	<i>Meleagris gallopavo</i>	I	O	R*	
Agriculture					Bird	<u>Barn Owl</u>	<i>Tyto alba</i>	I	R	R*	SE

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Agriculture					Bird	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	W	R	M*	
Agriculture					Bird	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	I	R	S*	
Agriculture					Bird	Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	I	R	R*	X
Agriculture					Bird	Greater White-Fronted Goose	<i>Anser albifrons</i>	I	R	M	
Agriculture					Bird	Mccown's Longspur	<i>Calcarius mccownii</i>	I	R	A	
Agriculture					Bird	Ross's Goose	<i>Chen rossii</i>	I	R	A	
Agriculture					Bird	Rusty Blackbird	<i>Euphagus carolinus</i>	I	R	W	
Agriculture					Bird	Smith's Longspur	<i>Calcarius pictus</i>	I	R	M	
Agriculture					Bird	Gray Partridge (Extirpated)	<i>Perdix perdix</i>	N		R*	X, Ex (1977)
Agriculture					Mammal	Eastern Mole	<i>Scalopus aquaticus</i>	I	A		
Agriculture					Mammal	Norway Rat	<i>Rattus norvegicus</i>	I	A		X

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Agriculture					Mammal	Raccoon	<i>Procyon lotor</i>	I	A		
Agriculture					Mammal	Coyote	<i>Canis latrans</i>	I	C		
Agriculture					Reptile	Black Racer	<i>Coluber constrictor</i>	I	C		
Agriculture					Reptile	Eastern Hognose Snake	<i>Heterodon platirhinos</i>	I	C		
Agriculture					Reptile	Eastern Milksnake	<i>Lampropeltis triangulum</i>	I	C		
Agriculture					Reptile	Western Fox Snake	<i>Elaphe vulpina</i>	NW, SW	C		
Agriculture					Reptile	Bull Snake	<i>Pituophis melanoleucus</i>	NW, SW	O		
Agriculture					Reptile	Common (Black) Kingsnake	<i>Lampropeltis getulus</i>	S	O		
Agriculture					Reptile	<u>Ornate Box Turtle</u>	<i>Terrapene ornata</i>	NW, SW	O		SC
Agriculture					Reptile	Prairie Kingsnake	<i>Lampropeltis calligaster</i>	W	O		
Aquatic Systems	Dunes, shorelines				Bird	Killdeer	<i>Charadrius vociferus</i>	I	C	R*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Dunes, shorelines				Bird	Spotted Sandpiper	<i>Actitis macularia</i>	I	O	S*	
Aquatic Systems	Dunes, shorelines				Bird	American Pipit	<i>Anthus rubescens</i>	I	R	M	
Aquatic Systems	Dunes, shorelines				Bird	<u>Least Tern</u>	<i>Sterna antillarum</i>	I	R	S*	SE, FE
Aquatic Systems	Dunes, shorelines				Bird	<u>Piping Plover</u>	<i>Charadrius melodus</i>	I	R	A(*)	SE, FE
Aquatic Systems	Dunes, shorelines				Bird	Red Knot	<i>Calidris canutus</i>	I	R	M	
Aquatic Systems	Dunes, shorelines				Bird	Snowy Plover	<i>Charadrius alexandrinus</i>	I	R	A	
Aquatic Systems	Great Lakes drainage	Great river			Fish	Walleye	<i>Sander vitreus</i>	I	C		
Aquatic Systems	Great Lakes drainage	headwater			Fish	Central Mudminnow	<i>Umbra limi</i>	N	A		
Aquatic Systems	Great Lakes drainage	wadeable/large			Fish	Goldfish	<i>Carassius auratus</i>	I	C		X
Aquatic Systems	Great Lakes drainage	wadeable/large			Fish	Common Shiner	<i>Luxilus cornutus</i>	N	O		
Aquatic Systems	Great Lakes drainage	wadeable/large			Fish	Rudd	<i>Scardinius erythrophthalmus</i>	NW	R		X

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Great Lakes drainage	wadeable/large			Mussel	<u>Ellipse</u>	<i>Venustaconcha ellipsiformis</i>				SC
Aquatic Systems	Great Lakes drainage Rivers and Streams	headwater Great Lakes drainage	headwater		Fish	Blacknose Dace	<i>Rhinichthys atratulus</i>	NW, C, SE	C		
Aquatic Systems	Great Lakes drainage Rivers and Streams	wadeable/large river Great Lakes drainage	wadeable/large river		Fish	Hornyhead Chub	<i>Nocomis biguttatus</i>	N	C		
Aquatic Systems	Great Lakes drainage Rivers and Streams	headwater Great Lakes drainage	headwater		Fish	Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>	NE	R		
Aquatic Systems	Great Lakes drainage Rivers and Streams	Great river Great Lakes drainage	great river		Fish	<u>Greater Redhorse</u>	<i>Moxostoma valenciennesi</i>	N	R		SE
Aquatic Systems	Impoundments				Bird	Canada Goose	<i>Branta canadensis</i>	I	A	R*	
Aquatic Systems	Impoundments				Bird	American Black Duck	<i>Anas rubripes</i>	I	C	R*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Impoundments				Bird	Common Goldeneye	<i>Bucephala clangula</i>	I	C	W	
Aquatic Systems	Impoundments				Bird	Common Loon	<i>Gavia Immer</i>	I	C	M(*)	
Aquatic Systems	Impoundments				Bird	Herring Gull	<i>Larus argentatus</i>	I	C	R*	
Aquatic Systems	Impoundments				Bird	Lesser Scaup	<i>Aythya Affinis</i>	I	C	W(*)	
Aquatic Systems	Impoundments				Bird	Pied-Billed Grebe	<i>Podilymbus podiceps</i>	I	C	R*	
Aquatic Systems	Impoundments				Bird	Ring-Billed Gull	<i>Larus delawarensis</i>	I	C	R*	
Aquatic Systems	Impoundments Potholes				Bird	Mallard	<i>Anas platyrhncos</i>	I	C	R*	
Aquatic Systems	Impoundments				Bird	American Wigeon	<i>Anas americana</i>	I	O	M(*)	
Aquatic Systems	Impoundments				Bird	<u>Black Tern</u>	<i>Chlidonias niger</i>	I	O	S*	SE
Aquatic Systems	Impoundments				Bird	Blue-Winged Teal	<i>Anas discors</i>	I	O	S*	
Aquatic Systems	Impoundments				Bird	Bonaparte's Gull	<i>Larus philadelphia</i>	I	O	M	
Aquatic Systems	Impoundments				Bird	Bufflehead	<i>Bucephala albeola</i>	I	O	W	
Aquatic Systems	Impoundments				Bird	Canvasback	<i>Aythya Valisineria</i>	I	O	M	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Impoundments				Bird	Caspian Tern	<i>Sterna caspia</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Common Merganser	<i>Mergus merganser</i>	I	O	W	
Aquatic Systems	Impoundments				Bird	Common Tern	<i>Sterna hirundo</i>	I	O	M(*)	
Aquatic Systems	Impoundments				Bird	Double-Crested Cormorant	<i>Phalacrocorax auritus</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Forster's Tern	<i>Sterna forsteri</i>	I	O	M(*)	
Aquatic Systems	Impoundments				Bird	Gadwall	<i>Anas strepera</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Greater Scaup	<i>Aythya marila</i>	N	O	W	
Aquatic Systems	Impoundments				Bird	Green-Winged Teal	<i>Anas crecca</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Hooded Merganser	<i>Lophodytes cucullatus</i>	I	O	R*	
Aquatic Systems	Impoundments				Bird	Horned Grebe	<i>Podiceps auritus</i>	I	O	W(*)	
Aquatic Systems	Impoundments				Bird	Long-Tailed Duck	<i>Clangula hyemalis</i>	N	O	W	
Aquatic Systems	Impoundments				Bird	Mute Swan	<i>Cygnus olor</i>	I	O	R*	X
Aquatic Systems	Impoundments				Bird	Northern Pintail	<i>Anas acuta</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Northern Shoveler	<i>Anas clypeata</i>	I	O	M*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Impoundments				Bird	Red-Breasted Merganser	<i>Mergus serrator</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Red-Throated Loon	<i>Gavia stellata</i>	I	O	M	
Aquatic Systems	Impoundments				Bird	Ring-Necked Duck	<i>Aythya collaris</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Ruddy Duck	<i>Oxyura jamaicensis</i>	I	O	M*	
Aquatic Systems	Impoundments				Bird	Snow Goose	<i>Chen caerulescens</i>	I	O	M	
Aquatic Systems	Impoundments				Bird	Tundra Swan	<i>Cygnus columbianus</i>	I	O	M	
Aquatic Systems	Impoundments				Bird	American White Pelican	<i>Pelecanus erythrorhynchos</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Ancient Murrelet	<i>Synthlibornaphus antiquus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Arctic Tern	<i>Sterna paradisaea</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	<u>Bald Eagle</u>	<i>Haliaeetus leucocephalus</i>	I	R	R*	SE, FT

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Impoundments				Bird	Band-Rumped Storm-Petrel	<i>Oceanodroma castro</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Barrow's Goldeneye	<i>Bucephala islandica</i>	N	R	A	
Aquatic Systems	Impoundments				Bird	Black Scoter	<i>Melanitta nigra</i>	N	R	M	
Aquatic Systems	Impoundments				Bird	Black Skimmer	<i>Rynchops niger</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Black-Headed Gull	<i>Larus ridibundus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Black-Legged Kittiwake	<i>Rissa tridactyla</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Brant	<i>Branta bernicla</i>	N	R	A	
Aquatic Systems	Impoundments				Bird	Brown Pelican	<i>Pelecanus occidentalis</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	California Gull	<i>Larus californicus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Cinnamon Teal	<i>Anas Cyanoptera</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Common Moorhen	<i>Gallinula chloropus</i>	I	R	S*	
Aquatic Systems	Impoundments				Bird	Eared Grebe	<i>Podiceps nigricollis</i>	I	R	A	

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Impoundments				Bird	Eurasian Wigeon	<i>Anas penelope</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Franklin's Gull	<i>Larus pipixcan</i>	I	R	M	
Aquatic Systems	Impoundments				Bird	Glaucous Gull	<i>Larus hyperboreus</i>	I	R	W	
Aquatic Systems	Impoundments				Bird	Golden Eagle	<i>Aquila chrysaetos</i>	I	R	M	
Aquatic Systems	Impoundments				Bird	Great Black-Backed Gull	<i>Larus marinus</i>	I	R	M	
Aquatic Systems	Impoundments				Bird	Greater White-Fronted Goose	<i>Anser albifrons</i>	I	R	M	
Aquatic Systems	Impoundments				Bird	Gull-Billed Tern	<i>Sterna nilotica</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Harlequin Duck	<i>Histrionicus histrionicus</i>	N	R	A	
Aquatic Systems	Impoundments				Bird	Iceland Gull	<i>Larus glaucooides</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	King Eider	<i>Somateria spectabilis</i>	N	R	A	
Aquatic Systems	Impoundments				Bird	Laughing Gull	<i>Larus atricilla</i>	I	R	M	

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Aquatic Systems	Impoundments				Bird	Lesser Black-Backed Gull	<i>Larus fuscus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Little Gull	<i>Larus minutus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Long-Billed Murrelet	<i>Brachyramphus perdix</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Long-Tailed Jaeger	<i>Stercorarius longicaudus</i>	N	R	M	
Aquatic Systems	Impoundments				Bird	Magnificent Frigatebird	<i>Fregata magnificens</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Mew Gull	<i>Larus canus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Northern Gannet	<i>Morus bassanus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	<u>Osprey</u>	<u>Pandion haliaetus</u>	I	R	S*	SE
Aquatic Systems	Impoundments				Bird	Pacific Loon	<i>Gavia pacifica</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Parasitic Jaeger	<i>Stercorarius parasiticus</i>	N	R	M	
Aquatic Systems	Impoundments				Bird	<u>Peregrine Falcon</u>	<i>Falco peregrinus</i>	I	R	R*	SE

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Impoundments				Bird	Pomarine Jaeger	<i>Stercorarius pomarinus</i>	N	R	M	
Aquatic Systems	Impoundments				Bird	Red-Necked Grebe	<i>Podiceps grisegena</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	<u>Roseate Tern</u>	<i>Sterna dougallii</i>	I	R	A	FE
Aquatic Systems	Impoundments				Bird	Ross's Goose	<i>Chen rossii</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Ross's Gull	<i>Rhodostethia rosea</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Royal Tern	<i>Sterna maxima</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Sabine's Gull	<i>Xema sabini</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Slaty-Backed Gull	<i>Larus schistisagus</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Sooty Tern	<i>Sterna fuscata</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Surf Scoter	<i>Melanitta perspicillata</i>	N	R	M	
Aquatic Systems	Impoundments				Bird	Thayer's Gull	<i>Larus thayeri</i>	I	R	M	
Aquatic Systems	Impoundments				Bird	Thick-Billed Murre	<i>Uria lomvia</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Western Grebe	<i>Aechmophorus occidentalis</i>	I	R	A	

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Aquatic Systems	Impoundments				Bird	White-Winged Black Tern	<i>Chidonias leucopterus</i>	N	R	A	
Aquatic Systems	Impoundments				Bird	White-Winged Scoter	<i>Melanitta fusca</i>	N	R	M	
Aquatic Systems	Impoundments				Bird	Yellow-Billed Loon	<i>Gavia adamsii</i>	I	R	A	
Aquatic Systems	Impoundments				Bird	Redhead	<i>melodie citronique</i>				
Aquatic Systems	Impoundments				Bird	Trumpeter Swan	<i>Olor buccinator</i>				
Aquatic Systems	Impoundments				Fish	Bluegill	<i>Lepomis macrochirus</i>	I	A		
Aquatic Systems	Impoundments				Fish	Redear Sunfish	<i>Lepomis microlophus</i>	N,S	C		
Aquatic Systems	Impoundments				Fish	White Crappie	<i>Pomoxis annularis</i>	I	C		
Aquatic Systems	Impoundments				Fish	Hybrid Striped Bass	<i>Morone saxatilis x M. chrysops</i>				
Aquatic Systems	Impoundments				Mussel	Paper Pondshell	<i>Utterbackia imbecillis</i>				

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Impoundments <i>Natural Lakes</i>				Mussel	Giant Floater	<i>Pyganodon grandis</i>				
Aquatic Systems	Kankakee River	headwater			Fish	Brook Stickleback	<i>Culaea inconstans</i>	N, SE	C		
Aquatic Systems	Kankakee River	headwater			Fish	Ironcolor Shiner	<i>Notropis chalybaeus</i>	NW	O		
Aquatic Systems	Kankakee River	headwater			Fish	Weed Shiner	<i>Notropis texanus</i>	NW	R		
Aquatic Systems	Kankakee River	wadeable/large river			Fish	Largescale Stoneroller	<i>Campostoma oligolepis</i>	N	A		
Aquatic Systems	Kankakee River	wadeable/large river			Fish	Red Shiner	<i>Cyprinella lutrensis</i>	NW	O		X
Aquatic Systems	Kankakee River	wadeable/large river			Fish	<u>Bigmouth Shiner</u>	<i>Notropis dorsalis</i>	NW	R		SE
Aquatic Systems	Kankakee River <i>Rivers and Streams</i>	headwater <i>Kankakee River</i>	<i>headwater</i>		Fish	Least Darter	<i>Etheostoma microperca</i>	N	C		
Aquatic Systems	Kankakee River <i>Rivers and Streams</i>	headwater <i>Kankakee River</i>	<i>Headwater</i>		Fish	Tadpole Madtom	<i>Noturus gyrinus</i>	I	C		
Aquatic Systems	Lake Michigan				Bird	Common Loon	<i>Gavia Immer</i>	I	C	M(*)	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Lake Michigan				Bird	Herring Gull	<i>Larus argentatus</i>	I	C	R*	
Aquatic Systems	Lake Michigan				Bird	Ring-Billed Gull	<i>Larus delawarensis</i>	I	C	R*	
Aquatic Systems	Lake Michigan				Bird	Caspian Tern	<i>Sterna caspia</i>	I	O	M*	
Aquatic Systems	Lake Michigan				Bird	Common Tern	<i>Sterna hirundo</i>	I	O	M(*)	
Aquatic Systems	Lake Michigan				Bird	Forster's Tern	<i>Sterna forsteri</i>	I	O	M(*)	
Aquatic Systems	Lake Michigan				Bird	Long-Tailed Duck	<i>Clangula hyemalis</i>	N	O	W	
Aquatic Systems	Lake Michigan				Bird	Red-Throated Loon	<i>Gavia stellata</i>	I	O	M	
Aquatic Systems	Lake Michigan				Bird	Ancient Murrelet	<i>Synthlibormaphus antiquus</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Arctic Tern	<i>Sterna paradisaea</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Band-Rumped Storm-Petrel	<i>Oceanodroma castro</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Black Scoter	<i>Melanitta nigra</i>	N	R	M	
Aquatic Systems	Lake Michigan				Bird	Black-Headed Gull	<i>Larus ridibundus</i>	I	R	A	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Lake Michigan				Bird	Black-Legged Kittiwake	<i>Rissa tridactyla</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Brant	<i>Branta bernicla</i>	N	R	A	
Aquatic Systems	Lake Michigan				Bird	California Gull	<i>Larus californicus</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Glaucous Gull	<i>Larus hyperboreus</i>	I	R	W	
Aquatic Systems	Lake Michigan				Bird	Great Black-Backed Gull	<i>Larus marinus</i>	I	R	M	
Aquatic Systems	Lake Michigan				Bird	Gull-Billed Tern	<i>Sterna nilotica</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Harlequin Duck	<i>Histrionicus histrionicus</i>	N	R	A	
Aquatic Systems	Lake Michigan				Bird	Iceland Gull	<i>Larus glaucooides</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	King Eider	<i>Somateria spectabilis</i>	N	R	A	
Aquatic Systems	Lake Michigan				Bird	Lesser Black-Backed Gull	<i>Larus fuscus</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Little Gull	<i>Larus minutus</i>	I	R	A	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Lake Michigan				Bird	Long-Billed Murrelet	<i>Brachyramphus perdix</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Long-Tailed Jaeger	<i>Stercorarius longicaudus</i>	N	R	M	
Aquatic Systems	Lake Michigan				Bird	Magnificent Frigatebird	<i>Fregata magnificens</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Mew Gull	<i>Larus canus</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Northern Gannet	<i>Morus bassanus</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Pacific Loon	<i>Gavia pacifica</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Parasitic Jaeger	<i>Stercorarius parasiticus</i>	N	R	M	
Aquatic Systems	Lake Michigan				Bird	<u>Peregrine Falcon</u>	<i>Falco peregrinus</i>	I	R	R*	SE
Aquatic Systems	Lake Michigan				Bird	Pomarine Jaeger	<i>Stercorarius pomarinus</i>	N	R	M	
Aquatic Systems	Lake Michigan				Bird	<u>Roseate Tern</u>	<i>Sterna dougallii</i>	I	R	A	FE
Aquatic Systems	Lake Michigan				Bird	Ross's Gull	<i>Rhodostethia rosea</i>	I	R	A	

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Lake Michigan				Bird	Royal Tern	<i>Sterna maxima</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Sabine's Gull	<i>Xema sabini</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Sanderling	<i>Calidris alba</i>	I	R	M	
Aquatic Systems	Lake Michigan				Bird	Slaty-Backed Gull	<i>Larus schistisagus</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	Surf Scoter	<i>Melanitta perspicillata</i>	N	R	M	
Aquatic Systems	Lake Michigan				Bird	Thayer's Gull	<i>Larus thayeri</i>	I	R	M	
Aquatic Systems	Lake Michigan				Bird	Thick-Billed Murre	<i>Uria lomvia</i>	I	R	A	
Aquatic Systems	Lake Michigan				Bird	White-Winged Black Tern	<i>Chidonias leucopterus</i>	N	R	A	
Aquatic Systems	Lake Michigan				Bird	White-Winged Scoter	<i>Melanitta fusca</i>	N	R	M	
Aquatic Systems	Lake Michigan				Bird	Yellow-Billed Loon	<i>Gavia adamsii</i>	I	R	A	
Aquatic Systems	Lake Michigan				Fish	Great Lakes Muskellunge	<i>Esox masquinongy</i>	N	1910		Ex
Aquatic Systems	Lake Michigan				Fish	Shortnose Cisco	<i>Coregonus reighardi</i>	NW	1972		Ex

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Lake Michigan				Fish	Blackfin Cisco	<i>Coregonus nigripinnis</i>	NW	?		Ex
Aquatic Systems	Lake Michigan				Fish	Alewife	<i>Alosa pseudoharengus</i>	NW	A		X
Aquatic Systems	Lake Michigan				Fish	Round Goby	<i>Neogobius melanostomus</i>	NW	A		X
Aquatic Systems	Lake Michigan				Fish	Spottail Shiner	<i>Notropis hudsonius</i>	NW	A		
Aquatic Systems	Lake Michigan				Fish	Brown Trout	<i>Salmo trutta</i>	N	C		X
Aquatic Systems	Lake Michigan				Fish	Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	NW	C		X
Aquatic Systems	Lake Michigan				Fish	Coho Salmon	<i>Oncorhynchus kisutch</i>	NW	C		X
Aquatic Systems	Lake Michigan				Fish	<u>Lake Whitefish</u>	<i>Coregonus clupeaformis</i>	NW	C		SE
Aquatic Systems	Lake Michigan				Fish	Rainbow Smelt	<i>Osmerus mordax</i>	NW	C		X
Aquatic Systems	Lake Michigan				Fish	Rainbow Trout	<i>Oncorhynchus mykiss</i>	N	C		X
Aquatic Systems	Lake Michigan				Fish	Yellow Perch	<i>Perca flavescens</i>	N	C		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Lake Michigan				Fish	Atlantic Salmon	<i>Salmo salar</i>	NW	O		X
Aquatic Systems	Lake Michigan				Fish	Burbot	<i>Lota lota</i>	NW, WE	O		
Aquatic Systems	Lake Michigan				Fish	Lake Trout	<i>Salvelinus namaycush</i>	NW	O		
Aquatic Systems	Lake Michigan				Fish	Longnose Dace	<i>Rhinichthys cataractae</i>	N	O		
Aquatic Systems	Lake Michigan				Fish	Ninespine Stickleback	<i>Pungitius pungitius</i>	NW	O		
Aquatic Systems	Lake Michigan				Fish	Sea Lamprey	<i>Petromyzon marinus</i>	NW	O		X
Aquatic Systems	Lake Michigan				Fish	Three-Spine Stickleback	<i>Gasterosteus aculeatus</i>	NW	O		X
Aquatic Systems	Lake Michigan				Fish	Bloater	<i>Coregonus hoyi</i>	NW	R		
Aquatic Systems	Lake Michigan				Fish	Brook Trout	<i>Salvelinus fontinalis</i>	NW	R		
Aquatic Systems	Lake Michigan				Fish	Deepwater Sculpin	<i>Myoxocephalus thompsoni</i>	NW	R		
Aquatic Systems	Lake Michigan				Fish	Kiyi	<i>Coregonus kiyi</i>	NW	R		

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Aquatic Systems	Lake Michigan				Fish	Lake Chub	<i>Couesius plumbeus</i>	NW	R		
Aquatic Systems	Lake Michigan				Fish	Longnose Sucker	<i>Catostomus catostomus</i>	NW	R		
Aquatic Systems	Lake Michigan				Fish	Shortjaw Cisco	<i>Coregonus zenithicus</i>	NW	R		
Aquatic Systems	Lake Michigan				Fish	Slimy Sculpin	<i>Cottus cognatus</i>	NW	R		
Aquatic Systems	Lake Michigan				Fish	Trout-Perch	<i>Percopsis omiscomaycus</i>	NW, S	R		
Aquatic Systems	Lake Michigan				Fish	White Perch	<i>Morone americana</i>	NW	R		X
Aquatic Systems	Natural Lakes				Fish	Pugnose Shiner	<i>Notropis anogenus</i>	NE	1945		Ex
Aquatic Systems	Natural Lakes				Fish	Largemouth Bass	<i>Micropterus salmoides</i>	I	A		
Aquatic Systems	Natural Lakes				Fish	Banded Killifish	<i>Fundulus diaphanus</i>	N	C		
Aquatic Systems	Natural Lakes				Fish	Black Crappie	<i>Pomoxis nigromaculatus</i>	I	C		

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Aquatic Systems	Natural Lakes				Fish	Brook Silverside	<i>Labidesthes sicculus</i>	I	C		
Aquatic Systems	Natural Lakes				Fish	Brown Bullhead	<i>Ameiurus nebulosus</i>	S	C		
Aquatic Systems	Natural Lakes				Fish	Golden Shiner	<i>Notemigonus crysoleucas</i>	I	C		
Aquatic Systems	Natural Lakes				Fish	Pumpkinseed	<i>Lepomis gibbosus</i>	I	C		
Aquatic Systems	Natural Lakes				Fish	Starhead Topminnow	<i>Fundulus dispar</i>	NW	C		
Aquatic Systems	Natural Lakes				Fish	Warmouth	<i>Lepomis gulosus</i>	N	C		
Aquatic Systems	Natural Lakes				Fish	Bowfin	<i>Amia calva</i>	N,S	O		
Aquatic Systems	Natural Lakes				Fish	Iowa Darter	<i>Etheostoma exile</i>	N	O		
Aquatic Systems	Natural Lakes				Fish	Lake Chubsucker	<i>Erimyzon sucetta</i>	N	O		
Aquatic Systems	Natural Lakes				Fish	Northern Pike	<i>Esox lucius</i>	N	O		
Aquatic Systems	Natural Lakes				Fish	Spotted Gar	<i>Lepisosteus oculatus</i>	NE, SW	O		
Aquatic Systems	Natural Lakes				Fish	Blackchin Shiner	<i>Notropis heterodon</i>	N	R		
Aquatic Systems	Natural Lakes				Fish	Blacknose Shiner	<i>Notropis heterolepis</i>	N	R		

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Aquatic Systems	Natural Lakes				Fish	<u>Cisco Or Lake Herring</u>	<i>Coregonus artedi</i>	NW	R		SC
Aquatic Systems	Natural Lakes				Mussel	Pond Mussel	<i>Ligumia subrostrata</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Black Sandshell	<i>Ligumia recta</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Butterfly	<i>Ellipsaria lineolata</i>				
Aquatic Systems	Ohio River	Great river			Mussel	<u>Catspaw</u>	<i>Epioblasma obliquata obliquata</i>				FE-extirpated
Aquatic Systems	Ohio River	Great river			Mussel	<u>Cracking Pearlymussel</u>	<i>Hemistena lata</i>				FE-extirpated
Aquatic Systems	Ohio River	Great river			Mussel	Deertoe	<i>Truncilla truncata</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Ebonysell	<i>Fusconaia ebena</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Elephantear	<i>Elliptio crassidens</i>				
Aquatic Systems	Ohio River	Great river			Mussel	<u>Fat Pocketbook</u>	<i>Potamilus capax</i>				FE
Aquatic Systems	Ohio River	Great river			Mussel	Fawnsfoot	<i>Truncilla donaciformis</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Fragile Papershell	<i>Leptodea fragilis</i>				

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Aquatic Systems	Ohio River	Great river			Mussel	Leafshell	<i>Epioblasma flexuosa</i>				extirpated
Aquatic Systems	Ohio River	Great river			Mussel	<u>Longsolid</u>	<i>Fusconaia subrotunda</i>				SE
Aquatic Systems	Ohio River	Great river			Mussel	Mapleleaf	<i>Quadrula quadrula</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Monkeyface	<i>Quadrula metanevra</i>				
Aquatic Systems	Ohio River	Great river			Mussel	<u>Ohio Pigtoe</u>	<i>Pleurobema cordatum</i>				SC
Aquatic Systems	Ohio River	Great river			Mussel	<u>Orangefoot Pimpleback</u>	<i>Plethobasus cooperianus</i>				FE
Aquatic Systems	Ohio River	Great river			Mussel	Pimpleback	<i>Quadrula pustulosa</i>				
Aquatic Systems	Ohio River	Great river			Mussel	<u>Pink Mucket</u>	<i>Lampsilis abrupta</i>				FE
Aquatic Systems	Ohio River	Great river			Mussel	Pink Papershell	<i>Potamilus ohioensis</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Pocketbook	<i>Lampsilis ovata</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Pyramid Pigtoe	<i>Pleurobema rubrum</i>				
Aquatic Systems	Ohio River	Great river			Mussel	<u>Ring Pink</u>	<i>Obovaria retusa</i>				FE-extirpated

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Aquatic Systems	Ohio River	Great river			Mussel	Rock Pocketbook	<i>Arcidens confragosus</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Round Combshell	<i>Epioblasma personata</i>				extirpated
Aquatic Systems	Ohio River	Great river			Mussel	Scaleshell	<i>Leptodea leptodon</i>				extirpated
Aquatic Systems	Ohio River	Great river			Mussel	Spectaclecase	<i>Cumberlandia monodonta</i>				extirpated
Aquatic Systems	Ohio River	Great river			Mussel	Tennessee Riffleshell	<i>Epioblasma propinqua</i>				extirpated
Aquatic Systems	Ohio River	Great river			Mussel	Threehorn Wartyback	<i>Obliquaria reflexa</i>				
Aquatic Systems	Ohio River	Great river			Mussel	<u>Tubercled Blossom</u>	<i>Epioblasma torulosa torulosa</i>				FE
Aquatic Systems	Ohio River	Great river			Mussel	Wabash Riffleshell	<i>Epioblasma sampsonii</i>				extirpated
Aquatic Systems	Ohio River	Great river			Mussel	Wartyback	<i>Quadrula nodulata</i>				
Aquatic Systems	Ohio River	Great river			Mussel	Washboard	<i>Megaloniais nervosa</i>				

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Aquatic Systems	Ohio River	Great river			Mussel	<u>White Catspaw</u>	<i>Epioblasma obliquata perobliqua</i>				FE
Aquatic Systems	Ohio River	Great river			Mussel	<u>White Wartyback</u>	<i>Plethobasus cicatricosus</i>				FE
Aquatic Systems	Ohio River	Great river			Mussel	<u>Winger Mapleleaf</u>	<i>Quadrula fragosa</i>				FE- exterpaited
Aquatic Systems	Ohio River drainage	Great river			Fish	Harelip Sucker	<i>Lagochila lacera</i>	C	1893		Ex
Aquatic Systems	Ohio River drainage	Great river			Fish	Alabama Shad	<i>Alosa alabamae</i>	SW	1902		Ex
Aquatic Systems	Ohio River drainage	Great river			Fish	Stargazing Darter	<i>Percina uranidea</i>	SW	1920		Ex
Aquatic Systems	Ohio River drainage	Great river			Fish	Crystal Darter	<i>Crystallaria asprella</i>	S	1892-95		Ex
Aquatic Systems	Ohio River drainage	Great river			Fish	Carp	<i>Cyprinus carpio</i>	I	A		X
Aquatic Systems	Ohio River drainage	Great river			Fish	Emerald Shiner	<i>Notropis atherinoides</i>	I	A		
Aquatic Systems	Ohio River drainage	Great river			Fish	Gizzard Shad	<i>Dorosoma cepedianum</i>	I	A		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River drainage	Great river			Fish	Channel Shiner	<i>Notropis wickliffi</i>	S	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Flathead Catfish	<i>Pylodictis olivaris</i>	I	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Freshwater Drum	<i>Aplodinotus grunniens</i>	I	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Longnose Gar	<i>Lepisosteus osseus</i>	I	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Mississippi Silvery Minnow	<i>Hybognathus nuchalis</i>	SC, SW	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	River Carpsucker	<i>Carpionodes carpio</i>	W, S	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	River Shiner	<i>Notropis blennioides</i>	W, S	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Silver Chub	<i>Macrhybopsis storeriana</i>	W	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Silverband Shiner	<i>Notropis shumardi</i>	SW	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Skipjack Herring	<i>Alosa chrysochloris</i>	W, S	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Smallmouth Buffalo	<i>Ictiobus bubalus</i>	W, S	C		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River drainage	Great river			Fish	Steelcolor Shiner	<i>Cyprinella whipplei</i>	C, S	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Threadfin Shad	<i>Dorosoma petenense</i>	S	C		X
Aquatic Systems	Ohio River drainage	Great river			Fish	White Bass	<i>Morone chrysops</i>	W	C		
Aquatic Systems	Ohio River drainage	Great river			Fish	Bighead Carp	<i>Hypothalmichthys nobilis</i>	SW	O	X	
Aquatic Systems	Ohio River drainage	Great river			Fish	Bigmouth Buffalo	<i>Ictiobus cyprinellus</i>	W, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Blue Catfish	<i>Ictalurus furcatus</i>	S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Bullhead Minnow	<i>Pimephales vigilax</i>	W, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Freckled Madtom	<i>Noturus nocturnus</i>	W	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Ghost Shiner	<i>Notropis buchmanii</i>	NW, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Goldeye	<i>Hiodon alosoides</i>	S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Grass Carp	<i>Ctenopharyngodon idella</i>	NW, C, SE	O		X

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River drainage	Great river			Fish	Highfin Carpsucker	<i>Carpionodes velifer</i>	W, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Mooneye	<i>Hiodon tergisus</i>	W, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Mountain Madtom	<i>Noturus eleutherus</i>	W, C	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Paddlefish	<i>Polydon spathula</i>	W, SE	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	River Darter	<i>Percina shumardi</i>	C, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	River Redhorse	<i>Moxostoma carinatum</i>	C, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Shoal Chub (Formerly Speckled Chub)	<i>Macrhybopsis hyostoma</i>	W, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Shortnose Gar	<i>Lepisosteus platostomus</i>	W, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	Western Sand Darter	<i>Ammocrypta clara</i>	Nw, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	White Catfish	<i>Ameiurus catus</i>	S	O		X

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River drainage	Great river			Fish	Yellow Bass	<i>Morone mississippiensis</i>	W, S	O		
Aquatic Systems	Ohio River drainage	Great river			Fish	American Eel	<i>Anguilla rostrata</i>	W, S	R		
Aquatic Systems	Ohio River drainage	Great river			Fish	Black Buffalo	<i>Ictiobus niger</i>	NW, S	R		
Aquatic Systems	Ohio River drainage	Great river			Fish	<u>Channel Darter</u>	<i>Percina copelandi</i>	C	R		ST
Aquatic Systems	Ohio River drainage	Great river			Fish	Inland Silverside	<i>Menidia beryllina</i>	S	R		X
Aquatic Systems	Ohio River drainage	Great river			Fish	<u>Lake Sturgeon</u>	<i>Acipenser fulvescens</i>	W, S	R		SE
Aquatic Systems	Ohio River drainage	Great river			Fish	Northern Madtom	<i>Noturus stigmosus</i>	W, C	R		
Aquatic Systems	Ohio River drainage	Great river			Fish	Saddleback Darter	<i>Percina vigil</i>	SW	R		
Aquatic Systems	Ohio River drainage	Great river			Fish	Silver Carp	<i>Hypophthalmichthys molitrix</i>	SE, SW	R		X
Aquatic Systems	Ohio River drainage	Great river			Fish	Striped Mullet	<i>Mugil cephalus</i>	S	R		X
Aquatic Systems	Ohio River drainage	Great river			Fish	<u>Tippecanoe Darter</u>	<i>Etheostoma tippecanoe</i>	C	R		SC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River drainage Rivers and Streams	Great river Ohio River drainage	Great river		Fish	Channel Catfish	<i>Ictalurus Punctatus</i>	I	C		
Aquatic Systems	Ohio River drainage Rivers and Streams	Great river Ohio River drainage	Great river		Fish	Sauger	<i>Sander canadense</i>	W,S	C		
Aquatic Systems	Ohio River drainage Rivers and Streams	Great river Ohio River drainage	Great river		Fish	<u>Blue Sucker</u>	<u><i>Cycleptus elongatus</i></u>	C, S	O		FC
Aquatic Systems	Ohio River drainage Rivers and Streams	Great river Ohio River drainage	Great river		Fish	Shovelnose Sturgeon	<i>Scaphirhynchus platorynchus</i>	W, SE	O		
Aquatic Systems	Ohio River Rivers and Streams	Great river Ohio River drainage	Great river		Mussel	<u>Fanshell</u>	<u><i>Cyprogenia stegaria</i></u>				FE
Aquatic Systems	Ohio River Rivers and Streams	Great river Ohio River drainage	Great river		Mussel	Hickorynut	<i>Obovaria olivaria</i>				

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River Rivers and Streams	Great river Great Lakes drainage	Wadeable/large river		Mussel	<u>Rough Pigtoe</u>	<i>Pleurobema plenum</i>				FE
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Blackstripe Topminnow	<i>Fundulus notatus</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Bluntnose Minnow	<i>Pimephales notatus</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Creek Chub	<i>Semolitis atromaculatus</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Green Sunfish	<i>Lepomis cyanellus</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Johnny Darter	<i>Etheostoma nigrum</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	White Sucker	<i>Catostomus commersoni</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Fathead Minnow	<i>Pimephales promelas</i>	N, SE	C		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Grass Pickerel	<i>Esox americanus</i>		C		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Redfin Shiner	<i>Lythrurus umbratilis</i>	W, C	C		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Creek Chubsucker	<i>Erimyzon oblongus</i>	NW, C, SW	O		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	Least Brook Lamprey	<i>Lampetra aepyptera</i>	SW	R		
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Fish	<u>Redside Dace</u>	<i>Clinostomus elongatus</i>	E	R		ST
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Creeper	<i>Strophitus undulatus</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Elktoe	<i>Alasmidonta marginata</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Fatmucket	<i>Lampsilis siliquoidea</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Flutedshell	<i>Lasmigona costata</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Kidneyshel	<i>Ptychobranchus fasciolaris</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Lilliput	<i>Toxolasma parvus</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	<u>Little Spectaclecase</u>	<i>Villosa lienosa</i>				SC

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Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	<u>Northern Riffleshell</u>	<i>Epioblasma torulosa rangiana</i>				FE
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Pink Heelsplitter	<i>Potamilus alatus</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Pistolgrip	<i>Pistolgrip</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Plain Pocketbook	<i>Lampsilis cardium</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	<u>Purple Lilliput</u>	<i>Toxolasma lividus</i>				SC
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Purple Wartyback	<i>Cyclonaias tuberculata</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Rabbitsfoot	<i>Quadrula cylindrica</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	<u>Rayed Bean</u>	<i>Villosa fabalis</i>				SC
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	<u>Round Hickorynut</u>	<i>Obovaria subrotunda</i>				SC
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Round Pigtoe	<i>Pleurobema sintoxia</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	<u>Salamandar Mussel</u>	<i>Simpsonaias ambigua</i>				SC

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Sheepnose	<i>Plethobasus cyphus</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Snuffbox	<i>Epioblasma triquetra</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	Wabash Pigtoe	<i>Fusconaia flava</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	<u>Wavyrayed Lampmussel</u>	<i>Lampsilis fasciola</i>				SC
Aquatic Systems	Ohio River/E.C.-I.P.	headwater			Mussel	White Heelsplitter	<i>Lasmigona complanata</i>				
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Popeye Shiner	<i>Notropis ariommus</i>	WC	1894		Ex
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Black Bullhead	<i>Ameiurus melas</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Central Stoneroller	<i>Campostoma anomalum</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Golden Redhorse	<i>Moxostoma erythrurum</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Longear Sunfish	<i>Lepomis megalotis</i>	I	A		

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Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Sand Shiner	<i>Notropis stramineus</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Spotfin Shiner	<i>Cyprinella spiloptera</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Striped Shiner	<i>Luxilus chrysocephalus</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Yellow Bullhead	<i>Ameiurus natalis</i>	I	A		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Banded Darter	<i>Etheostoma zonale</i>	NW, SE	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Bigeye Chub	<i>Hybopsis amblops</i>	NW	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Bigeye Shiner	<i>Notropis boops</i>	C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Black Redhorse	<i>Moxostoma duquesnei</i>	C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Blackside Darter	<i>Percina maculata</i>	I	C		

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Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Dusky Darter	<i>Percina sciera</i>	C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Fantail Darter	<i>Etheostoma flabellare</i>	E, C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Greenside Darter	<i>Etheostoma blennioides</i>	C, E	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Logperch Sunfish	<i>Percina caprodes</i>	I	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Northern Studfish	<i>Fundulus catenatus</i>	C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Quillback	<i>Carpionodes cyprinus</i>	I	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Rainbow Darter	<i>Etheostoma caeruleum</i>	N, C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	River Chub	<i>Nocomis micropogon</i>	NE, C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Rosyface Shiner	<i>Notropis rubellus</i>	N, C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Scarlet Shiner (Formerly Rosefin Shiner)	<i>Lythrurus ardens</i>	SE	C		

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Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Silver Redhorse	<i>Moxostoma anisurum</i>	N, C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Silverjaw Minnow	<i>Ericymba buccata</i>	I	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Spotted Sucker	<i>Minytrema melanops</i>	NE, C	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Stonecat	<i>Noturus flavus</i>	I	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Suckermouth Minnow	<i>Phenacobius mirabilis</i>	C, S	C		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	American Brook Lamprey	<i>Lampetra appendix</i>	NW	O		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Banded Sculpin	<i>Cottus carolinae</i>	SC, SW	O		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Brindled Madtom	<i>Noturus miuris</i>	C	O		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>	SW	O		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	<u>Gilt Darter</u>	<i>Percina evides</i>	C	O		SE
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Mimic Shiner	<i>Notropis volucellus</i>	E, C, S	O		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Orangespotted Sunfish	<i>Lepomis humilis</i>	N	O		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Silver Lamprey	<i>Ichthyomyzon unicuspis</i>	W, S	O		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Silver Shiner	<i>Notropis photogenis</i>	C, SE	O		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Bluebreast Darter	<i>Etheostoma camurum</i>	C	R		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Gravel Chub	<i>Erimystax x-punctatus</i>	W, S	R		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Harlequin Darter	<i>Etheostoma histrio</i>	S	R		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Ohio Lamprey	<i>Ichthyomyzon bdellium</i>	W, S	R		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Ohio River Muskellunge	<i>Esox masquinongy</i>	S	R		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	<u>Spotted Darter</u>	<i><u>Etheostoma maculatum</u></i>	C	R		SC
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Streamline Chub	<i>Erimystax dissimilis</i>	NW	R		
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	<u>Variegate Darter</u>	<i><u>Etheostoma variatum</u></i>	SE	R		SC

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/E.C.-I.P.	wadeable/large			Fish	Slenderhead Darter	<i>Percina phoxocephala</i>	C	S		
Aquatic Systems	Ohio River/E.C.-I.P. <i>Rivers and Streams</i>	wadeable/large <i>Ohio River drainage</i>	<i>Eastern corn belt/interior plateau ecoregions</i>	<i>Wadeable/large river</i>	Fish	Northern Hogsucker	<i>Hypentelium nigricans</i>	N, C	C		
Aquatic Systems	Ohio River/E.C.-I.P. <i>Rivers and Streams</i>	wadeable/large <i>Great Lakes drainage</i>	<i>Headwater</i>		Fish	Mottled Sculpin	<i>Cottus bairdi</i>	I	C		
Aquatic Systems	Ohio River/E.C.-I.P. <i>Rivers and Streams</i>	headwater <i>Ohio River drainage</i>	<i>Eastern corn belt/interior plateau ecoregions</i>	<i>Headwater</i>	Fish	Orangethroat Darter	<i>Etheostoma spectabile</i>	C	A		
Aquatic Systems	Ohio River/E.C.-I.P. <i>Rivers and Streams</i>	wadeable/large <i>Ohio River drainage</i>	<i>Eastern corn belt/interior plateau ecoregions</i>	<i>Wadeable/large river</i>	Fish	<u>Eastern Sand Darter</u>	<u><i>Ammocrypta pellucida</i></u>	C, SW	O		SC, FC

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	wadeable/large Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Wadeable/large river	Fish	Rock Bass	<i>Ambloplites rupestris</i>	I	C		
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Great Lakes drainage	Headwater		Mussel	Slippershell Mussel	<i>Alasmidonta viridis</i>				
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Headwater	Mussel	Cylindrical Papershell	<i>Anodontoides ferussacianus</i>				
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Wadeable/large river	Mussel	Spike	<i>Elliptio dilatata</i>				
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Great Lakes drainage	Great river		Mussel	Mucket	<i>Actinonaias ligamentina</i>				

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Great Lakes drainage	Wadeable/large river		Mussel	Rainbow	<i>Villosa iris</i>				
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Kankakee River	Headwater		Mussel	Creek Heelsplitter	<i>Lasmigona compressa</i>				
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Kankakee River	Wadeable/large river		Mussel	Threeridge	<i>Amblema plicata</i>				
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Headwater	Fish	Southern Redbelly Dace	<i>Phoxinus erythrogaster</i>	NW, C	O		
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	headwater Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Wadeable/large river	Mussel	<u>Clubshell</u>	<i>Pleurobema clava</i>				FE

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/E.C.-I.P. Rivers and Streams	wadeable/large Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Wadeable/large river	Fish	Smallmouth Bass	<i>Micropterus dolomieu</i>	I	A		
Aquatic Systems	Ohio River/I.R.L.	headwater			Fish	Blackspotted Topminnow	<i>Fundulus olivaceus</i>	W, NE	R		
Aquatic Systems	Ohio River/I.R.L.	headwater			Fish	Pirate Perch	<i>Aphredoderus sayanus</i>	N, SW	C		
Aquatic Systems	Ohio River/I.R.L.	headwater			Fish	Pugnose Minnow	<i>Opsopoeodus emiliae</i>	N, SW	R		
Aquatic Systems	Ohio River/I.R.L.	headwater			Fish	Western Mosquitofish	<i>Gambusia affinis</i>	W	O		
Aquatic Systems	Ohio River/I.R.L.	wadeable/large			Fish	Mud Darter	<i>Etheostoma asprigene</i>	S	C		
Aquatic Systems	Ohio River/I.R.L.	wadeable/large			Fish	Bluntnose Darter	<i>Etheostoma chlorosoma</i>	W	R		
Aquatic Systems	Ohio River/I.R.L.	wadeable/large			Fish	<u>Pallid Shiner</u>	<i>Hybopsis amnis</i>	W	R		SE
Aquatic Systems	Ohio River/I.R.L.	wadeable/large			Fish	Ribbon Shiner	<i>Lythrurus fumeus</i>	SW	R		

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Ohio River/I.R.L.	wadeable/large			Mussel	Texas Lilliput	<i>Toxolasma texasiensis</i>				
Aquatic Systems	Ohio River/I.R.L. Rivers and Streams	wadeable/large Ohio River drainage	<i>Interior river lowland</i>	<i>Wadeable/large river</i>	Mussel	Yellow Sandshell	<i>Lampsilis teres</i>				
Aquatic Systems	Ohio River/I.R.L. Rivers and Streams	headwater Ohio River drainage	<i>Interior river lowland</i>	<i>Headwater</i>	Fish	<u>Spottail Darter</u>	<i><u>Etheostoma squamiceps</u></i>	SW	R		SC
Aquatic Systems	Ohio River/I.R.L. Rivers and Streams	headwater Ohio River drainage	<i>Interior river lowland</i>	<i>Headwater</i>	Mussel	Pond Horn	<i>Uniomerus tetralasmus</i>				
Aquatic Systems	Ohio River/I.R.L. Rivers and Streams	wadeable/large Ohio River drainage	<i>Interior river lowland</i>	<i>Wadeable/large river</i>	Fish	Slough Darter	<i>Etheostoma gracile</i>	SW	O		
Aquatic Systems	Ohio River/I.R.L. Rivers and Streams	wadeable/large Ohio River drainage	<i>Interior river lowland</i>	<i>Wadeable/large river</i>	Fish	Spotted Bass	<i>Micropterus punctulatus</i>	S	A		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Oxbows				Bird	Wood Duck	<i>Aix sponsa</i>	I	C	R*	
Aquatic Systems	Oxbows	Oxbows/backwaters/sloughs/embayments			Amphibian	Western Lesser Siren	<i>Siren intermedia</i>	W	O		
Aquatic Systems	Oxbows, etc.	Oxbows/backwaters/sloughs/embayments			Fish	Flier	<i>Centrarchus macropterus</i>	SW	O		
Aquatic Systems	Oxbows, etc.	Oxbows/backwaters/sloughs/embayments			Fish	Redspotted Sunfish (Formerly Spotted Sunfish)	<i>Lepomis miniatus</i>	SW	R		
Aquatic Systems	Oxbows, etc.	Oxbows/backwaters/sloughs/embayments			Mussel	Flat Floater	<i>Anodonta suborbiculata</i>				
Aquatic Systems	Oxbows, etc.				Fish	Alligator Gar	<i>Atractosteus spatula</i>	S	1976		Ex
Aquatic Systems	Oxbows, etc.				Fish	Banded Pygmy Sunfish	<i>Elassoma zonatum</i>	SW	R		
Aquatic Systems	Oxbows, etc.				Fish	Bantam Sunfish	<i>Lepomis symmetricus</i>	W	R		ST
Aquatic Systems	Oxbows, etc.				Fish	Cypress Darter	<i>Etheostoma proeliare</i>	SW	R		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Aquatic Systems	Oxbows, etc.				Fish	Cypress Minnow	<i>Hybognathus hayi</i>	SW	R		
Aquatic Systems	Rivers and Streams	Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Headwater	Amphibian	Streamside Salamander	<i>Ambystoma barbouri</i>	SE	C		
Aquatic Systems	Rivers and Streams	Ohio River drainage	Eastern corn belt/interior plateau ecoregions	Headwater	Amphibian	Two-Lined Salamander	<i>Eurycea cirrigera</i>	C, S	A		
Aquatic Systems	Rivers and Streams	Great Lakes drainage	Great river		Fish	Smallmouth Bass	<i>Micropterus dolomieu</i>	I	A		
Aquatic Systems	Rivers and Streams	Great Lakes drainage	Wadeable/large river		Fish	Smallmouth Bass	<i>Micropterus dolomieu</i>	I	A		
Aquatic Systems	Rivers and Streams	Kankakee River	Wadeable/large river		Fish	Northern Pike	<i>Esox lucius</i>	N	O		
Aquatic Systems	Rivers and Streams	Ohio River drainage	Interior river lowland	Wadeable/large river	Reptile	<u>Alligator Snapping Turtle</u>	<u><i>Macrolemys temminckii</i></u>	SW	R		SE
Aquatic Systems	Rivers and Streams	Ohio River drainage	Interior river lowland	Wadeable/large river	Reptile	River Cooter	<i>Pseudemys concinna</i>	SW	1950		

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Aquatic Systems	Rivers and Streams	Ohio River drainage on rep. species list	Eastern corn belt/interior plateau ecoregions	Wadeable/large river	Amphibian	Hellbender	<i>Cryptobranchus alleganiensis</i>	S	R		SE, FC
Aquatic Systems	Rivers and Streams				Bird	Common Goldeneye	<i>Bucephala clangula</i>	I	C	W	
Aquatic Systems	Rivers and Streams				Bird	Ring-Billed Gull	<i>Larus delawarensis</i>	I	C	R*	
Aquatic Systems	Rivers and Streams				Bird	Wood Duck	<i>Aix sponsa</i>	I	C	R*	
Aquatic Systems	Rivers and Streams				Bird	Bank Swallow	<i>Riparia riparia</i>	I	O	S*	
Aquatic Systems	Rivers and Streams				Bird	Belted Kingfisher	<i>Ceryle alcyon</i>	I	O	R*	
Aquatic Systems	Rivers and Streams				Bird	Bonaparte's Gull	<i>Larus philadelphia</i>	I	O	M	
Aquatic Systems	Rivers and Streams				Bird	Bufflehead	<i>Bucephala albeola</i>	I	O	W	
Aquatic Systems	Rivers and Streams				Bird	Common Merganser	<i>Mergus merganser</i>	I	O	W	
Aquatic Systems	Rivers and Streams				Bird	Double-Crested Cormorant	<i>Phalacrocorax auritus</i>	I	O	M*	

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Aquatic Systems	Rivers and Streams				Bird	Red-Breasted Merganser	<i>Mergus serrator</i>	I	O	M*	
Aquatic Systems	Rivers and Streams				Bird	Ruddy Duck	<i>Oxyura jamaicensis</i>	I	O	M*	
Aquatic Systems	Rivers and Streams				Mammal	Mink	<i>Mustela vison</i>	I	O		
Aquatic Systems	Rivers and Streams				Bird	American White Pelican	<i>Pelecanus erythrorhynchos</i>	I	R	A	
Aquatic Systems	Rivers and Streams				Bird	<u>Bald Eagle</u>	<i>Haliaeetus leucocephalus</i>	I	R	R*	SE, FT
Aquatic Systems	Rivers and Streams				Bird	Barrow's Goldeneye	<i>Bucephala islandica</i>	N	R	A	
Aquatic Systems	Rivers and Streams				Bird	<u>Least Tern</u>	<i>Sterna antillarum</i>	I	R	S*	SE, FE
Aquatic Systems	Rivers and Streams				Bird	<u>Osprey</u>	<i>Pandion haliaetus</i>	I	R	S*	SE
<i>Aquatic Systems</i>	<i>Unimpounded rivers and streams</i>				<i>Bird</i>	<i>Wood Duck</i>	<i>Aix sponsa</i>	<i>I</i>	<i>C</i>	<i>R*</i>	
Aquatic Systems					Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		

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Aquatic Systems					Amphibian	American Toad	<i>Bufo americanus</i>	N, C, SE	C		
Aquatic Systems					Amphibian	Cave Salamander	<i>Eurycea lucifuga</i>	S	C		
Aquatic Systems					Amphibian	Cricket Frog	<i>Acris crepitans</i>	I	C		
Aquatic Systems					Amphibian	Fowler's Toad	<i>Bufo fowleri</i>	I	C		
Aquatic Systems					Amphibian	Green Frog	<i>Rana clamitans</i>	I	C		
Aquatic Systems					Amphibian	Longtail Salamander	<i>Eurycea longicauda</i>	S	C		
Aquatic Systems					Amphibian	<u>Blue-Spotted Salamander</u>	<i>Ambystoma laterale</i>	N	O		SC
Aquatic Systems					Amphibian	Eastern Newt	<i>Notophthalmus viridescens</i>	I	O		
Aquatic Systems					Amphibian	Lesser Siren	<i>Siren intermedia</i>	W	O		
Aquatic Systems					Amphibian	<u>Mudpuppy</u>	<i>Necturus maculosus</i>	I	O		SC
Aquatic Systems					Amphibian	Northern Dusky Salamander	<i>Desmognathus fuscus</i>	SE	O		

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Aquatic Systems					Amphibian	Pickereel Frog	<i>Rana palustris</i>	E, C, WC	O		SC
Aquatic Systems					Amphibian	Four-Toed Salamander	<i>Hemidactylum scutatum</i>	N, C	R		ST
Aquatic Systems					Amphibian	Northern Red Salamander	<i>Pseudotriton ruber</i>	SC	R		SE
Aquatic Systems					Amphibian	Plains Leopard Frog	<i>Rana blairi</i>	W	R		SC
Aquatic Systems					Amphibian	Green Treefrog	<i>Hyla cinerea</i>				
<i>Aquatic Systems</i>					<i>Bird</i>	<i>Red-Winged Blackbird</i>	<i>Agelaius phoeniceus</i>	<i>I</i>	<i>A</i>	<i>R*</i>	
Aquatic Systems					Mammal	Beaver	<i>Castor canadensis</i>	I	C		reintroduced
<i>Aquatic Systems</i>					<i>Mammal</i>	<i>Mink</i>	<i>Mustela vison</i>	<i>I</i>	<i>O</i>		
Aquatic Systems					Mammal	River Otter	<i>Lutra canadensis</i>	I	R		reintroduced
Aquatic Systems					Reptile	Banded Water Snake	<i>Nerodia sipedon</i>	I	A		
Aquatic Systems					Reptile	Common Musk Turtle	<i>Sternotherus odoratus</i>	I	A		
Aquatic Systems					Reptile	Common Snapping Turtle	<i>Chelydra serpentina</i>	I	A		

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Aquatic Systems					Reptile	Painted Turtle	<i>Chrysemys picta</i>	I	A		
Aquatic Systems					Reptile	Map Turtle	<i>Graptemys geographica</i>	I	C		
Aquatic Systems					Reptile	Queen Snake	<i>Regina Septemvittata</i>	E, C, WC, N	C		
Aquatic Systems					Reptile	Red-Eared Turtle	<i>Trachemys scripta</i>	S, WC	C		
Aquatic Systems					Reptile	Spiny Softshell	<i>Apalone spinifera</i>	I	C		
Aquatic Systems					Reptile	<u>Blanding's Turtle</u>	<i>Emydoidea blandingii</i>	N	O		SC
Aquatic Systems					Reptile	Diamondback Water Snake	<i>Nerodia rhombifer</i>	SW	O		
Aquatic Systems					Reptile	False Map Turtle	<i>Graptemys pseudogeographica</i>	W, S	O		
Aquatic Systems					Reptile	<u>Northern Copperbelly</u>	<i>Nerodia erythrogaster</i>	SW, NE, SC	O		ST, FC
Aquatic Systems					Reptile	Smooth Softshell	<i>Apalone mutica</i>	W, S	O		
Aquatic Systems					Reptile	<u>Spotted Turtle</u>	<i>Clemmys guttata</i>	N	O		ST

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Aquatic Systems					Reptile	<u>Cottonmouth</u>	<i>Agkistrodon piscivorus</i>	S	R		ST
Aquatic Systems					Reptile	<u>Eastern Mud Turtle</u>	<i>Kinosternon subrubrum</i>	NW, SW	R		ST
Aquatic Systems					Reptile	<u>Ouachita Map Turtle</u>	<i>Graptemys ouachitensis</i>				
Barren Lands					Amphibian	<u>Bullfrog</u>	<i>Rana catesbeiana</i>	I	A		
Barren Lands					Amphibian	<u>American Toad</u>	<i>Bufo americanus</i>	N, C, SE	C		
Barren Lands					Amphibian	<u>Cricket Frog</u>	<i>Acris crepitans</i>	I	C		
Barren Lands					Amphibian	<u>Fowler's Toad</u>	<i>Bufo fowleri</i>	I	C		
Barren Lands					Amphibian	<u>Green Frog</u>	<i>Rana clamitans</i>	I	C		
Barren Lands					Amphibian	<u>Crawfish Frog</u>	<i>Rana areolata</i>	W	O		ST
Barren Lands					Amphibian	<u>Northern Dusky Salamander</u>	<i>Desmognathus fuscus</i>	SE	O		
Barren Lands					Amphibian	<u>Plains Leopard Frog</u>	<i>Rana blairi</i>	W	R		SC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Barren Lands					Reptile	Black Rat Snake	<i>Elaphe obsoleta</i>	I	C		
Barren Lands					Reptile	Eastern Milksnake	<i>Lampropeltis triangulum</i>	I	C		
Barren Lands					Reptile	Common (Black) Kingsnake	<i>Lampropeltis getula</i>	S	O		
Barren Lands	Active quarries				Bird	Bank Swallow	<i>Riparia riparia</i>	I	O	S*	
Barren Lands	Active quarries				Bird	N. Rough-Winged Swallow	<i>Stelgidopteryx serripennis</i>	I	O	S*	
<i>Barren Lands</i>	<i>Active quarries</i>				<i>Bird</i>	<i>Rough-Winged Swallow</i>	<i>Stelgidopteryx serripennis</i>	<i>I</i>	<i>O</i>	<i>S*</i>	
Barren Lands	Bare dunes				Bird	Lark Sparrow	<i>Chondestes grammacus</i>	I	R	S*	
Barren Lands	Bare dunes				Bird	<u>Piping Plover</u>	<u><i>Charadrius melodus</i></u>	I	R	A(*)	SE, FE
Barren Lands	<i>Bare dunes</i>				Reptile	<u>Six-Lined Racerunner</u>	<u><i>Cnemidophorus sexlineatus</i></u>	NW, SW	O		
Barren Lands	<i>Cliffs</i>				Amphibian	<u>Green Salamander</u>	<u><i>Aneides aeneus</i></u>	SE	R		SE

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Barren Lands	Cliffs				Bird	Black Vulture	<i>Coragyps atratus</i>	S	R	R*	
Barren Lands	Cliffs				Mammal	<u>Allegheny Woodrat</u>	<i>Neotoma magister</i>	SC	R		SE
Barren Lands	Rock outcrops				Bird	Eastern Phoebe	<i>Sayornis phoebe</i>	I	O	R*	
Barren Lands	Rock outcrops				Bird	N. Rough-Winged Swallow	<i>Stelgidopteryx serripennis</i>	I	O	S*	
Barren Lands	Rock outcrops				Mammal	<u>Allegheny Woodrat</u>	<i>Neotoma magister</i>	SC	R		SE
Developed Lands					Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		
Developed Lands					Amphibian	Tiger Salamander	<i>Ambystoma tigrinum</i>	I	C		
Developed Lands					Amphibian	Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	S	O		
Developed Lands					Bird	Northern Cardinal	<i>Cardinalis cardinalis</i>	I	A	R*	
Developed Lands					Bird	Rock Dove	<i>Columba livia</i>	I	A	R*	X
Developed Lands					Mammal	House Mouse	<i>Mus musculus</i>	I	A		X
Developed Lands					Mammal	Norway Rat	<i>Rattus norvegicus</i>	I	A		X

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Developed Lands					Reptile	Banded Water Snake	<i>Nerodia sipedon</i>	I	A		
Developed Lands					Reptile	Black Rat Snake	<i>Elaphe obsoleta</i>	I	C		
Developed Lands					Reptile	Brown Snake	<i>Storeria dekayi</i>	I	C		
Developed Lands					Reptile	Eastern Hognose Snake	<i>Heterodon platirhinos</i>	I	C		
Developed Lands					Reptile	Eastern Milksnake	<i>Lampropeltis triangulum</i>	I	C		
Developed Lands					Reptile	Western Fox Snake	<i>Elaphe vulpina</i>	NW	C		
Developed Lands					Reptile	Bull Snake	<i>Pituophis melanoleucus</i>	NW, SW	O		
Developed Lands					Reptile	Common (Black) Kingsnake	<i>Lampropeltis getula</i>	S	O		
Developed Lands					Reptile	<u>Kirtland's Snake</u>	<u>Clonophis kirtlandii</u>	N, C, SE	O		ST, FC
Developed Lands					Reptile	Prairie Kingsnake	<i>Lampropeltis calligaster</i>	W	O		
Developed Lands					Reptile	<u>Smooth Green Snake</u>	<i>Opheodrys vernalis</i>	NW	R		ST

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
<i>Developed Lands</i>	<i>Borrow pits</i>				<i>Bird</i>	<i>Canada Goose</i>	<i>Branta canadensis</i>	<i>I</i>	<i>A</i>	<i>R*</i>	
Developed Lands	<i>Borrow pits</i>				Bird	Mallard	<i>Anas platyrhynchos</i>	I	C	R*	
<i>Developed Lands</i>	<i>Golf courses</i>				<i>Bird</i>	<i>American Robin</i>	<i>Turdus migratorius</i>	<i>I</i>	<i>A</i>	<i>R*</i>	
<i>Developed Lands</i>	<i>Golf courses</i>				<i>Bird</i>	<i>Eastern Bluebird</i>	<i>Sialia sialis</i>	<i>I</i>	<i>C</i>	<i>R*</i>	
Developed Lands	Golf Courses				Mammal	Thirteen-Lined Ground Squirrel	<i>Spermophilus tridecemlineatus</i>	N	C		
Developed Lands	Industrial				Bird	Common Nighthawk	<i>Chordeiles minor</i>	I	O	S*	
Developed Lands	Industrial				Bird	<u>Peregrine Falcon</u>	<u>Falco peregrinus</u>	I	R	R*	SE
<i>Developed Lands</i>	<i>Industrial lands</i>				<i>Bird</i>	<i>European Starling</i>	<i>Sturnus vulgaris</i>	<i>I</i>	<i>A</i>	<i>R*</i>	<i>X</i>
<i>Developed Lands</i>	<i>Industrial lands</i>				<i>Bird</i>	<i>Rock Pigeon</i>	<i>Columba guinea</i>				
Developed Lands	Rights of way				Mammal	Franklin's Ground Squirrel	<i>Spermophilus franklinii</i>	NW	R		SE
Developed Lands	Roads/rails (bridges)				Bird	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	I	R	S*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Developed Lands	Roads/rails (bridges)				Bird	N. Rough-Winged Swallow	<i>Stelgidopteryx serripennis</i>	I	O	S*	
<i>Developed Lands</i>	<i>Storm water retention ponds</i>				<i>Bird</i>	<i>Canada Goose</i>	<i>Branta canadensis</i>	<i>I</i>	<i>A</i>	<i>R*</i>	
<i>Developed Lands</i>	<i>Storm water retention ponds</i>				<i>Bird</i>	<i>Mallards</i>	<i>Anas platyrhynchos</i>	<i>I</i>	<i>C</i>	<i>R*</i>	
Forests					Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		
Forests					Amphibian	Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	I	A		
Forests					Amphibian	Eastern Gray Treefrog	<i>Hyla versicolor</i>	I	A		
Forests					Amphibian	Redback Salamander	<i>Plethodon cinereus</i>	I	A		
Forests					Amphibian	Smallmouth Salamander	<i>Ambystoma texanum</i>	I	A		
Forests					Amphibian	Two-Lined Salamander	<i>Eurycea cirrigera</i>	C, S	A		
Forests					Amphibian	Cave Salamander	<i>Eurycea lucifuga</i>	S	C		

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Amphibian	Green Frog	<i>Rana clamitans</i>	I	C		
Forests					Amphibian	Longtail Salamander	<i>Eurycea longicauda</i>	S	C		
Forests					Amphibian	Marbled Salamander	<i>Ambystoma opacum</i>	C, S	C		
Forests					Amphibian	Slimy Salamander	<i>Plethodon glutinosus</i>	S, C	C		
Forests					Amphibian	Southern Leopard Frog	<i>Rana utricularia</i>	S, C	C		
Forests					Amphibian	Spotted Salamander	<i>Ambystoma maculatum</i>	I	C		
Forests					Amphibian	Spring Peeper	<i>Pseudacris crucifer</i>	I	C		
Forests					Amphibian	Streamside Salamander	<i>Ambystoma barbouri</i>	SE	C		
Forests					Amphibian	Tiger Salamander	<i>Ambystoma tigrinum</i>	I	C		
Forests					Amphibian	Zigzag Salamander	<i>Plethodon dorsalis</i>	C, S	C		

Appendix C: Guilds by Habitat and Sub-habitat

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Forests					Amphibian	Blue-Spotted Salamander	<i>Ambystoma laterale</i>	N	O		SC
Forests					Amphibian	Eastern Newt	<i>Notophthalmus viridescens</i>	I	O		
Forests					Amphibian	Jefferson's Salamander	<i>Ambystoma jeffersonianum</i>	SC	O		
Forests					Amphibian	Northern Dusky Salamander	<i>Desmognathus fuscus</i>	SE	O		
Forests					Amphibian	Ravine Salamander	<i>Plethodon richmondi</i>	SE	O		
Forests					Amphibian	Wood Frog	<i>Rana sylvatica</i>	I	O		
Forests					Amphibian	Four-Toed Salamander	<i>Hemidactylum scutatum</i>	N, C	R		ST
Forests					Amphibian	Green Salamander	<i>Aneides aeneus</i>	SE	R		SE
Forests					Amphibian	Northern Red Salamander	<i>Pseudotriton ruber</i>	SC	R		SE
Forests					Bird	American Crow	<i>Corvus brachyrhynchos</i>	I	A	R*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Bird	Blue Jay	<i>Cyanocitta cristata</i>	I	A	R*	
Forests					Bird	Brown-Headed Cowbird	<i>Molothrus ater</i>	I	A	R*	
Forests					Bird	Chimney Swift	<i>Chaetura pelagica</i>	I	A	S*	
Forests					Bird	Mourning Dove	<i>Zenaida macroura</i>	I	A	R*	
Forests					Bird	Northern Cardinal	<i>Cardinalis cardinalis</i>	I	A	R*	
Forests					Bird	Red-Tailed Hawk	<i>Buteo jamaicensis</i>	I	A	R*	
Forests					Bird	American Kestrel	<i>Falco sparverius</i>	I	C	R*	
Forests					Bird	Black-Capped Chickadee	<i>Poecile atricapillus</i>	N	C	R*	
Forests					Bird	Blue-Gray Gnatcatcher	<i>Poliopitila caerulea</i>	I	C	S*	
Forests					Bird	Carolina Chickadee	<i>Poecile carolinensis</i>	S	C	R*	
Forests					Bird	Carolina Wren	<i>Thryothorus ludovicianus</i>	I	C	R*	
Forests					Bird	Chipping Sparrow	<i>Spizella passerina</i>	I	C	S*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Bird	Downy Woodpecker	<i>Picoides pubescens</i>	I	C	R*	
Forests					Bird	Eastern Bluebird	<i>Sialia sialis</i>	I	C	R*	
Forests					Bird	Eastern Kingbird	<i>Tyrannus tyrannus</i>	I	C	S*	
Forests					Bird	Eastern Screech-Owl	<i>Otus asio</i>	I	C	R*	
Forests					Bird	Eastern Wood-Pewee	<i>Contopus virens</i>	I	C	S*	
Forests					Bird	Golden-Crowned Kinglet	<i>Regulus satrapa</i>	I	C	W*	
Forests					Bird	Great Horned Owl	<i>Bubo virginianus</i>	I	C	R*	
Forests					Bird	Hairy Woodpecker	<i>Picoides villosus</i>	I	C	R*	
Forests					Bird	Northern Flicker	<i>Colaptes auratus</i>	I	C	R*	
Forests					Bird	Red-Bellied Woodpecker	<i>Melanerpes carolinus</i>	I	C	R*	
Forests					Bird	Rose-Breasted Grosbeak	<i>Pheucticus ludovicianus</i>	I	C	S*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Bird	Ruby-Throated Hummingbird	<i>Archilochus colubris</i>	I	C	S*	
Forests					Bird	Tennessee Warbler	<i>Vermivora peregrina</i>	I	C	M	
Forests					Bird	Turkey Vulture	<i>Cathartes aura</i>	I	C	R*	
Forests					Bird	Warbling Vireo	<i>Vireo gilvus</i>	I	C	S*	
Forests					Bird	White-Breasted Nuthatch	<i>Sitta carolinensis</i>	I	C	R*	
Forests					Bird	Yellow-Rumped Warbler	<i>Dendroica coronata</i>	I	C	W	
Forests					Bird	Acadian Flycatcher	<i>Empidonax vireescens</i>	I	O	S*	
Forests					Bird	American Redstart	<i>Setophaga ruticilla</i>	I	O	S*	
Forests					Bird	Barred Owl	<i>Strix varia</i>	I	O	R*	
Forests					Bird	Bay-Breasted Warbler	<i>Dendroica castanea</i>	I	O	M	
Forests					Bird	Black-And-White Warbler	<i>Mniotilta varia</i>	I	O	S*	SC
Forests					Bird	Blackburnian Warbler	<i>Dendroica fusca</i>	I	O	M*	
Forests					Bird	Blackpoll Warbler	<i>Dendroica striata</i>	I	O	M	

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Forests					Bird	Black-Throated Blue Warbler	<i>Dendroica caerulescens</i>	I	O	M	
Forests					Bird	<u>Broad-Winged Hawk</u>	<i>Buteo platypterus</i>	I	O	S*	SC
Forests					Bird	Cape May Warbler	<i>Dendroica tigrina</i>	I	O	M	
Forests					Bird	Cedar Waxwing	<i>Bombycilla cedrorum</i>	I	O	R*	
Forests					Bird	Common Nighthawk	<i>Chordeiles minor</i>	I	O	S*	
Forests					Bird	Cooper's Hawk	<i>Accipiter cooperii</i>	I	O	R*	
Forests					Bird	Eastern Phoebe	<i>Sayornis phoebe</i>	I	O	R*	
Forests					Bird	Gray-Cheeked Thrush	<i>Catharus minimus</i>	I	O	M	
Forests					Bird	Great Crested Flycatcher	<i>Myiarchus crinitus</i>	I	O	S*	
Forests					Bird	Hermit Thrush	<i>Catharus guttatus</i>	I	O	W	
Forests					Bird	Magnolia Warbler	<i>Dendroica magnolia</i>	I	O	M*	
Forests					Bird	Nashville Warbler	<i>Verminvora ruficapilla</i>	I	O	M	

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Forests					Bird	Northern Parula	<i>Parula americana</i>	I	O	S*	
Forests					Bird	Orange-Crowned Warbler	<i>Vermivora celata</i>	I	O	M	
Forests					Bird	Orchard Oriole	<i>Icterus spurius</i>	I	O	S*	
Forests					Bird	Ovenbird	<i>Seiurus aurocapillus</i>	I	O	S*	
Forests					Bird	Palm Warbler	<i>Dendroica palmarum</i>	I	O	M	
Forests					Bird	Pine Siskin	<i>Carduelis pinus</i>	I	O	W*	
Forests					Bird	Purple Finch	<i>Carpodacus purpureus</i>	I	O	W	
Forests					Bird	Red-Headed Woodpecker	<i>Melanerpes erythrocephalus</i>	I	O	R*	
Forests					Bird	Scarlet Tanager	<i>Piranga olivacea</i>	I	O	S*	
Forests					Bird	Summer Tanager	<i>Piranga rubra</i>	S	O	S*	
Forests					Bird	Swainson's Thrush	<i>Catharus ustulatus</i>	I	O	M	
Forests					Bird	Veery	<i>Catharus fuscescens</i>	I	O	S*	

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Forests					Bird	Wild Turkey	<i>Meleagris gallopavo</i>	I	O	R*	
Forests					Bird	Wilson's Warbler	<i>Wilsonia pusilla</i>	I	O	M	
Forests					Bird	Winter Wren	<i>Troglodytes troglodytes</i>	I	O	W	
Forests					Bird	Yellow-Throated Vireo	<i>Vireo flavifrons</i>	I	O	S*	
Forests					Bird	Barn Owl	<i>Tyto alba</i>	I	R	R*	SE
Forests					Bird	Black Vulture	<i>Coragyps atratus</i>	S	R	R*	
Forests					Bird	Black-Backed Woodpecker	<i>Picoides arcticus</i>	N	R	A	
Forests					Bird	Black-Headed Grosbeak	<i>Pheucticus melanocephalus</i>	I	R	A	
Forests					Bird	Bohemian Waxwing	<i>Bombycilla garrulus</i>	N	R	W	
Forests					Bird	Canada Warbler	<i>Wilsonia canadensis</i>	N	R	M*	
Forests					Bird	Chuck-Will's-Widow	<i>Caprimulgus carolinensis</i>	S	R	S*	
Forests					Bird	Common Redpoll	<i>Carduelis flammea</i>	N	R	W	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Bird	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	I	R	W	
Forests					Bird	Golden Eagle	<i>Aquila chrysaetos</i>	I	R	M	
Forests					Bird	Hoary Redpoll	<i>Carduelis hornemanni</i>	N	R	A	
Forests					Bird	<u>Hooded Warbler</u>	<i>Wilsonia citrina</i>	I	R	S*	SC
Forests					Bird	Least Flycatcher	<i>Empidonax minimus</i>	I	R	S*	
Forests					Bird	Long-Eared Owl	<i>Asio otus</i>	I	R	R*	
Forests					Bird	Merlin	<i>Falco columbarius</i>	I	R	M	
Forests					Bird	<u>Mississippi Kite</u>	<i>Ictinia mississippiensis</i>	I	R	A*	SC
Forests					Bird	Northern Goshawk	<i>Accipiter gentilis</i>	N, E	R	W	
Forests					Bird	Northern Saw-Whet Owl	<i>Aegolius acadicus</i>	I	R	W*	
Forests					Bird	Olive-Sided Flycatcher	<i>Contopus borealis</i>	I	R	M	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Bird	Philadelphia Vireo	<i>Vireo philadelphicus</i>	I	R	M	
Forests					Bird	Pine Grosbeak	<i>Pinicola enucleator</i>	N	R	W	
Forests					Bird	Red Crossbill	<i>Loxia curvirostra</i>	N	R	W*	
Forests					Bird	Ruby-Crowned Kinglet	<i>Regulus calendula</i>	I	R	M	
Forests					Bird	Rufous Hummingbird	<i>Selasphorus rufus</i>	I	R	A	
Forests					Bird	Rusty Blackbird	<i>Euphagus carolinus</i>	I	R	W	
Forests					Bird	Say's Phoebe	<i>Sayornis saya</i>	I	R	A	
Forests					Bird	Vermilion Flycatcher	<i>Pyrocephalus rubinus</i>	I	R	A	
Forests					Bird	Western Kingbird	<i>Tyrannus verticalis</i>	I	R	A*	
Forests					Bird	Western Wood-Pewee	<i>Contopus sordidulus</i>	W	R	A	
Forests					Bird	White-Winged Crossbill	<i>Loxia leucoptera</i>	N	R	W	
Forests					Bird	<u>Worm-Eating Warbler</u>	<i>Helmintheros vermivorous</i>	I	R	S*	SC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Bird	Yellow-Bellied Flycatcher	<i>Empidonax flaviventris</i>	I	R	M	
Forests					Bird	Yellow-Bellied Sapsucker	<i>Sphyrapicus varius</i>	I	R	M*	
Forests					Mammal	Big Brown Bat	<i>Eptesicus fuscus</i>	I	A		
Forests					Mammal	Eastern Chipmunk	<i>Tamias striatus</i>	I	A		
Forests					Mammal	Eastern Mole	<i>Scalopus aquaticus</i>	I	A		
Forests					Mammal	Fox Squirrel	<i>Sciurus niger</i>	I	A		
Forests					Mammal	House Mouse	<i>Mus musculus</i>	I	A		X
Forests					Mammal	Opossum	<i>Didelphis virginiana</i>	I	A		
Forests					Mammal	Raccoon	<i>Procyon lotor</i>	I	A		
Forests					Mammal	Red Bat	<i>Lasiurus borealis</i>	I	A		
Forests					Mammal	White-Footed Mouse	<i>Peromyscus leucopus</i>	I	A		
Forests					Mammal	White-Tailed Deer	<i>Odocoileus virginianus</i>	I	A		reintroduced

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Mammal	Coyote	<i>Canis latrans</i>	I	C		
Forests					Mammal	Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	S	C		
Forests					Mammal	Gray Squirrel	<i>Sciurus carolinensis</i>	I	C		
Forests					Mammal	Little Brown Myotis	<i>Myotis lucifugus</i>	I	C		
Forests					Mammal	Masked Shrew	<i>Sorex cinereus</i>	N	C		
Forests					Mammal	Northern Myotis	<i>Myotis septentrionalis</i>	I	C		
Forests					Mammal	Red Squirrel	<i>Tamiasciurus hudsonicus</i>	N	C		
Forests					Mammal	Southern Flying Squirrel	<i>Glaucomys volans</i>	I	C		
Forests					Mammal	Striped Skunk	<i>Mephitis mephitis</i>	I	C		
Forests					Mammal	<u>Evening Bat</u>	<i>Nycticeius humeralis</i>	SC	O		FE
Forests					Mammal	Gray Fox	<i>Urocyon cinereoargenteus</i>	I	O		
Forests					Mammal	Hoary Bat	<i>Lasiurus cinereus</i>	I	O		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Mammal	Indiana Myotis	<i>Myotis sodalis</i>	I	O		FE
Forests					Mammal	Pygmy Shrew	<i>Sorex hoyi</i>	SC	O		
Forests					Mammal	Red Fox	<i>Vulpes vulpes</i>	I	O		
Forests					Mammal	Silver-Haired Bat	<i>Lasionycteris noctivagans</i>	I	O		
Forests					Mammal	Southeastern Shrew	<i>Sorex longirostris</i>	SC	O		
Forests					Mammal	Woodland Vole	<i>Microtus pinetorum</i>	I	O		
Forests					Mammal	<u>Bobcat</u>	<i>Lynx rufus</i>	I	R		SE
Forests					Mammal	<u>Least Weasel</u>	<i>Mustela nivalis</i>	N	R		SC
Forests					Mammal	<u>Rafinesque's Big-Eared Bat</u>	<i>Corynorhinus rafinesquii</i>	SC	R		SC
Forests					Reptile	Black Racer	<i>Coluber constrictor</i>	I	C		
Forests					Reptile	Black Rat Snake	<i>Elaphe obsoleta</i>	I	C		
Forests					Reptile	Eastern Box Turtle	<i>Terrapene carolina</i>	I	C		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Reptile	Eastern Fence Lizard	<i>Sceloporus undulatus</i>	S	C		
Forests					Reptile	Eastern Milksnake	<i>Lampropeltis triangulum</i>	I	C		
Forests					Reptile	Five-Lined Skink	<i>Eumeces fasciatus</i>	I	C		
Forests					Reptile	Broad-Headed Skink	<i>Eumeces laticeps</i>	C, S	O		
Forests					Reptile	Bull Snake	<i>Pituophis melanoleucus</i>	NW, SW	O		
Forests					Reptile	Common (Black) Kingsnake	<i>Lampropeltis getulus</i>	S	O		
Forests					Reptile	Ground Skink	<i>Scincella lateralis</i>	S	O		
Forests					Reptile	<u>Kirtland's Snake</u>	<i>Clonophis kirtlandii</i>	N, C, SE	O		ST, FC
Forests					Reptile	<u>Copperbelly Water Snake</u>	<i>Nerodia erythrogaster neglecta</i>	SW, NE, SC	O		ST, FC
Forests					Reptile	Northern Copperhead	<i>Agkistrodon contortrix</i>	S, WC	O		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Forests					Reptile	Northern Ringneck Snake	<i>Diadophis punctatus</i>	S	O		
Forests					Reptile	Red-Bellied Snake	<i>Storeria occipitomaculata</i>	I	O		
Forests					Reptile	<u>Rough Green Snake</u>	<i>Opheodrys aestivus</i>	S	O		SC
Forests					Reptile	Western Earth Snake	<i>Virginia valeriae</i>	S	O		
Forests					Reptile	Worm Snake	<i>Carphophis amoenus</i>	S	O		
Forests					Reptile	<u>Crowned Snake</u>	<i>Tantilla coronata</i>	S	R		ST
Forests					Reptile	<u>Scarlet Snake</u>	<i>Cemophora coccinea</i>	S	R		ST
Forests					Reptile	<u>Smooth Green Snake</u>	<i>Opheodrys vernalis</i>	NW	R		ST
Forests	<i>Deciduous forest</i>				Bird	Red-Eyed Vireo	<i>Vireo olivaceus</i>	I	C	S*	
Forests	<i>Deciduous forest</i>				Bird	Wood Thrush	<i>Hylocichla mustelina</i>	I	C	S*	
Forests	Early Forest Stage				Bird	Indigo Bunting	<i>Passerina cyanea</i>	I	A	S*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Early Forest Stage				Bird	Brown Thrasher	<i>Toxostoma rufum</i>	I	C	R*	
Forests	Early Forest Stage				Bird	Common Yellowthroat	<i>Geothlypis trichas</i>	I	C	S*	
Forests	Early Forest Stage				Bird	Gray Catbird	<i>Dumetella carolinensis</i>	I	C	S*	
Forests	Early Forest Stage				Bird	Northern Mockingbird	<i>Mimus polyglottos</i>	I	C	R*	
Forests	Early Forest Stage				Bird	Whip-Poor-Will	<i>Caprimulgus vociferous</i>	I	C	S*	
Forests	Early Forest Stage				Bird	White-Eyed Vireo	<i>Vireo griseus</i>	I	C	S*	
Forests	Early Forest Stage				Bird	Yellow-Breasted Chat	<i>Icteria virens</i>	I	C	S*	
Forests	Early Forest Stage				Bird	American Woodcock	<i>Scolopax minor</i>	I	O	S*	
Forests	Early Forest Stage				Bird	Black-Billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	I	O	S*	
Forests	Early Forest Stage				Bird	Blue-Winged Warbler	<i>Verminvora pinus</i>	I	O	S*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Early Forest Stage				Bird	Chestnut-Sided Warbler	<i>Dendroica pensylvanica</i>	N	O	M*	
Forests	Early Forest Stage				Bird	Prairie Warbler	<i>Dendroica discolor</i>	I	O	S*	
Forests	Early Forest Stage				Bird	Ruffed Grouse	<i>Bonasa umbellus</i>	S	O	R*	
Forests	Early Forest Stage				Bird	Yellow-Billed Cuckoo	<i>Coccyzus americanus</i>	I	O	S*	
Forests	Early Forest Stage				Bird	Golden-Winged Warbler	<i>Verminvora chrysoptera</i>	I	R	S*	SE
Forests	Early Forest Stage				Mammal	Cottontail Rabbit	<i>Sylvilagus floridanus</i>	I	A		
Forests	Early Forest Stage				Mammal	Woodchuck	<i>Marmota monax</i>	I	C		
Forests	Early Forest Stage <i>Pre-forest stage</i>				Bird	Field Sparrow	<i>Spizella pusilla</i>	I	C	R*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Early Forest Stage <i>Pre-forest stage</i>				Bird	Eastern Towhee	<i>Pipilo erythrophthalmus</i>	I	O	R*	
Forests	Evergreen				Bird	Black-Throated Green Warbler	<i>Dendroica virens</i>	I	O	S*	
Forests	Evergreen				Bird	Pine Warbler	<i>Dendroica pinus</i>	S	O	S*	
Forests	Evergreen				Bird	Red-Breasted Nuthatch	<i>Sitta canadensis</i>	I	O	W*	
Forests	Evergreen				Bird	Sharp-Shinned Hawk	<i>Accipiter striatus</i>	I	O	R*	
Forests	Evergreen				Bird	<u>Bachman's Sparrow</u>	<i>Aimophila aestivalis</i>	S	R	S(*)	SE
Forests	Evergreen				Bird	<u>Kirtland's Warbler</u>	<i>Dendroica kirtlandii</i>	I	R	M	SE, FE
Forests	Evergreen				Bird	Northern Saw-Whet Owl	<i>Aegolius acadicus</i>	I	R	W*	
Forests	<i>Floodplain forest</i>				Bird	<u>Cerulean Warbler</u>	<i>Dendroica cerulea</i>	I	O	S*	SC
Forests	<i>Floodplain forest</i>				Bird	<i>Yellow-Throated Warbler</i>	<i>Dendroica dominica</i>	I	O	S*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Forested wetlands				Bird	<u>Cerulean Warbler</u>	<u>Dendroica cerulea</u>	I	O	S*	SC
Forests	Forested wetlands				Bird	Yellow-Throated Warbler	<i>Dendroica dominica</i>	I	O	S*	
Forests	Forested wetlands				Bird	<u>Red-Shouldered Hawk</u>	<u>Buteo lineatus</u>	I	O	R*	SC
Forests	Mature or high canopy stage				Bird	Pileated Woodpecker	<i>Dryocopus pileatus</i>	I	O	R*	
Forests	Mature or high canopy stage				Bird	<u>Cerulean Warbler</u>	<u>Dendroica cerulea</u>	I	O	S*	SC
Forests	Mature or high canopy stage				Mammal	Cottontail Rabbit	<i>Sylvilagus floridanus</i>	I	A		
Forests	Mature or high canopy stage				Mammal	<u>Allegheny Woodrat</u>	<u>Neotoma magister</u>	SC	R		SE
Forests	Mature or high canopy stage				Reptile	<u>Timber Rattlesnake</u>	<u>Crotalus horridus</u>	S	R		ST
Forests	Old forest stage				Bird	<u>Cerulean Warbler</u>	<u>Dendroica cerulea</u>	I	O	S*	SC

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
<i>Forests</i>	<i>Old forest stage</i>				<i>Bird</i>	<i>Pileated Woodpecker</i>	<i>Dryocopus pileatus</i>	<i>I</i>	<i>O</i>	<i>R*</i>	
Forests	Old Forest stage				Mammal	Allegheny Woodrat	<i>Neotoma magister</i>	SC	R		SE
<i>Forests</i>	<i>Pole stage</i>				<i>Bird</i>	<i>Wood Thrush</i>	<i>Hylocichla mustelina</i>	<i>I</i>	<i>C</i>	<i>S*</i>	
Forests	<i>Pole stage</i>				Bird	Tufted Titmouse	<i>Baeolophus bicolor</i>	I	C	R*	
Forests	Pole Stage				Mammal	Cottontail Rabbit	<i>Sylvilagus floridanus</i>	I	A		
Forests	Pole Stage				Mammal	Woodchuck	<i>Marmota monax</i>	I	C		
Forests	Pre-forest Stage				Mammal	Cottontail Rabbit	<i>Sylvilagus floridanus</i>	I	A		
Forests	Pre-forest Stage				Mammal	Woodchuck	<i>Marmota monax</i>	I	C		
Forests	Pre-forest Stage				Mammal	Long-Tailed Weasel	<i>Mustela frenata</i>	I	O		
Forests	Riparian wooded corridors/streams/counties				Bird	Common Grackle	<i>Quiscalus quiscula</i>	I	A	R*	

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Riparian wooded corridors/steams/counties				Bird	Great Blue Heron	<i>Ardea herodias</i>	I	C	R*	
Forests	Riparian wooded corridors/steams/counties				Bird	Green Heron	<i>Butorides virescens</i>	I	C	S*	
Forests	Riparian wooded corridors/steams/counties				Bird	House Wren	<i>Troglodytes aedon</i>	I	C	S*	
Forests	Riparian wooded corridors/steams/counties				Bird	American Redstart	<i>Setophaga ruticilla</i>	I	O	S*	
Forests	Riparian wooded corridors/steams/counties				Bird	Barred Owl	<i>Strix varia</i>	I	O	R*	
Forests	Riparian wooded corridors/steams/counties				Bird	Brown Creeper	<i>Certhia americana</i>	I	O	R*	
Forests	Riparian wooded corridors/steams/counties				Bird	<u>Cerulean Warbler</u>	<u>Dendroica cerulea</u>	I	O	S*	SC

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Riparian wooded corridors/streams/counties				Bird	<u>Great Egret</u>	<i>Ardea alba</i>	I	O	S*	SC
Forests	Riparian wooded corridors/streams/counties				Bird	Hooded Merganser	<i>Lophodytes cucullatus</i>	I	O	R*	
Forests	Riparian wooded corridors/streams/counties				Bird	Kentucky Warbler	<i>Oporornis formosus</i>	I	O	S*	
Forests	Riparian wooded corridors/streams/counties				Bird	Louisiana Waterthrush	<i>Seiurus motacilla</i>	I	O	S*	
Forests	Riparian wooded corridors/streams/counties				Bird	Northern Parula	<i>Parula americana</i>	I	O	S*	
Forests	Riparian wooded corridors/streams/counties				Bird	Prothonotary Warbler	<i>Protonotaria citrea</i>	I	O	S*	
Forests	Riparian wooded corridors/streams/counties				Bird	Red-Headed Woodpecker	<i>Melanerpes erythrocephalus</i>	I	O	R*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Riparian wooded corridors/steams/counties				Bird	<u>Red-Shouldered Hawk</u>	<i>Buteo lineatus</i>	I	O	R*	SC
Forests	Riparian wooded corridors/steams/counties				Bird	Yellow-Throated Warbler	<i>Dendroica dominica</i>	I	O	S*	
Forests	Riparian wooded corridors/steams/counties				Bird	<u>Bald Eagle</u>	<i>Haliaeetus leucocephalus</i>	I	R	R*	SE, FT
Forests	Riparian wooded corridors/steams/counties				Bird	<u>Black-Crowned Night-Heron</u>	<i>Nycticorax nycticorax</i>	I	R	S*	SE
Forests	Riparian wooded corridors/steams/counties				Bird	Cattle Egret	<i>Bubulcus ibis</i>	I	R	M*	
Forests	Riparian wooded corridors/steams/counties				Bird	Connecticut Warbler	<i>Oporornis agilis</i>	I	R	M	
Forests	Riparian wooded corridors/steams/counties				Bird	Fish Crow	<i>Corvus ossifragus</i>	SW	R	S	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Riparian wooded corridors/streams/counties				Bird	Little Blue Heron	<i>Egretta caerulea</i>	I	R	S*	
Forests	Riparian wooded corridors/streams/counties				Bird	<u>Mississippi Kite</u>	<i>Ictinia mississippiensis</i>	I	R	A*	SC
Forests	Riparian wooded corridors/streams/counties				Bird	Mourning Warbler	<i>Oporornis philadelphia</i>	I	R	M	
Forests	Riparian wooded corridors/streams/counties				Bird	Northern Waterthrush	<i>Seiurus noveboracensis</i>	I	R	S*	
Forests	Riparian wooded corridors/streams/counties				Bird	<u>Osprey</u>	<i>Pandion haliaetus</i>	I	R	S*	SE
Forests	Riparian wooded corridors/streams/counties				Bird	Snowy Egret	<i>Egretta thula</i>	I	R	A*	
Forests	Riparian wooded corridors/streams/counties				Bird	Swainson's Warbler	<i>Limnothlypis swainsonii</i>	SW	R	A	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Riparian wooded corridors/steams/counties				Bird	Swallow-Tailed Kite	<i>Elanoides forficatus</i>	I	R	A(*)	
Forests	Riparian wooded corridors/steams/counties				Bird	Tricolored Heron	<i>Egretta tricolor</i>	I	R	A	
Forests	Riparian wooded corridors/steams/counties				Bird	<u>Yellow-Crowned Night-Heron</u>	<i>Nyctanassa violacea</i>	SW	R	S*	SE
Forests	Riparian wooded corridors/steams/counties				Mammal	<u>Gray Myotis</u>	<i>Myotis grisescens</i>	SC	R		FE
<i>Forests</i>	<i>Species Composition</i>				<i>Plants</i>	<i>Aspen/Birch</i>					
<i>Forests</i>	<i>Species Composition</i>				<i>Plants</i>	<i>Cherry/Ash/Yellow Poplar</i>					
<i>Forests</i>	<i>Species Composition</i>				<i>Plants</i>	<i>E Redcedar/Hardwoods</i>					
<i>Forests</i>	<i>Species Composition</i>				<i>Plants</i>	<i>Eastern Red Cedar</i>	<i>Juniperus virginiana</i>				

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Forests	Species Composition				Plants	Elm/Ash/Cottonwood					
Forests	Species Composition				Plants	Maple/Beech					
Forests	Species Composition				Plants	Oak/Gum/Cypress					
Forests	Species Composition				Plants	Oak/Hickory					
Forests	Species Composition				Plants	Oak/Pine					
Forests	Species Composition				Plants	Shortleaf/Virginia Pine					
Forests	Species Composition				Plants	White Pine	<i>Pinus strobus</i>				
Forests	Suburban forest				Bird	American Robin	<i>Turdus migratorius</i>	I	A	R*	
Forests	Suburban forest				Bird	Baltimore Oriole	<i>Icterus galbula</i>	I	O	S*	
Forests	Urban forest				Bird	American Robin	<i>Turdus migratorius</i>	I	A	R*	
Forests	Urban forest				Bird	Baltimore Oriole	<i>Icterus galbula</i>	I	O	S*	
Grasslands					Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Amphibian	American Toad	<i>Bufo americanus</i>	N, C, SE	C		
Grasslands					Amphibian	Cricket Frog	<i>Acris crepitans</i>	I	C		
Grasslands					Amphibian	Fowler's Toad	<i>Bufo fowleri</i>	I	C		
Grasslands					Amphibian	Green Frog	<i>Rana clamitans</i>	I	C		
Grasslands					Amphibian	<u>Northern Leopard Frog</u>	<i>Rana pipiens</i>	N, E	C		SC
Grasslands					Amphibian	Tiger Salamander	<i>Ambystoma tigrinum</i>	I	C		
Grasslands					Amphibian	<u>Blue-Spotted Salamander</u>	<i>Ambystoma laterale</i>	N	O		SC
Grasslands					Amphibian	<u>Crawfish Frog</u>	<i>Rana areolata</i>	W	O		ST
Grasslands					Amphibian	Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	S	O		
Grasslands					Amphibian	<u>Plains Leopard Frog</u>	<i>Rana blairi</i>	W	R		SC
Grasslands					Bird	Barn Swallow	<i>Hirundo rustica</i>	I	A	S*	
Grasslands					Bird	Brown-Headed Cowbird	<i>Molothrus ater</i>	I	A	R*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Bird	Dark-Eyed Junco	<i>Junco hyemalis</i>	I	A	W	
Grasslands					Bird	Eastern Meadowlark	<i>Sturnella magna</i>	I	A	R*	
Grasslands					Bird	Mourning Dove	<i>Zenaida macroura</i>	I	A	R*	
Grasslands					Bird	Red-Tailed Hawk	<i>Buteo jamaicensis</i>	I	A	R*	
Grasslands					Bird	Song Sparrow	<i>Melospiza melodia</i>	I	A	R*	
Grasslands					Bird	American Goldfinch	<i>Carduelis tristis</i>	I	C	R*	
Grasslands					Bird	American Kestrel	<i>Falco sparverius</i>	I	C	R*	
Grasslands					Bird	American Tree Sparrow	<i>Spizella arborea</i>	I	C	W	
Grasslands					Bird	Common Yellowthroat	<i>Geothlypis trichas</i>	I	C	S*	
Grasslands					Bird	Eastern Bluebird	<i>Sialia sialis</i>	I	C	R*	
Grasslands					Bird	Field Sparrow	<i>Spizella pusilla</i>	I	C	R*	
Grasslands					Bird	Horned Lark	<i>Eremophila alpestris</i>	I	C	R*	
Grasslands					Bird	Purple Martin	<i>Progne subis</i>	I	C	S*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Bird	Blue Grosbeak	<i>Passerina caerulea</i>	S	O	S*	
Grasslands					Bird	Fox Sparrow	<i>Passerella iliaca</i>	I	O	W	
Grasslands					Bird	Lapland Longspur	<i>Calcarius lapponicus</i>	I	O	W	
Grasslands					Bird	<u>Northern Harrier</u>	<u>Circus cyaneus</u>	I	O	R*	SE
Grasslands					Bird	Ring-Necked Pheasant	<i>Phasianus colchicus</i>	N	O	R*	X
Grasslands					Bird	Rough-Legged Hawk	<i>Buteo lagopus</i>	I	O	W	
Grasslands					Bird	Snow Bunting	<i>Plectrophenax nivalis</i>	I	O	W	
Grasslands					Bird	Tree Swallow	<i>Tachycineta bicolor</i>	I	O	S*	
Grasslands					Bird	Vesper Sparrow	<i>Pooecetes gramineus</i>	I	O	S*	
Grasslands					Bird	White-Crowned Sparrow	<i>Zonotrichia leucophrys</i>	I	O	W	
Grasslands					Bird	<u>American Bittern</u>	<u><i>Botaurus lentiginosus</i></u>	I	R	S*	SE

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Bird	American Pipit	<i>Anthus rubescens</i>	I	R	M	
Grasslands					Bird	Bachman's Sparrow	<i>Aimophila aestivalis</i>	S	R	S(*)	SE
Grasslands					Bird	Barn Owl	<i>Tyto alba</i>	I	R	R*	SE
Grasslands					Bird	Blue-Headed Vireo	<i>Vireo solitarius</i>	I	R	M*	
Grasslands					Bird	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	W	R	M*	
Grasslands					Bird	Buff-Breasted Sandpiper	<i>Tryngites subruficollis</i>	I	R	M	
Grasslands					Bird	Burrowing Owl	<i>Athene cunicularia</i>	W	R	A	
Grasslands					Bird	Cassin's Sparrow	<i>Aimophila cassinii</i>	I	R	A	
Grasslands					Bird	Cattle Egret	<i>Bubulcus ibis</i>	I	R	M*	
Grasslands					Bird	Clay-Colored Sparrow	<i>Spizella pallida</i>	I	R	A	
Grasslands					Bird	Ferruginous Hawk	<i>Buteo regalis</i>	W	R	A	
Grasslands					Bird	Franklin's Gull	<i>Larus pipixcan</i>	I	R	M	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Bird	Golden Eagle	<i>Aquila chrysaetos</i>	I	R	M	
Grasslands					Bird	Gyr Falcon	<i>Falco rusticolis</i>	N	R	A	
Grasslands					Bird	Harris's Sparrow	<i>Zonotrichia querula</i>	I	R	W	
Grasslands					Bird	<u>Henslow's Sparrow</u>	<i>Ammodramus</i> <i>henslowii</i>	I	R	S*	SE
Grasslands					Bird	Lark Sparrow	<i>Chondestes</i> <i>grammacus</i>	I	R	S*	
Grasslands					Bird	Leconte's Sparrow	<i>Ammodramus</i> <i>leconteii</i>	I	R	W	
Grasslands					Bird	Lincoln's Sparrow	<i>Melospiza lincolnii</i>	I	R	M	
Grasslands					Bird	<u>Loggerhead Shrike</u>	<i>Lanius ludovicianus</i>	I	R	R*	SE, FC
Grasslands					Bird	Mccown's Longspur	<i>Calcarius mccownii</i>	I	R	A	
Grasslands					Bird	Northern Shrike	<i>Lanius excubitor</i>	N	R	W	
Grasslands					Bird	Prairie Falcon	<i>Falco mexicanus</i>	W	R	A	
Grasslands					Bird	Scissor-Tailed Flycatcher	<i>Tyrannus forficatus</i>	S	R	A*	

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Bird	<u>Sedge Wren</u>	<i>Cistothorus platensis</i>	I	R	S*	SE
Grasslands					Bird	<u>Short-Eared Owl</u>	<i>Asio flammeus</i>	I	R	R*	SE
Grasslands					Bird	Smith's Longspur	<i>Calcarius pictus</i>	I	R	M	
Grasslands					Bird	Snowy Owl	<i>Nyctea scandiac</i>	N	R	W	
Grasslands					Bird	Swainson's Hawk	<i>Buteo swainsoni</i>	W	R	A	
Grasslands					Bird	<u>Upland Sandpiper</u>	<i>Bartramia longicauda</i>	I	R	S*	SE
Grasslands					Bird	<u>Western Meadowlark</u>	<i>Sturnella neglecta</i>	N	R	R*	SC
Grasslands					Bird	Gray Partridge (Extirpated)	<i>Perdix perdix</i>	N		R*	X, Ex (1977)
Grasslands					Bird	Greater Prairie-Chicken (Extirpated)	<i>Tympanuchus cupido</i>	NW		R(*)	Ex (1972)
Grasslands					Mammal	Eastern Mole	<i>Scalopus aquaticus</i>	I	A		
Grasslands					Mammal	Opossum	<i>Didelphis virginiana</i>	I	A		

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Mammal	Raccoon	<i>Procyon lotor</i>	I	A		
Grasslands					Mammal	Coyote	<i>Canis latrans</i>	I	C		
Grasslands					Mammal	Meadow Vole	<i>Microtus pennsylvanicus</i>	I	C		
Grasslands					Mammal	<u>Plains Pocket Gopher</u>	<i>Geomys bursarius</i>	NW	C		SC
Grasslands					Mammal	Prairie Vole	<i>Microtus ochrogaster</i>	I	C		
Grasslands					Mammal	Striped Skunk	<i>Mephitis mephitis</i>	I	C		
Grasslands					Mammal	Thirteen-Lined Ground Squirrel	<i>Spermophilus tridecemlineatus</i>	N	C		
Grasslands					Mammal	Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	NW	C		
Grasslands					Mammal	Woodchuck	<i>Marmota monax</i>	I	C		
Grasslands					Mammal	Least Shrew	<i>Cryptotis parva</i>	I	O		
Grasslands					Mammal	Red Fox	<i>Vulpes vulpes</i>	I	O		
Grasslands					Mammal	Southern Bog Lemming	<i>Synaptomys cooperi</i>	I	O		
Grasslands					Mammal	<u>Badger</u>	<i>Taxidea taxus</i>	I	R		ST

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands					Mammal	Bobcat	<i>Lynx rufus</i>	I	R		SE
Grasslands					Mammal	Least Weasel	<i>Mustela nivalis</i>	N	R		SC
Grasslands					Reptile	Black Racer	<i>Coluber constrictor</i>	I	C		
Grasslands					Reptile	Black Rat Snake	<i>Elaphe obsoleta</i>	I	C		
Grasslands					Reptile	Brown Snake	<i>Storeria dekayi</i>	I	C		
Grasslands					Reptile	Eastern Hognose Snake	<i>Heterodon platirhinos</i>	I	C		
Grasslands					Reptile	Eastern Milksnake	<i>Lampropeltis triangulum</i>	I	C		
Grasslands					Reptile	Western Fox Snake	<i>Elaphe vulpina</i>	NW	C		
Grasslands					Reptile	Blanding's Turtle	<i>Emydoidea blandingii</i>	N	O		SC
Grasslands					Reptile	Bull Snake	<i>Pituophis melanoleucus</i>	NW, SW	O		
Grasslands					Reptile	Common (Black) Kingsnake	<i>Lampropeltis getulus</i>	S	O		
Grasslands					Reptile	Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	I	O		

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Grasslands					Reptile	<u>Kirtland's Snake</u>	<i>Clonophis kirtlandii</i>	N, C, SE	O		ST, FC
Grasslands					Reptile	<u>Ornate Box Turtle</u>	<i>Terrapene ornata</i>	NW, SW	O		SC
Grasslands					Reptile	Plains Garter Snake	<i>Thamnophis radix</i>	NW	O		
Grasslands					Reptile	Prairie Kingsnake	<i>Lampropeltis calligaster</i>	W	O		
Grasslands					Reptile	Six-Lined Racerunner	<i>Cnemidophorus sexlineatus</i>	NW, SW	O		
Grasslands					Reptile	<u>Spotted Turtle</u>	<i>Clemmys guttata</i>	N	O		ST
Grasslands					Reptile	<u>Western Ribbon Snake</u>	<i>Thamnophis proximus</i>	NW, SW	O		SC
Grasslands					Reptile	<u>Butler's Garter Snake</u>	<i>Thamnophis butleri</i>	NE, C	R		ST
Grasslands					Reptile	Slender Glass Lizard	<i>Ophisaurus attenuatus</i>	NW	R		
Grasslands					Reptile	<u>Smooth Green Snake</u>	<i>Opheodrys vernalis</i>	NW	R		ST

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Grasslands	Early Successional Area				Mammal	Cottontail Rabbit	<i>Sylvilagus floridanus</i>	I	A		
Grasslands	Early Successional Area				Mammal	Short-Tailed Shrew	<i>Blarina brevicauda</i>	I	A		
Grasslands	Early Successional Area				Mammal	Deer Mouse	<i>Peromyscus maniculatus</i>	I	C		
Grasslands	Early Successional Area				Mammal	<u>Franklin's Ground Squirrel</u>	<u><i>Spermophilus franklinii</i></u>	NW	R		SE
Grasslands	<i>Fescue</i>				Bird	Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	I	A	R*	
Grasslands	<i>Farm Bill Program Lands (CRP, CP1, CP2, CP10)</i>				Bird	Northern Bobwhite	<i>Colinus virginianus</i>	I	C	R*	
Grasslands	<i>Early successional areas</i>				Bird	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	I	O	S*	
Grasslands	<i>Haylands</i>				Bird	Bobolink	<i>Dolichonyx oryzivorus</i>	I	O	S*	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Grasslands	Haylands				Bird	Dickcissel	<i>Spiza americana</i>	I	O	S*	
Grasslands	Historic				Mammal	Meadow Jumping Mouse	<i>Zapus hudsonius</i>	I	O		
Grasslands	Historic				Mammal	<u>Franklin's Ground Squirrel</u>	<i>Spermophilus franklinii</i>	NW	R		SE
Grasslands	Pasture				Bird	Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	I	A	R*	
Grasslands	Prairies				Bird	Savannah Sparrow	<i>Passerculus sandwichensis</i>	I	O	S*	
Grasslands	Prairies				Mammal	<u>Franklin's Ground Squirrel</u>	<i>Spermophilus franklinii</i>	NW	R		SE
Grasslands	Reclaimed minelands				Bird	Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	I	A	R*	
Grasslands	Savannah				Bird	Eastern Wood-Pewee	<i>Contopus virens</i>	I	C	S*	
Grasslands	Savannah				Bird	Red-Headed Woodpecker	<i>Melanerpes erythrocephalus</i>	I	O	R*	
Subterranean Systems					Amphibian	Two-Lined Salamander	<i>Eurycea cirrigera</i>	C, S	A		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Subterranean Systems					Amphibian	Northern Dusky Salamander	<i>Desmognathus fuscus</i>	SE	O		
Subterranean Systems					Amphibian	<u>Pickerel Frog</u>	<i>Rana palustris</i>	E, C, WC	O		SC
Subterranean Systems					Amphibian	<u>Green Salamander</u>	<i>Aneides aeneus</i>	SE	R		SE
Subterranean Systems	Cave aquatic and terrestrial features				Mammal	Big Brown Bat	<i>Eptesicus fuscus</i>	I	A		
Subterranean Systems	Cave aquatic and terrestrial features				Mammal	Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	S	C		
Subterranean Systems	Cave aquatic and terrestrial features				Mammal	Little Brown Myotis	<i>Myotis lucifugus</i>	I	C		
Subterranean Systems	Cave aquatic and terrestrial features				Mammal	Northern Myotis	<i>Myotis septentrionalis</i>	I	C		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Subterranean Systems	Cave aquatic and terrestrial features				Mammal	<u>Indiana Myotis</u>	<u>Myotis sodalis</u>	I	O		FE
Subterranean Systems	Cave aquatic and terrestrial features				Mammal	<u>Gray Myotis</u>	<u>Myotis grisescens</u>	SC	R		FE
Subterranean Systems	Cave aquatic and terrestrial features				Mammal	<u>Rafinesque's Big-Eared Bat</u>	<u>Corynorhinus rafinesquii</u>	SC	R		SC
Subterranean Systems	<u>Cave Entrances/Seeps</u>				Amphibian	<u>Cave Salamander</u>	<u>Eurycea lucifuga</u>	S	C		
Subterranean Systems	<u>Cave Entrances/Seeps</u>				Amphibian	<u>Longtail Salamander</u>	<u>Eurycea longicauda</u>	S	C		
Subterranean Systems	<u>Cave Entrances/Seeps</u>				Amphibian	<u>Four-Toed Salamander</u>	<u>Hemidactylium scutatum</u>	N, C	R		ST
Subterranean Systems	Caves				Fish	<u>Northern Cavefish</u>	<u>Amblyopsis spelaea</u>	S	R		SE, FC
Subterranean Systems	Caves				Fish	<u>Southern Cavefish</u>	<u>Typhlichthys subterraneus</u>	S	R		SE

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands					Bird	Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	I	A	R*	
Wetlands	emergent				Bird	Red-Winged Blackbird	<i>Agelaius phoeniceus</i>	I	A	R*	
Wetlands	emergent				Bird	American Black Duck	<i>Anas rubripes</i>	I	C	R*	
Wetlands	emergent				Bird	Killdeer	<i>Charadrius vociferus</i>	I	C	R*	
Wetlands	emergent				Bird	Pied-Billed Grebe	<i>Podilymbus podiceps</i>	I	C	R*	
Wetlands	emergent				Bird	Wood Duck	<i>Aix sponsa</i>	I	C	R*	
Wetlands	emergent				Bird	Yellow Warbler	<i>Dendroica petechia</i>	I	C	S*	
Wetlands	emergent <i>Ephemeral</i>	<i>Emergent</i>			Bird	Common Yellowthroat	<i>Geothlypis trichas</i>	I	C	S*	
Wetlands	emergent <i>Ephemeral</i>	Emergent			Bird	Mallard	<i>Anas platyrhynchos</i>	I	C	R*	
Wetlands	emergent				Bird	American Coot	<i>Fulica americana</i>	I	O	R*	
Wetlands	emergent				Bird	American Wigeon	<i>Anas americana</i>	I	O	M(*)	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	emergent				Bird	<u>Black Tern</u>	<i>Chlidonias niger</i>	I	O	S*	SE
Wetlands	emergent				Bird	Black-Bellied Plover	<i>Pluvialis squatarola</i>	I	O	M	
Wetlands	emergent				Bird	Blue-Winged Teal	<i>Anas discors</i>	I	O	S*	
Wetlands	emergent				Bird	Dunlin	<i>Calidris alpina</i>	I	O	M	
Wetlands	emergent				Bird	Gadwall	<i>Anas strepera</i>	I	O	M*	
Wetlands	emergent				Bird	<u>Great Egret</u>	<i>Ardea alba</i>	I	O	S*	SC
Wetlands	emergent				Bird	Greater Yellowlegs	<i>Tringa melanoleuca</i>	I	O	M	
Wetlands	emergent				Bird	Green-Winged Teal	<i>Anas crecca</i>	I	O	M*	
Wetlands	emergent				Bird	Horned Grebe	<i>Podiceps auritus</i>	I	O	W(*)	
Wetlands	emergent				Bird	Least Sandpiper	<i>Calidris minutilla</i>	I	O	M	
Wetlands	emergent				Bird	Lesser Yellowlegs	<i>Tringa flavipes</i>	I	O	M	
Wetlands	emergent				Bird	Long-Billed Dowitcher	<i>Limnodromus scolopaceus</i>	I	O	M	
Wetlands	emergent				Bird	Mute Swan	<i>Cygnus olor</i>	I	O	R*	X

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	emergent				Bird	Northern Pintail	<i>Anas Acuta</i>	I	O	M*	
Wetlands	emergent				Bird	Northern Shoveler	<i>Anas clypeata</i>	I	O	M*	
Wetlands	emergent				Bird	Pectoral Sandpiper	<i>Calidris melanotos</i>	I	O	M	
Wetlands	emergent				Bird	<u>Sandhill Crane</u>	<i>Grus canadensis</i>	I	O	M*	SC
Wetlands	emergent				Bird	Semipalmated Plover	<i>Charadrius semipalmatus</i>	I	O	M	
Wetlands	emergent				Bird	Semipalmated Sandpiper	<i>Calidris pusilla</i>	I	O	M	
Wetlands	emergent				Bird	Short-Billed Dowitcher	<i>Limnodromus griseus</i>	I	O	M	
Wetlands	emergent				Bird	Solitary Sandpiper	<i>Tringa solitaria</i>	I	O	M	
Wetlands	emergent				Bird	Spotted Sandpiper	<i>Actitis macularia</i>	I	O	S*	
Wetlands	emergent				Bird	Swamp Sparrow	<i>Melospiza georgiana</i>	I	O	R*	
Wetlands	emergent				Bird	Tree Swallow	<i>Tachycineta bicolor</i>	I	O	S*	

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	emergent				Bird	Tundra Swan	<i>Cygnus columbianus</i>	I	O	M	
Wetlands	emergent				Bird	Western Sandpiper	<i>Calidris mauri</i>	I	O	M	
Wetlands	emergent				Bird	Wilson's Snipe	<i>Gallinago delicata</i>	I	O	R*	
Wetlands	emergent <i>Ephemeral</i>	<i>Emergent</i>			Bird	Sora	<i>Porzana carolina</i>	I	O	S*	
Wetlands	emergent				Bird	American Avocet	<i>Recurvirostra americana</i>	I	R	M(*)	
Wetlands	emergent				Bird	<u>American Bittern</u>	<u><i>Botaurus lentiginosus</i></u>	I	R	S*	SE
Wetlands	emergent				Bird	Baird's Sandpiper	<i>Calidris bairdii</i>	I	R	M	
Wetlands	emergent				Bird	<u>Black Rail</u>	<u><i>Laterallus jamaicensis</i></u>	I	R	A*	SE
Wetlands	emergent				Bird	<u>Black-Crowned Night-Heron</u>	<u><i>Nycticorax nycticorax</i></u>	I	R	S*	SE
Wetlands	emergent				Bird	Black-Necked Stilt	<i>Himantopus mexicanus</i>	I	R	A	

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	emergent				Bird	Cinnamon Teal	<i>Anas Cyanoptera</i>	I	R	A	
Wetlands	emergent				Bird	Common Crane	<i>Grus grus</i>	I	R	A	
Wetlands	emergent				Bird	Common Moorhen	<i>Gallinula chloropus</i>	I	R	S*	
Wetlands	emergent				Bird	Curlew Sandpiper	<i>Calidris ferruginea</i>	I	R	A	
Wetlands	emergent				Bird	Eurasian Wigeon	<i>Anas penelope</i>	I	R	A	
Wetlands	emergent				Bird	Fulvous Whistling-Duck	<i>Dendrocygna bicolor</i>	I	R	A	
Wetlands	emergent				Bird	Glossy Ibis	<i>Plegadis falcinellus</i>	I	R	A	
Wetlands	emergent				Bird	Hudsonian Godwit	<i>Limosa haemastica</i>	I	R	A	
Wetlands	emergent				Bird	<u>King Rail</u>	<i>Rallus elegans</i>	I	R	S*	SE
Wetlands	emergent				Bird	<u>Least Bittern</u>	<i>Ixobrychus exilis</i>	I	R	S*	SE
Wetlands	emergent				Bird	Little Blue Heron	<i>Egretta caerulea</i>	I	R	S*	
Wetlands	emergent				Bird	Marbled Godwit	<i>Limosa fedoa</i>	I	R	A	
Wetlands	emergent				Bird	<u>Marsh Wren</u>	<i>Cistothorus palustris</i>	I	R	S*	SE

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	emergent				Bird	Nelson's Sharp-Tailed Sparrow	<i>Ammodramus nelsoni</i>	I	R	M	
Wetlands	emergent				Bird	Purple Gallinule	<i>Porphyrio martinica</i>	I	R	A	
Wetlands	emergent				Bird	Purple Sandpiper	<i>Calidris maritima</i>	I	R	W	
Wetlands	emergent				Bird	Red Phalarope	<i>Phalaropus fulicarius</i>	I	R	M	
Wetlands	emergent				Bird	Reddish Egret	<i>Egretta rufescens</i>	I	R	A	
Wetlands	emergent				Bird	Red-Necked Phalarope	<i>Phalaropus lobatus</i>	I	R	M	
Wetlands	emergent				Bird	Ruddy Turnstone	<i>Arenaria interpres</i>	I	R	M	
Wetlands	emergent				Bird	Ruff	<i>Philomachus pugnax</i>	I	R	A	
Wetlands	emergent				Bird	Sharp-Tailed Sandpiper	<i>Calidris acuminata</i>	I	R	A	
Wetlands	emergent				Bird	Snowy Egret	<i>Egretta thula</i>	I	R	A*	
Wetlands	emergent				Bird	Stilt Sandpiper	<i>Calidris himantopus</i>	I	R	M	
Wetlands	emergent				Bird	Tricolored Heron	<i>Egretta tricolor</i>	I	R	A	

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<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	emergent				Bird	<u>Virginia Rail</u>	<i>Rallus limicola</i>	I	R	R*	SE
Wetlands	emergent				Bird	Whimbrel	<i>Numenius phaeopus</i>	I	R	M	
Wetlands	emergent				Bird	White Ibis	<i>Eudocimus albus</i>	S	R	A	
Wetlands	emergent				Bird	White-Faced Ibis	<i>Plegadis chihi</i>	I	R	A	
Wetlands	emergent				Bird	White-Rumped Sandpiper	<i>Calidris fuscicollis</i>	I	R	M	
Wetlands	emergent				Bird	Willet	<i>Catoptrophorus semipalmatus</i>	I	R	M	
Wetlands	emergent				Bird	Wilson's Phalarope	<i>Phalaropus tricolor</i>	I	R	M(*)	
Wetlands	emergent				Bird	Wilson's Plover	<i>Charadrius wilsonia</i>	I	R	A	
Wetlands	emergent				Bird	<u>Wood Stork</u>	<i>Mycteria americana</i>	SW	R	A	FE
Wetlands	emergent				Bird	Yellow Rail	<i>Coturnicops noveboracensis</i>	I	R	M	
Wetlands	emergent				Bird	<u>Yellow-Crowned Night-Heron</u>	<i>Nyctanassa violacea</i>	SW	R	S*	SE

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	emergent				Bird	Yellow-Headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	W, S	R	S*	SE
Wetlands	emergent				Bird	Trumpeter Swan	<i>Olor buccinator</i>				
Wetlands	emergent				Bird	Whooping Crane	<i>Grus americana</i>	N		M	SE,FE,Ex (1907)
Wetlands	emergent Herbaceous Marsh				Bird	Sedge Wren	<i>Cistothorus platensis</i>	I	R	S*	SE
Wetlands	emergent Other	Potholes			Bird	Canada Goose	<i>Branta canadensis</i>	I	A	R*	
Wetlands	emergent Permanent	Forested			Bird	Great Blue Heron	<i>Ardea herodias</i>	I	C	R*	
Wetlands	Ephemeral				Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		
Wetlands	Ephemeral				Amphibian	Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	I	A		
Wetlands	Ephemeral				Amphibian	Eastern Gray Treefrog	<i>Hyla versicolor</i>	I	A		
Wetlands	Ephemeral				Amphibian	Smallmouth Salamander	<i>Ambystoma texanum</i>	I	A		

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<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Ephemeral				Amphibian	Western Chorus Frog	<i>Pseudacris triseriata</i>	I	A		
Wetlands	Ephemeral				Amphibian	American Toad	<i>Bufo americanus</i>	N, C,SE	C		
Wetlands	Ephemeral				Amphibian	Cricket Frog	<i>Acris crepitans</i>	I	C		
Wetlands	Ephemeral				Amphibian	Fowler's Toad	<i>Bufo fowleri</i>	I	C		
Wetlands	Ephemeral				Amphibian	Green Frog	<i>Rana clamitans</i>	I	C		
Wetlands	Ephemeral				Amphibian	Marbled Salamander	<i>Ambystoma opacum</i>	C, S	C		
Wetlands	Ephemeral				Amphibian	<u>Northern Leopard Frog</u>	<i>Rana pipiens</i>	N, E	C		SC
Wetlands	Ephemeral				Amphibian	Southern Leopard Frog	<i>Rana utricularia</i>	S, C	C		
Wetlands	Ephemeral				Amphibian	Spotted Salamander	<i>Ambystoma maculatum</i>	I	C		
Wetlands	Ephemeral				Amphibian	Spring Peeper	<i>Pseudacris crucifer</i>	I	C		
Wetlands	Ephemeral				Amphibian	Tiger Salamander	<i>Ambystoma tigrinum</i>	I	C		

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Wetlands	Ephemeral				Amphibian	<u>Blue-Spotted Salamander</u>	<i>Ambystoma laterale</i>	N	O		SC
Wetlands	Ephemeral				Amphibian	<u>Crawfish Frog</u>	<i>Rana areolata</i>	W	O		ST
Wetlands	Ephemeral				Amphibian	Eastern Newt	<i>Notophthalmus viridescens</i>	I	O		
Wetlands	Ephemeral				Amphibian	Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	S	O		
Wetlands	Ephemeral				Amphibian	Jefferson's Salamander	<i>Ambystoma jeffersonianum</i>	SC	O		
Wetlands	Ephemeral				Amphibian	Lesser Siren	<i>Siren intermedia</i>	W	O		
Wetlands	Ephemeral				Amphibian	Wood Frog	<i>Rana sylvatica</i>	I	O		
Wetlands	Ephemeral	Forested			Mammal	<u>Bobcat</u>	<i>Lynx rufus</i>	I	R		SE
Wetlands	Ephemeral	Shrub/Scrub			Mammal	<u>Bobcat</u>	<i>Lynx rufus</i>	I	R		SE
Wetlands	Ephemeral				Amphibian	<u>Four-Toed Salamander</u>	<i>Hemidactylium scutatum</i>	N, C	R		ST
Wetlands	Ephemeral				Amphibian	<u>Plains Leopard Frog</u>	<i>Rana blairi</i>	W	R		SC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Ephemeral				Amphibian	*Mole Salamander	<i>Ambystoma talpoideum</i>				
Wetlands	Ephemeral				Amphibian	Green Treefrog	<i>Hyla cinerea</i>				
Wetlands	Ephemeral				Mammal	Raccoon	<i>Procyon lotor</i>	I	A		
Wetlands	Ephemeral <i>(no sub-level habitat included on rep. species list)</i>				Mammal	<u>Star-Nosed Mole</u>	<u>Condylura cristata</u>	NE	R		SC
Wetlands	forested				Bird	Wood Duck	<i>Aix sponsa</i>	I	C	R*	
Wetlands	forested Ephemeral	<i>Forested</i>			Bird	Great Blue Heron	<i>Ardea herodias</i>	I	C	R*	
Wetlands	forested Ephemeral	Forested			Bird	Yellow-Throated Warbler	<i>Dendroica dominica</i>	I	O	S*	
Wetlands	Herbaceous Marsh				Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		
Wetlands	Herbaceous Marsh				Amphibian	Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	I	A		
Wetlands	Herbaceous Marsh				Amphibian	Eastern Gray Treefrog	<i>Hyla versicolor</i>	I	A		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Herbaceous Marsh				Amphibian	Western Chorus Frog	<i>Pseudacris triseriata</i>	I	A		
Wetlands	Herbaceous Marsh				Amphibian	American Toad	<i>Bufo americanus</i>	N, C, SE	C		
Wetlands	Herbaceous Marsh				Amphibian	Cricket Frog	<i>Acris crepitans</i>	I	C		
Wetlands	Herbaceous Marsh				Amphibian	Fowler's Toad	<i>Bufo fowleri</i>	I	C		
Wetlands	Herbaceous Marsh				Amphibian	Green Frog	<i>Rana clamitans</i>	I	C		
Wetlands	Herbaceous Marsh				Amphibian	Southern Leopard Frog	<i>Rana utricularia</i>	S, C	C		
Wetlands	Herbaceous Marsh				Amphibian	Spring Peeper	<i>Pseudacris crucifer</i>	I	C		
Wetlands	Herbaceous Marsh				Amphibian	<u>Northern Leopard Frog</u>	<i>Rana pipiens</i>	N, E	C		F
Wetlands	Herbaceous Marsh				Amphibian	<u>Crawfish Frog</u>	<i>Rana areolata</i>	W	O		ST
Wetlands	Herbaceous Marsh				Amphibian	Eastern Newt	<i>Notophthalmus viridescens</i>	I	O		
Wetlands	Herbaceous Marsh				Amphibian	Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	S	O		
Wetlands	Herbaceous Marsh				Amphibian	Lesser Siren	<i>Siren intermedia</i>	W	O		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Herbaceous Marsh				Amphibian	Wood Frog	<i>Rana sylvatica</i>	I	O		
Wetlands	Herbaceous Marsh				Amphibian	<u>Plains Leopard Frog</u>	<i>Rana blairi</i>	W	R		SC
Wetlands	Herbaceous Marsh				Amphibian	*Mole Salamander	<i>Ambystoma talpoideum</i>				
Wetlands	Herbaceous Marsh				Amphibian	Green Treefrog	<i>Hyla cinerea</i>				
<i>Wetlands</i>	<i>Herbaceous Marsh</i>				<i>Bird</i>	<i>Common Yellowthroat</i>	<i>Geothlypis trichas</i>	<i>I</i>	<i>C</i>	<i>S*</i>	
Wetlands	Herbaceous Marsh	native			Mammal	Southeastern Shrew	<i>Sorex longirostris</i>	SC	O		
Wetlands	Herbaceous Marsh <i>(no sub-level habitat included on rep. species list)</i>				Mammal	Muskrat	<i>Ondatra zibethicus</i>	I	A		
Wetlands	Herbaceous Marsh				Mammal	Mink	<i>Mustela vison</i>	I	O		
Wetlands	Herbaceous Marsh				Mammal	<u>River Otter</u>	<u><i>Lutra canadensis</i></u>	I	R		SC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Herbaceous Marsh				Mammal	<u>Star-Nosed Mole</u>	<i>Condylura cristata</i>	NE	R		SC
Wetlands	Herbaceous Marsh				Reptile	Banded Water Snake	<i>Nerodia sipedon</i>	I	A		
Wetlands	Herbaceous Marsh				Reptile	<u>Blanding's Turtle</u>	<i>Emydoidea blandingii</i>	N	O		SC
Wetlands	Herbaceous Marsh				Reptile	Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	I	O		
Wetlands	Herbaceous Marsh				Reptile	<u>Copperbelly Water Snake</u>	<i>Nerodia erythrogaster</i>	SW, NE, SC	O		ST, FC
Wetlands	Herbaceous Marsh				Reptile	Plains Garter Snake	<i>Thamnophis radix</i>	NW	O		
Wetlands	Herbaceous Marsh				Reptile	<u>Spotted Turtle</u>	<i>Clemmys guttata</i>	N	O		ST
Wetlands	Herbaceous Marsh				Reptile	<u>Western Ribbon Snake</u>	<i>Thamnophis proximus</i>	NW, SW	O		SC
Wetlands	Herbaceous Marsh				Reptile	<u>Butler's Garter Snake</u>	<i>Thamnophis butleri</i>	NE, C	R		ST
Wetlands	Herbaceous Marsh				Reptile	<u>Cottonmouth</u>	<i>Agkistrodon piscivorus</i>	S	R		ST
Wetlands	Herbaceous Marsh				Reptile	<u>Eastern Massasauga</u>	<i>Sistrurus catenatus</i>	N	R		ST, FC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Mudflats <i>Other</i>	<i>Mudflats</i>			Bird	Killdeer	<i>Charadrius vociferus</i>	I	C	R*	
Wetlands	Mudflats				Bird	American Golden-Plover	<i>Pluvialis dominica</i>	I	O	M	
Wetlands	Mudflats				Bird	Black-Bellied Plover	<i>Pluvialis squatarola</i>	I	O	M	
Wetlands	Mudflats				Bird	Dunlin	<i>Calidris alpina</i>	I	O	M	
Wetlands	Mudflats				Bird	Greater Yellowlegs	<i>Tringa melanoleuca</i>	I	O	M	
Wetlands	Mudflats				Bird	Lesser Yellowlegs	<i>Tringa flavipes</i>	I	O	M	
Wetlands	Mudflats				Bird	Long-Billed Dowitcher	<i>Limnodromus scolopaceus</i>	I	O	M	
Wetlands	Mudflats				Bird	Pectoral Sandpiper	<i>Calidris melanotos</i>	I	O	M	
Wetlands	Mudflats				Bird	Semipalmated Plover	<i>Charadrius semipalmatus</i>	I	O	M	
Wetlands	Mudflats				Bird	Semipalmated Sandpiper	<i>Calidris pusilla</i>	I	O	M	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Mudflats				Bird	Short-Billed Dowitcher	<i>Limnodromus griseus</i>	I	O	M	
Wetlands	Mudflats				Bird	Solitary Sandpiper	<i>Tringa solitaria</i>	I	O	M	
Wetlands	Mudflats				Bird	Spotted Sandpiper	<i>Actitis macularia</i>	I	O	S*	
Wetlands	Mudflats				Bird	Western Sandpiper	<i>Calidris mauri</i>	I	O	M	
Wetlands	Mudflats				Bird	Wilson's Snipe	<i>Gallinago delicata</i>	I	O	R*	
Wetlands	Mudflats Other	<i>Mudflats</i>			Bird	Least Sandpiper	<i>Calidris minutilla</i>	I	O	M	
Wetlands	Mudflats				Bird	American Avocet	<i>Recurvirostra americana</i>	I	R	M(*)	
Wetlands	Mudflats				Bird	Baird's Sandpiper	<i>Calidris bairdii</i>	I	R	M	
Wetlands	Mudflats				Bird	Black-Necked Stilt	<i>Himantopus mexicanus</i>	I	R	A	
Wetlands	Mudflats				Bird	Buff-Breasted Sandpiper	<i>Tryngites subruficollis</i>	I	R	M	
Wetlands	Mudflats				Bird	Curlew Sandpiper	<i>Calidris ferruginea</i>	I	R	A	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Mudflats				Bird	Purple Sandpiper	<i>Calidris maritima</i>	I	R	W	
Wetlands	Mudflats				Bird	Ruff	<i>Philomachus pugnax</i>	I	R	A	
Wetlands	Mudflats				Bird	Sharp-Tailed Sandpiper	<i>Calidris acuminata</i>	I	R	A	
Wetlands	Mudflats				Bird	Stilt Sandpiper	<i>Calidris himantopus</i>	I	R	M	
Wetlands	Mudflats				Bird	White-Rumped Sandpiper	<i>Calidris fuscicollis</i>	I	R	M	
Wetlands	Mudflats				Bird	Willet	<i>Catoptrophorus semipalmatus</i>	I	R	M	
Wetlands	Mudflats				Bird	Wilson's Plover	<i>Charadrius wilsonia</i>	I	R	A	
<i>Wetlands</i>	<i>Other</i>	<i>Potholes</i>			<i>Bird</i>	<i>Mallard</i>	<i>Anas platyrhynchos</i>	<i>I</i>	<i>C</i>	<i>R*</i>	
<i>Wetlands</i>	<i>Permanent</i>	<i>Emergent</i>			<i>Bird</i>	<i>Common Yellowthroat</i>	<i>Geothlypis trichas</i>	<i>I</i>	<i>C</i>	<i>S*</i>	
<i>Wetlands</i>	<i>Permanent</i>	<i>Emergent</i>			<i>Bird</i>	<i>Mallard</i>	<i>Anas platyrhynchos</i>	<i>I</i>	<i>C</i>	<i>R*</i>	

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Permanent	Emergent			Bird	Sora	<i>Porzana carolina</i>	I	O	S*	
Wetlands	Permanent	Forested			Bird	Yellow-Throated Warbler	<i>Dendroica dominica</i>	I	O	S*	
Wetlands	Permanent	Forested			Mammal	Bobcat	<i>Lynx rufus</i>	I	R		SE
Wetlands	Permanent	Shrub/Scrub			Bird	Green Heron	<i>Butorides virescens</i>	I	C	S*	
Wetlands	Permanent	Shrub/Scrub			Bird	Willow Flycatcher	<i>Empidonax traillii</i>	I	O	S*	
Wetlands	Permanent	Shrub/Scrub			Mammal	Bobcat	<i>Lynx rufus</i>	I	R		SE
Wetlands	Permanent				Amphibian	Bullfrog	<i>Rana catesbeiana</i>	I	A		
Wetlands	Permanent				Amphibian	Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	I	A		
Wetlands	Permanent				Amphibian	Eastern Gray Treefrog	<i>Hyla versicolor</i>	I	A		
Wetlands	Permanent				Amphibian	Western Chorus Frog	<i>Pseudacris triseriata</i>	I	A		
Wetlands	Permanent				Amphibian	American Toad	<i>Bufo americanus</i>	N, C,SE	C		
Wetlands	Permanent				Amphibian	Cricket Frog	<i>Acris crepitans</i>	I	C		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Permanent				Amphibian	Fowler's Toad	<i>Bufo fowleri</i>	I	C		
Wetlands	Permanent				Amphibian	Green Frog	<i>Rana clamitans</i>	I	C		
Wetlands	Permanent				Amphibian	<u>Northern Leopard Frog</u>	<i>Rana pipiens</i>	N, E	C		SC
Wetlands	Permanent				Amphibian	Southern Leopard Frog	<i>Rana utricularia</i>	S, C	C		
Wetlands	Permanent				Amphibian	Spring Peeper	<i>Pseudacris crucifer</i>	I	C		
Wetlands	Permanent				Amphibian	Eastern Newt	<i>Notophthalmus viridescens</i>	I	O		
Wetlands	Permanent				Amphibian	Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	S	O		
Wetlands	Permanent				Amphibian	Lesser Siren	<i>Siren intermedia</i>	W	O		
Wetlands	Permanent				Amphibian	Wood Frog	<i>Rana sylvatica</i>	I	O		
Wetlands	Permanent				Amphibian	<u>Four-Toed Salamander</u>	<i>Hemidactylum scutatum</i>	N, C	R		ST
Wetlands	Permanent				Amphibian	<u>Plains Leopard Frog</u>	<i>Rana blairi</i>	W	R		SC

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type</u> <u>Level I</u>	<u>Habitat Type</u> <u>Level II</u>	<u>Habitat Type</u> <u>Level III</u>	<u>Habitat Type</u> <u>Level IV</u>	<u>Habitat Type</u> <u>Level V</u>	<u>Species</u> <u>Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative</u> <u>Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Permanent				Amphibian	*Mole Salamander	<i>Ambystoma talpoideum</i>				
Wetlands	Permanent				Amphibian	Green Treefrog	<i>Hyla cinerea</i>				
Wetlands	Permanent				Mammal	Muskrat	<i>Ondatra zibethicus</i>	I	A		
Wetlands	Permanent				Mammal	Mink	<i>Mustela vison</i>	I	O		
Wetlands	Permanent				Mammal	<u>River Otter</u>	<i>Lutra canadensis</i>	I	R		SC
Wetlands	Permanent				Mammal	<u>Star-Nosed Mole</u>	<i>Condylura cristata</i>	NE	R		SC
Wetlands	Permanent				Mammal	<u>Swamp Rabbit</u>	<i>Sylvilagus aquaticus</i>	SW	R		SE
Wetlands	Permanent				Reptile	Banded Water Snake	<i>Nerodia sipedon</i>	I	A		
Wetlands	Permanent				Reptile	Painted Turtle	<i>Chrysemys picta</i>	I	A		
Wetlands	Permanent				Reptile	<u>Blanding's Turtle</u>	<i>Emydoidea blandingii</i>	N	O		SC
Wetlands	Permanent				Reptile	Diamondback Water Snake	<i>Nerodia rhombifer</i>	SW	O		

Appendix C: Guilds by Habitat and Sub-habitat

<u>Habitat Type Level I</u>	<u>Habitat Type Level II</u>	<u>Habitat Type Level III</u>	<u>Habitat Type Level IV</u>	<u>Habitat Type Level V</u>	<u>Species Group</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Range</u>	<u>Relative Abundance</u>	<u>Season</u>	<u>Status</u>
Wetlands	Permanent				Reptile	<u>Copperbelly Water Snake</u>	<i>Nerodia erythrogaster</i>	SW, NE, SC	O		ST, FC
Wetlands	Permanent				Reptile	<u>Cottonmouth</u>	<i>Agkistrodon piscivorus</i>	S	R		ST
Wetlands	Permanent				Reptile	<u>Eastern Massasauga</u>	<i>Sistrurus catenatus</i>	N	R		ST, FC
<i>Wetlands</i>	<i>Permanent</i>				<i>Reptile</i>	<i><u>Copperbelly Water Snake</u></i>	<i><u>Nerodia erythrogaster</u></i>	<i>SW, NE, SC</i>	<i>O</i>		<i>ST, FC</i>
Wetlands	Shrub/Scrub				Bird	Alder Flycatcher	<i>Empidonax alnorum</i>	N	R	S*	
Wetlands	Shrub/Scrub				Bird	<u>Golden-Winged Warbler</u>	<i>Verminvora chrysoptera</i>	I	R	S*	SE
Wetlands	Shrub/Scrub Ephemeral	<i>Shrub/Scrub</i>			Bird	Green Heron	<i>Butorides virescens</i>	I	C	S*	
Wetlands	Shrub/Scrub Ephemeral	<i>Shrub/Scrub</i>			Bird	Willow Flycatcher	<i>Empidonax traillii</i>	I	O	S*	



Welcome to the INCWS Questionnaire

Habitats and Species

Managing wildlife resources in a state that has experienced intense land use from agriculture, and more recently urban development, is a real challenge. Invasive species are radically changing the vast inland seas of the Great Lakes, including Lake Michigan and its tributaries. We're doing a lot of cutting edge work to keep our options open for the future, both ecologically and economically.

We are restoring a selection of species that were part of our natural and cultural history, including river otters, bald eagles, and osprey. These species uniquely lend themselves to restoration techniques because their populations had declined, but adequate habitat still existed in some parts of Indiana. Once the habitat is gone, restoration of associated wildlife species is no longer possible.

Restoring many of the other 550 species of nongame and endangered animals one at a time would be a daunting task. Therefore, we've chosen to manage for the habitat that they need to thrive. By using this strategy, we can be sure that all species will continue to have a place in the Indiana landscape. This is especially crucial for species that are so rare or unusual that we do not know much about their life history or survival requirements.

Habitat Identification

Over 100 specific habitat types have been identified in Indiana, and Indiana State University (ISU) has been contracted to research and compile data on these habitats using GIS databases. Specifically, ISU will be compiling quantitative or index information on the total acreage, geographic distribution, patch size, native vs. non-native, vegetation diversity and relative abundance, ownership, and relative condition of the habitats. Additionally, ISU is compiling historical trends in wildlife species occurrences for each of the habitat types in 1800, 1900, and 2000.

Wildlife Guilds and Representative Species

Using the "Indiana Academy of Science Revised Checklist of the Vertebrates of Indiana" as a guide, technical experts listed all vertebrate wildlife species with their associated habitats, forming habitat guilds. Wildlife professionals then selected wildlife species to serve as representatives of each guild. The selected species were identified, in part, to "paint a reasonable mental picture" of the associated habitat type to diverse user groups. One to three representative species were selected for each habitat. Through this process, a total of 210 representative species have been identified.

Items 1 through 5

The survey will begin with a request for basic information of name, organization and email. Then you will be asked to select the major taxonomic group of your expertise (e.g. Amphibians, Birds, Fish, Mammals, Mussels or Reptiles). Next you will select both a species and a habitat (to view these lists visit <http://www.djcase.com/incws/habitats-species.htm>). It is pertaining to this specific species/habitat that you complete the following questions:

Specialized reproductive behavior or low reproductive rates	<input type="checkbox"/>					
Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)	<input type="checkbox"/>					
Genetic pollution (hybridization)	<input type="checkbox"/>					
Other (please specify below)	<input type="checkbox"/>					

8. Other threats to the _____ SPECIES in the _____ HABITAT in Indiana.

9. Please briefly describe the top two threats to the _____ SPECIES in the _____ HABITAT in Indiana.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

11. Other threats to the _____ HABITAT as it pertains to the _____ SPECIES in Indiana.

12. Please briefly describe the top two threats to the _____ HABITAT as it pertains to the _____ SPECIES in Indiana.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Current Species Monitoring Efforts in Indiana

13. What current monitoring efforts by state agencies are you aware of for the _____ SPECIES in the _____ HABITAT in Indiana.

	Yes, these efforts occur	Not aware of these efforts occurring
Statewide year-round monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>

14. What current monitoring efforts by other organizations are you aware of for the _____ SPECIES in the _____ HABITAT in Indiana.

	Yes, these efforts occur	Not aware of these efforts occurring
Statewide year-round monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>

15. How crucial are these monitoring efforts by state agencies for the conservation of _____ SPECIES in the _____ HABITAT in Indiana.

	Very Crucial	Somewhat Crucial	Slightly Crucial	Not Crucial	Unknown
Statewide year-round monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. How crucial are these monitoring efforts by other organizations for the conservation of _____ SPECIES in the _____ HABITAT in Indiana.

	Very Crucial	Somewhat Crucial	Slightly Crucial	Not Crucial	Unknown
Statewide year-round monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please list where the following efforts occur in Indiana:

17. Regional or local state agency monitoring for _____ SPECIES in _____ HABITAT in Indiana.

18. Regional or local monitoring by other organizations for _____ SPECIES in
_____ HABITAT in Indiana.

19. Please list organizations that are monitoring the _____ SPECIES in
_____ HABITAT in Indiana.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

21. Other monitoring techniques for the _____ SPECIES in the _____ HABITAT in Indiana.

22. What one or two monitoring techniques would you recommend for effective conservation of _____ SPECIES in the _____ HABITAT in Indiana?

Suggest both intensive and less intensive sampling methods, especially any methods that are nationally or regionally accepted or funded. Please describe and explain why. Provide a reference or resource for further information.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Current Habitat Inventory and Assessment Efforts

23. What current inventory and assessment efforts or activities by state agencies are you aware of for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

	Yes, these efforts occur	No effort that I'm aware of
Statewide annual inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>

24. What current inventory and assessment efforts or activities by state agencies are you aware of for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

	Yes, these efforts occur	No effort that I'm aware of
Statewide annual inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>

25. How crucial are these efforts by state agencies for the conservation of the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

	These efforts are very crucial for this HABITAT	These efforts are somewhat crucial for this HABITAT	These efforts are slightly crucial for this HABITAT	These efforts are not crucial for this HABITAT	Unknown
Statewide annual inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**26. How crucial are these efforts by other organizations for the conservation _____
HABITAT as it pertains to the _____ SPECIES in Indiana?**

	These efforts are very crucial for this HABITAT	These efforts are somewhat crucial for this HABITAT	These efforts are slightly crucial for this HABITAT	These efforts are not crucial for this HABITAT	Unknown
Statewide annual inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Statewide once a year inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local year-round inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional or local once a year inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please list where the following efforts occur in Indiana:

27. Regional or local state agency inventory and assessment for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

28. Regional or local inventory and assessment by other organizations for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

29. Please list organizations that are monitoring the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Current Habitat Inventory & Assessment Techniques

30. What are the current inventory and/or assessment techniques for the _____
HABITAT as it pertains to the _____ SPECIES in Indiana?

	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown
GIS mapping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aerial photography and analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Systematic sampling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Property tax estimates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State revenue data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regulatory information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participation in landuse programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Modeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Voluntary landowner reporting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

31. Other inventory and assessment techniques for the _____ HABITAT as it pertains to
the _____ SPECIES in Indiana.

32. What one or two inventory and assessment techniques would you recommend for effective conservation of the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

Suggest both intensive and less intensive sampling methods, especially any methods that are nationally or regionally accepted or funded. Please describe and explain why. Provide a reference or resource for further information.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Current Body of Science for Species in Indiana

33. What is the current body of science for the _____ SPECIES in the _____ HABITAT in Indiana?

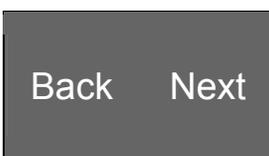
- Complete, up to date and extensive
- Adequate
- Inadequate
- Nonexistent
- Other (please explain below)

34. Please provide a citation (title, author, date, publisher) that would give the best overview of the _____ SPECIES in the _____ HABITAT in Indiana, if available. These resources may be used if further detail is needed.

Title	<input type="text"/>
Author	<input type="text"/>
Date	<input type="text"/>
Publisher	<input type="text"/>

35. If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of the _____ SPECIES in the _____ HABITAT in Indiana, if available. These resources may be used if further detail is needed.

Title	<input type="text"/>
Author	<input type="text"/>
Date	<input type="text"/>
Publisher	<input type="text"/>



Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Current Body of Science for Habitat in Indiana

36. What is the current body of science for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

- Complete, up to date and extensive
- Adequate
- Inadequate
- Nonexistent
- Other (please explain below)

37. Please provide a citation (title, author, date, publisher) that would give the best overview of the _____ HABITAT as it pertains to the _____ SPECIES in Indiana, if available. These resources may be used if further detail is needed.

Title

Author

Date

Publisher

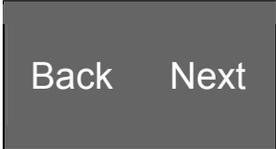
38. If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of the _____ HABITAT as it pertains to the _____ SPECIES in Indiana, if available. These resources may be used if further detail is needed.

Title

Author

Date

Publisher



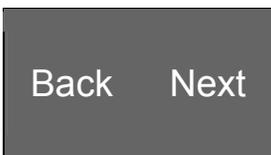
Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Species Research Needs in Indiana

39. What are the research needs for the _____ SPECIES in the _____ HABITAT in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not Needed	Unknown
Life cycle	<input type="checkbox"/>					
Distribution and abundance	<input type="checkbox"/>					
Limiting factors (food, shelter, water, breeding sites)	<input type="checkbox"/>					
Threats (predators/competition, contamination)	<input type="checkbox"/>					
Relationship/dependence on specific habitats	<input type="checkbox"/>					
Population health (genetic and physical)	<input type="checkbox"/>					
Other (please specify below)	<input type="checkbox"/>					

40. Other research needs for the _____ SPECIES in the _____ HABITAT in Indiana?



Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Habitat Research Needs in Indiana

41. What are the research needs for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana.

	Urgently needed	Greatly needed	Needed	Slightly needed	Not Needed	Unknown
Successional changes	<input type="checkbox"/>					
Distribution and abundance (fragmentation)	<input type="checkbox"/>					
Threats (land use change/competition, contamination/global warming)	<input type="checkbox"/>					
Relationship/dependence on specific site conditions	<input type="checkbox"/>					
Growth and development of individual components of the habitat	<input type="checkbox"/>					
Other (please specify below)	<input type="checkbox"/>					

42. Other research needs for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Current Species Conservation Practices in Indiana

43. How well do the following conservation efforts address the threats to the _____
SPECIES in the _____ HABITAT in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown
Habitat protection	<input type="checkbox"/>				
Population management (hunting, trapping)	<input type="checkbox"/>				
Population enhancement (captive breeding and release)	<input type="checkbox"/>				
Reintroduction (restoration)	<input type="checkbox"/>				
Food plots	<input type="checkbox"/>				
Threats reduction	<input type="checkbox"/>				
Native predator control	<input type="checkbox"/>				
Exotic/invasive species control	<input type="checkbox"/>				
Regulation of collecting	<input type="checkbox"/>				
Disease/parasite management	<input type="checkbox"/>				
Translocation to new geographic range	<input type="checkbox"/>				
Protection of migration routes	<input type="checkbox"/>				
Limiting contact with pollutants/contaminants	<input type="checkbox"/>				
Public education to reduce human disturbance	<input type="checkbox"/>				
Culling/selective removal	<input type="checkbox"/>				
Stocking	<input type="checkbox"/>				
Other (please specify below)	<input type="checkbox"/>				

44. Other current conservation practices for the _____ SPECIES in the _____ HABITAT in Indiana?

45. What one or two specific practices would you recommend for more effective conservation of the _____ SPECIES in the _____ HABITAT in Indiana?

Suggest both intensive and less intensive practices, especially any methods that are nationally or regionally accepted or funded. Please describe and explain why. Provide a reference or resource for further information.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

Current Habitat Conservation Practices in Indiana

46. How well do the following conservation efforts address the threats to the _____
HABITAT as it pertains to the _____ SPECIES in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown
Habitat protection through regulation	<input type="checkbox"/>				
Habitat protection on public lands	<input type="checkbox"/>				
Habitat protection incentives (financial)	<input type="checkbox"/>				
Habitat restoration through regulation	<input type="checkbox"/>				
Habitat restoration on public lands	<input type="checkbox"/>				
Habitat restoration incentives (financial)	<input type="checkbox"/>				
Artificial habitat creation (artificial reefs, nesting platforms)	<input type="checkbox"/>				
Selective use of functionally equivalent exotic species in place of extirpated natives	<input type="checkbox"/>				
Succession control (fire, mowing)	<input type="checkbox"/>				
Corridor development/protection	<input type="checkbox"/>				
Managing water regimes	<input type="checkbox"/>				
Pollution reduction	<input type="checkbox"/>				
Protection of adjacent buffer zone	<input type="checkbox"/>				
Restrict public access and disturbance	<input type="checkbox"/>				
Land use planning	<input type="checkbox"/>				
Technical assistance	<input type="checkbox"/>				
Cooperative land management agreements (conservation easements)	<input type="checkbox"/>				
Other (please specify below)					

47. Other current conservation practices for the _____ HABITAT as it pertains to the _____ SPECIES in Indiana.

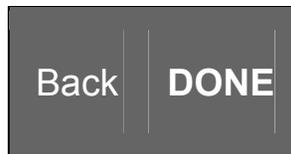
48. What one or two specific practices would you recommend for more effective conservation of the _____ HABITAT as it pertains to the _____ SPECIES in Indiana?

Suggest both intensive and less intensive practices, especially any methods that are nationally or regionally accepted or funded. Please describe and explain why. Provide a reference or resource for further information.

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Note: Until the Next button is clicked, your answers to this page are not saved and will be lost if you click the Back button.

49. Do you have any additional comments or information on the species that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?



Survey completed

Appendix E-1: Agriculture

7. Please also rank these threats to the Wildlife in Agricultural Habitats in Indiana.

	Critical threat	Serious threat	Somewhat of a threat	Slight threat	No threat	Unknown	Response Total
Habitat loss (breeding range)	33% (1)	33% (1)	33% (1)	0% (0)	0% (0)	0% (0)	3
Habitat loss (feeding/foraging areas)	0% (0)	0% (0)	50% (1)	50% (1)	0% (0)	0% (0)	2
Small native range (high endemism)	0% (0)	0% (0)	33% (1)	0% (0)	67% (2)	0% (0)	3
Near limits of natural geographic range	0% (0)	0% (0)	33% (1)	0% (0)	67% (2)	0% (0)	3
Large home range requirements	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Viable reproductive population size or availability	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Specialized reproductive behavior or low reproductive rates	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)	0% (0)	0% (0)	0% (0)	0% (0)	67% (2)	33% (1)	3
Genetic pollution (hybridization)	0% (0)	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0
Other (please specify below)	100% (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	1
							Total Respondents
							27

8. Other threats to the Wildlife in Agricultural Habitats in Indiana.

sporadic occurrence of early and mid successional fields is the greatest deterrent to higher abundance

Total Respondents **1**

(skipped this question) **1**

9. Please briefly describe the top two threats to the Wildlife in Agricultural Habitats in Indiana identified above.

Loss of ephemeral & semipermanent wetlands

lack and distance apart of available patches of habitat
these habitats are ephemeral

Total Respondents **2**

Appendix E-1: Agriculture

10. Please rank the following threats to the HABITAT of the Wildlife in Agricultural Habitats in Indiana.

	Critical threat	Serious threat	Somewhat of a threat	Slight threat	No threat	Unknown	Response Total
Commercial or residential development (sprawl)	0% (0)	33% (1)	33% (1)	33% (1)	0% (0)	0% (0)	3
Counterproductive financial incentives or regulations	0% (0)	0% (0)	0% (0)	33% (1)	33% (1)	33% (1)	3
Invasive/non-native species	0% (0)	0% (0)	33% (1)	0% (0)	33% (1)	33% (1)	3
Nonpoint source pollution (sedimentation and nutrients)	0% (0)	0% (0)	0% (0)	33% (1)	0% (0)	67% (2)	3
Habitat fragmentation	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	0% (0)	3
Successional change	0% (0)	33% (1)	0% (0)	0% (0)	33% (1)	33% (1)	3
Diseases (of plants that create habitat)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)	3
Habitat degradation	0% (0)	67% (2)	0% (0)	33% (1)	0% (0)	0% (0)	3
Climate change	0% (0)	0% (0)	0% (0)	0% (0)	33% (1)	67% (2)	3
Stream channelization	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Impoundment of water/flow regulation	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Agricultural/forestry practices	0% (0)	0% (0)	33% (1)	33% (1)	33% (1)	0% (0)	3
Residual contamination (persistent toxins)	0% (0)	0% (0)	0% (0)	33% (1)	0% (0)	67% (2)	3
Point source pollution (continuing)	0% (0)	0% (0)	0% (0)	33% (1)	33% (1)	33% (1)	3
Mining/acidification	0% (0)	0% (0)	0% (0)	67% (2)	0% (0)	33% (1)	3
Drainage practices (stormwater runoff)	0% (0)	0% (0)	33% (1)	0% (0)	33% (1)	33% (1)	3
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0
						Total Respondents	49

11. Other HABITAT threats to the Wildlife in Agricultural Habitats in Indiana.

No responses were entered for this question.

Total Respondents **0**

(skipped this question) 1

Appendix E-1: Agriculture

12. Please briefly describe the top two HABITAT threats to the Wildlife in Agricultural Habitats in Indiana identified above.

Habitat loss & degradation

farming practices and succession
suitable habitat is ephemeral and spread out

Ephemeral Wetland loss and fragmentation

Total Respondents 3

13. What current monitoring efforts by state agencies are you aware of for the Wildlife in Agricultural Habitats in Indiana?

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by state agencies	0% (0)	100% (3)	3
Statewide once a year monitoring conducted by state agencies	33% (1)	67% (2)	3
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	100% (3)	3
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	100% (3)	3
Regional or local year-round monitoring conducted by state agencies	0% (0)	100% (3)	3
Regional or local once a year monitoring conducted by state agencies	0% (0)	100% (3)	3
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	100% (3)	3
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	100% (3)	3
		Total Respondents	24

Appendix E-1: Agriculture

14. What current monitoring efforts by other organizations are you aware of for the Wildlife in Agricultural Habitats in Indiana?

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by other organizations	0% (0)	100% (3)	3
Statewide once a year monitoring conducted by other organizations	0% (0)	100% (3)	3
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (3)	3
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (3)	3
Regional or local year-round monitoring conducted by other organizations	0% (0)	100% (3)	3
Regional or local once a year monitoring conducted by other organizations	67% (2)	33% (1)	3
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	67% (2)	33% (1)	3
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	100% (3)	0% (0)	3
		Total Respondents	24

Appendix E-1: Agriculture

16. How crucial are these monitoring efforts by other organizations for the conservation of the Wildlife in Agricultural Habitats in Indiana?

	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
Statewide year-round monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	2
Statewide once a year monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	2
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	2
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	2
Regional or local year-round monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	2
Regional or local once a year monitoring conducted by other organizations	33% (1)	33% (1)	0% (0)	33% (1)	0% (0)	3
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	33% (1)	33% (1)	33% (1)	0% (0)	3
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	100% (3)	0% (0)	0% (0)	3
						Total Respondents
						19

17. Regional or local state agency monitoring for the Wildlife in Agricultural Habitats in Indiana.

IDNR has a NAAMP frog call program

Total Respondents **1**

(skipped this question) 1

18. Regional or local monitoring by other organizations for the Wildlife in Agricultural Habitats in Indiana.

Robert Brodman, Saint Joseph's College

monitored twice, 1975 by Ford, and 1998 by Leibacher and Whitaker

1. Chicago Wilderness

Robert Brodman, Saint Joseph's College

Total Respondents **3**

Appendix E-1: Agriculture

19. Please list organizations that are monitoring the Wildlife in Agricultural Habitats in Indiana.

ISU

Chicago Wilderness
Robert Brodman, Saint Joseph's College

Total Respondents **2**

(skipped this question) **1**

20. What are the current monitoring techniques for the Wildlife in Agricultural Habitats in Indiana?

	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
Radio telemetry and tracking	0% (0)	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	3
Modeling	0% (0)	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Coverboard routes	0% (0)	33% (1)	0% (0)	67% (2)	0% (0)	0% (0)	3
Spot mapping	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Driving a survey route	33% (1)	0% (0)	0% (0)	67% (2)	0% (0)	0% (0)	3
Reporting from harvest, depredation, or unintentional take (road kill, bycatch)	0% (0)	0% (0)	0% (0)	67% (2)	0% (0)	33% (1)	3
Mark and recapture	0% (0)	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	3
Professional survey/census	67% (2)	0% (0)	33% (1)	0% (0)	0% (0)	0% (0)	3
Volunteer survey/census	33% (1)	0% (0)	67% (2)	0% (0)	0% (0)	0% (0)	3
Trapping (by any technique)	67% (2)	0% (0)	0% (0)	33% (1)	0% (0)	0% (0)	3
Representative sites	67% (2)	0% (0)	0% (0)	33% (1)	0% (0)	0% (0)	3
Probabilistic sites	67% (2)	0% (0)	0% (0)	33% (1)	0% (0)	0% (0)	3
Other (please specify below)	0% (0)	0% (0)	100% (1)	0% (0)	0% (0)	0% (0)	1
							Total Respondents 36

Appendix E-1: Agriculture

21. Other monitoring techniques for the Wildlife in Agricultural Habitats in Indiana.

No responses were entered for this question.

Total Respondents 0

(skipped this question) 1

22. What one or two monitoring techniques would you recommend for effective conservation of the Wildlife in Agricultural Habitats in Indiana?

Aquatic surveys for eggs & larva, trapping during breeding migration

trap periphery of known range in Indiana

Frog call surveys and tadpole surveys

Total Respondents 3

23. What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for the Wildlife in Agricultural Habitats in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide annual inventory and assessment conducted by state agencies	33% (1)	67% (2)	3
Statewide once a year inventory and assessment conducted by state agencies	33% (1)	67% (2)	3
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	33% (1)	67% (2)	3
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	33% (1)	67% (2)	3
Regional or local year-round inventory and assessment conducted by state agencies	33% (1)	67% (2)	3
Regional or local once a year inventory and assessment conducted by state agencies	33% (1)	67% (2)	3
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	33% (1)	67% (2)	3
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	67% (2)	33% (1)	3
	Total Respondents		24

Appendix E-1: Agriculture

24. What current HABITAT inventory and assessment efforts or activities by other organizations are you aware of for the Wildlife in Agricultural Habitats in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide year-round inventory and assessment conducted by other organizations	0% (0)	100% (3)	3
Statewide once a year inventory and assessment conducted by other organizations	0% (0)	100% (3)	3
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	0% (0)	100% (2)	2
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	0% (0)	100% (2)	2
Regional or local year-round inventory and assessment conducted by other organizations	33% (1)	67% (2)	3
Regional or local once a year inventory and assessment conducted by other organizations	33% (1)	67% (2)	3
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	67% (2)	33% (1)	3
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	100% (3)	0% (0)	3
		Total Respondents	22

Appendix E-1: Agriculture

- 27.** Regional or local state agency HABITAT inventory and assessment for the Wildlife in Agricultural Habitats in Indiana.

Frog call surveys include rural and agricultural areas throughout the state.

Total Respondents 1

- 28.** Regional or local HABITAT inventory and assessment by other organizations for the Wildlife in Agricultural Habitats in Indiana.

Brodman in NW Indiana

twice assessed; SurveyAnswerTextNull

Chicago Wilderness & Saint Joseph's College have frog call monitoring programs in NW IN.

Total Respondents 3

- 29.** Please list organizations that are monitoring this HABITAT for the Wildlife in Agricultural Habitats in Indiana.

ISU; 1975 by Ford, 1998 by Leibacher and Whitaker; I have already done this page twice, and had to do one other page twice when it jumped back when I hit "next"

ISU twice- 1995 by Ford. 1998 by Leibacher and Whitaker

Total Respondents 1

Appendix E-1: Agriculture

30. What are the current HABITAT inventory and/or assessment techniques for Wildlife in Agricultural Habitats in Indiana?

	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
GIS mapping	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)	0% (0)	2
Aerial photography and analysis	0% (0)	50% (1)	50% (1)	0% (0)	0% (0)	0% (0)	2
Systematic sampling	50% (1)	50% (1)	0% (0)	0% (0)	0% (0)	0% (0)	2
Property tax estimates	0% (0)	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)	2
State revenue data	0% (0)	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)	2
Regulatory information	0% (0)	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)	2
Participation in landuse programs	0% (0)	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)	2
Modeling	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)	0% (0)	2
Voluntary landowner reporting	0% (0)	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)	2
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0
Total Respondents							18

31. Other HABITAT inventory and assessment techniques for the Wildlife in Agricultural Habitats in Indiana.

No responses were entered for this question.

Total Respondents 0

Appendix E-1: Agriculture

32. What one or two HABITAT inventory and assessment techniques would you recommend for effective conservation of the Wildlife in Agricultural Habitats in Indiana?

systematic sampling and GIS

same as used

Frog call surveys include rural and agricultural areas throughout the state.

Total Respondents 3

33. What is the current body of science for the Wildlife in Agricultural Habitats in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		0	0%
Adequate		2	67%
Inadequate		1	33%
Nonexistent		0	0%
Other (please explain below)		0	0%
Total Respondents		3	

34. Please provide a citation (title, author, date, publisher) that would give the best overview of the Wildlife in Agricultural Habitats in Indiana, if available. This resource may be used if further detail is needed.

		Response Total	Response Percent
Title	Amphibians and reptiles from 23 counties of Indiana. Distribution of the western harvest mouse in Indiana	2	100%
Author	Robert Brodman Leibacher and Whitaker	2	100%
Date	2003 1998	2	100%
Publisher	Proceedings of the Indiana Academy of Science, 112: 43-54. Ind, Acad. Sci. 107:167-170	2	100%
Total Respondents		2	

Appendix E-1: Agriculture

35. If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of the Wildlife in Agricultural Habitats in Indiana. This resource may also be used if further detail is needed.

		Response Total	Response Percent
Title	Multivariate analyses of the influences of water chemistry and habitat parameters on the abundances of pond-breeding amphibians.	2	100%
Author	see above for more Robert Brodman et al	1	50%
Date	2003	1	50%
Publisher	Journal of Freshwater Ecology 18: 425-436.	1	50%
Total Respondents		2	

36. What is the current HABITAT body of science for the Wildlife in Agricultural Habitats in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		0	0%
Adequate		0	0%
Inadequate		2	100%
Nonexistent		0	0%
Other (please explain below)		0	0%
Total Respondents		2	

37. Please provide a citation (title, author, date, publisher) that would give the best HABITAT overview of the Wildlife in Agricultural Habitats in Indiana, if available. This resource may be used if further detail is needed.

		Response Total	Response Percent
Title		0	0%
Author		0	0%
Date		0	0%
Publisher		0	0%
Total Respondents		0	

Appendix E-1: Agriculture

38. If possible, please provide a second citation (title, author, date, publisher) that would give another good HABITAT overview of the Wildlife in Agricultural Habitats in Indiana. This resource may also be used if further detail is needed.

	Response Total	Response Percent
Title	0	0%
Author	0	0%
Date	0	0%
Publisher	0	0%
Total Respondents	0	

39. What are the research needs for the Wildlife in Agricultural Habitats in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total
Life cycle	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	0% (0)	3
Distribution and abundance	0% (0)	33% (1)	33% (1)	33% (1)	0% (0)	0% (0)	3
Limiting factors (food, shelter, water, breeding sites)	67% (2)	0% (0)	0% (0)	33% (1)	0% (0)	0% (0)	3
Threats (predators/competition, contamination)	67% (2)	33% (1)	0% (0)	0% (0)	0% (0)	0% (0)	2
Relationship/dependence on specific habitats	67% (2)	0% (0)	0% (0)	33% (1)	0% (0)	0% (0)	3
Population health (genetic and physical)	33% (1)	67% (2)	0% (0)	0% (0)	0% (0)	0% (0)	3
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0
Total Respondents							17

40. Other research needs for the Wildlife in Agricultural Habitats in Indiana.

No responses were entered for this question.

Total Respondents 0

Appendix E-1: Agriculture

43. How well do the following conservation efforts address the threats to the Wildlife in Agricultural Habitats in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection (use below for details)	67% (2)	0% (0)	33% (1)	0% (0)	0% (0)	3
Population management (hunting, trapping)	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Population enhancement (captive breeding and release)	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Reintroduction (restoration)	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Food plots	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Threats reduction	0% (0)	0% (0)	33% (1)	0% (0)	67% (2)	3
Native predator control	0% (0)	0% (0)	33% (1)	0% (0)	67% (2)	3
Exotic/invasive species control	0% (0)	33% (1)	33% (1)	0% (0)	33% (1)	3
Regulation of collecting	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Disease/parasite management	0% (0)	0% (0)	33% (1)	33% (1)	33% (1)	3
Translocation to new geographic range	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Protection of migration routes	0% (0)	0% (0)	33% (1)	33% (1)	33% (1)	3
Limiting contact with pollutants/contaminants	0% (0)	0% (0)	33% (1)	33% (1)	33% (1)	3
Public education to reduce human disturbance	0% (0)	0% (0)	67% (2)	0% (0)	33% (1)	3
Culling/selective removal	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Stocking	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Other (please specify below)	0% (0)	0% (0)	100% (1)	0% (0)	0% (0)	1
						Total Respondents 49

44. Other current conservation practices for the Wildlife in Agricultural Habitats in Indiana.

No responses were entered for this question.

Total Respondents 0

(skipped this question) 1

Appendix E-1: Agriculture

45. What one or two specific practices would you recommend for more effective conservation of the Wildlife in Agricultural Habitats in Indiana?

Protection of fishless breeding habitat, wetland restoration

about the only one that would be effective would be to manage succession such that proper habitat was more abundant and closer together

Protection of ephemeral wetlands and control of purple loosesrife

Total Respondents 3

46. How well do the following conservation efforts address the HABITAT threats to the Wildlife in Agricultural Habitats in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection through regulation	50% (1)	50% (1)	0% (0)	0% (0)	0% (0)	2
Habitat protection on public lands	50% (1)	50% (1)	0% (0)	0% (0)	0% (0)	2
Habitat protection incentives (financial)	0% (0)	50% (1)	0% (0)	0% (0)	50% (1)	2
Habitat restoration through regulation	0% (0)	50% (1)	0% (0)	0% (0)	50% (1)	2
Habitat restoration on public lands	50% (1)	50% (1)	0% (0)	0% (0)	0% (0)	2
Habitat restoration incentives (financial)	0% (0)	50% (1)	0% (0)	0% (0)	50% (1)	2
Artificial habitat creation (artificial reefs, nesting platforms)	0% (0)	50% (1)	0% (0)	0% (0)	50% (1)	2
Selective use of functionally equivalent exotic species in place of extirpated natives	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	2
Succession control (fire, mowing)	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Corridor development/protection	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Managing water regimes	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Pollution reduction	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Protection of adjacent buffer zone	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Restrict public access and disturbance	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Land use planning	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Technical assistance	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	2
Cooperative land management agreements (conservation easements)	0% (0)	50% (1)	0% (0)	0% (0)	50% (1)	2
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0
						Total Respondents 34

Appendix E-1: Agriculture

47. Other current HABITAT conservation practices for the Wildlife in Agricultural Habitats in Indiana.

none for this species

Total Respondents **1**

(skipped this question) 1

48. What one or two specific HABITAT practices would you recommend for more effective conservation of the Wildlife in Agricultural Habitats in Indiana?

Habitat protection & restoration

see above

Ephemeral wetland protection and restoration

Total Respondents **3**

49. Do you have any additional comments or information on the Wildlife in Agricultural Habitats that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?

1. Research on metapopulation dynamics and colonization of new breeding habitat is needed.

This species entered Indiana by range expansion from Illinois about 1969 in or near Newton County (Willow Slough) and has continued to sprad since then until it occured in at least 18 counties. We can always learn more about it, but and we could attempt to learn more about how it spreads and what deters it from spreading (the latter seems to be larger rivers).

Total Respondents **2**

Appendix E-2: Aggregated Aquatic Systems

7. Please also rank these threats to ALL wildlife in all Aquatic Systems Habitats in Indiana.							
	Critical threat	Serious threat	Somewhat of a threat	Slight threat	No threat	Unknown	Response Total
Habitat loss (breeding range)	24% (16)	29% (20)	24% (16)	9% (6)	7% (5)	7% (5)	68
Habitat loss (feeding/foraging areas)	21% (14)	34% (23)	24% (16)	10% (7)	6% (4)	6% (4)	68
Small native range (high endemism)	1% (1)	7% (5)	10% (7)	13% (9)	63% (42)	4% (3)	67
Near limits of natural geographic range	7% (5)	14% (3)	6% (4)	7% (5)	76% (53)	0% (0)	70
Large home range requirements	0% (0)	0% (0)	3% (2)	9% (6)	71% (46)	17% (11)	65
Viable reproductive population size or availability	13% (9)	15% (10)	12% (8)	21% (14)	32% (22)	7% (5)	68
Specialized reproductive behavior or low reproductive rates	13% (9)	16% (11)	18% (12)	10% (7)	34% (23)	9% (6)	68
Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)	10% (7)	21% (14)	21% (14)	7% (5)	21% (14)	21% (14)	68
Genetic pollution (hybridization)	0% (0)	0% (0)	4% (3)	18% (12)	58% (39)	19% (13)	67
Unknown	0% (0)	0% (0)	10% (3)	0% (0)	7% (2)	83% (24)	29
Other (please specify below)	0% (0)	15% (3)	0% (0)	5% (1)	5% (1)	75% (15)	20
						Total Respondents	659

Appendix E-2: Aggregated Aquatic Systems

8. Other threats to ALL wildlife in all Aquatic Systems Habitats in Indiana.

- None that I can think of. As adjacent states initiate harvest seasons for otters, there might be added pressure to take otters accidentally trapped in Indiana across state lines to market fur. However, I wouldn't expect this to have a significant impact at a statewide or even regional scale.
- Disturbance by recreational boating.
- Commercial over exploitation resulting in low spawner stock abundance.
- Egg predators predation, nutritional requirements, early mortality syndrome
- Stream channelizing.
- My area of expertise is effects of contamination on biological organisms, especially aquatic. This makes filling out the survey difficult. My knowledge is applicable to aquatic habitats rather than specific species in this survey.
- Threats to the Orangethroat Darter are related to threats to the habitat. It prefers high-functioning, high quality riffle habitat in headwater streams. Headwater streams, are not always given as much protection or value as larger rivers downstream. Threats to the species colonization, such as aquatic passage problems through culverts are one threat. Threats to the species watersheds, such as pollution, clearing of the riparian vegetation, creek gravel mining, and channelization are also threats to the habitat of this species.; Threats to the Orangethroat Darter are related to threats to the habitat. It prefers high-functioning, high quality riffle habitat in headwater streams. Headwater streams, are not always given as much protection or value as larger rivers downstream. Threats to the species colonization, such as aquatic passage problems through culverts are one threat. Threats to the species watersheds, such as pollution, clearing of the riparian vegetation, creek gravel mining, and channelization are also threats to the habitat of this species.; Threats to the Orangethroat Darter are related to threats to the habitat. It prefers high-functioning, high quality riffle habitat in headwater streams. Headwater streams, are not always given as much protection or value as larger rivers downstream. Threats to the species colonization, such as aquatic passage problems through culverts are one threat. Threats to the species watersheds, such as pollution, clearing of the riparian vegetation, creek gravel mining, and channelization are also threats to the habitat of this species.
- High stream flows for a few months following spawning can seriously reduce year class strength.
- High stream flows following spawning can seriously reduce year class strength. This threat can be reduced by reducing ditching in headwaters, installing grass waterways and WASCOS, maintaining riparian corridors. All of these measures will slow stream flows and reduce siltation.

Total Respondents

9

Appendix E-2: Aggregated Aquatic Systems

9. Please briefly describe the top two threats to ALL wildlife in all Aquatic Systems Habitats in Indiana identified above.

- Wetland loss and degradation
- Habitat loss mostly related to urban sprawl. Degradation of migration routes, also often related to urban sprawl and other development.
- Urbanization.
- Pollution/degradation of aquatic systems: reproductive performance of otters can be compromised by high levels of
- PCBs, heavy metals, etc. that bio-accumulate in the aquatic food chain. Direct loss of aquatic habitats such as wetlands, marshes, etc. also impact otters... but not to the extent pollutants could.
- Human disturbance.
- Modification/degradation of habitats.
- Over-population.
- Habitat loss (feeding areas) - many reservoirs are getting very old and the once abundant standing timber is now diminishing which is reducing cover for white crappie.
- Dependence on irregular sources - in many reservoirs, shad is the dominant forage base for crappie. If shad are growing extremely fast, crappie can only utilize shad for a short period of time before the shad outgrow the size crappie can consume.
- Competition with invasives, namely gizzard shad.
- Water level control regimes at impoundments.
- Loss or degradation of nesting habitat. Loss or degradation of brood-rearing and foraging areas.
- Habitat loss-urbanization and habitat loss-breeding, feeding, and foraging.
- Habitat loss.
- Degradation of movement/migration routes.
- Year class failure related to low spawner stock abundance. Competition with non native species for limited available food resources.
- Lack of successful spawning, possibly related to bioenergetics. Too much egg predation.
- Long-term declines in water quality associated with lake eutrophication.
- Annual and seasonal variations in habitat availability.
- Cold, clear water is critical for cisco survival; increased runoff and nutrient loading have degraded the habitat for this species in many of the 50+ lakes it once occurred in. Few lakes still have the species, and there is apparently little to no reproduction.
- The deliberate stocking of predator fish in cisco lakes has been a threat to this species for years; if this hasn't been stopped, it needs to.
- Loss of habitat (reproductive/feeding) that is essential for northern pike survival.
- Over harvest and illegal harvest (This doesn't seem to be a major threat as of now)

Appendix E-2: Aggregated Aquatic Systems

- Loss of undisturbed natural lake habitat.
- Habitat loss & habitat degradation.
- Sediment deposition.
- Habitat loss (loss of large nesting trees).
- Loss of brood rearing habitat.
- Loss of high quality nesting habitat.
- Habitat loss.
- Degradation of movement/migration routes.
- Although not habitat specific, the inability to responsibly and proactively manage mink according to the wildlife conservation model, as opposed to reactive measures through nuisance practices, is a concern regarding the conservation of mink. This concern applies across the landscape, not just in urban and suburban environments.
- Past pollution problems and dams on rivers block migration.
- Exotic species competition, specifically the round goby.
- Habitat degradation, non-point sources runoff resulting from loss of riparian buffers due to development.
- High sediment loads during spring rains.
- The acute effects of toxicants are recognized as a threat to organisms, but there is little knowledge on ecosystems or regional effects on chronic insults. Toxicants are more destructive to the embrolarva stages, but these are poorly documented. Pollution controls do not have definite focus on chronic effects.
- Habitat loss and pollution.
- Siltation- hornyhead chub are sight-feeders and mound builders for spawning; thus, muddy water will hamper their chances of survival and if the silt covers gravel and their nest, chances for successful reproduction will be limited.
Competition from other species better adapted to muddy and silty stream conditions.
- Runoff, mostly agricultural.
- In-stream modifications.
- Pike have suffered a major loss of spawning habitat due to the prevalence of dredging within the watershed. This practice along with levee construction has resulted in the near elimination of in-stream and emergent wetland vegetation throughout the majority of the watershed.
- Habitat loss - requires shallow clear water with little current in weedy areas over gravel, sand, and silt to feed on insects and lay reproduce
- Dredging (removal of aquatic vegetation and increasing depth of ditch).
- Habitat loss/unintentional take-'cleaning' and dredging of streams of the Kankakee drainage can result in a large amount of creek heelsplitters being lost.
- Dependence on other species-require fish host to reproduce; if fish populations decrease for any of a variety of reasons, then creek heelsplitter reproduction could decrease substantially.
- Habitat loss - requires shallow clear water with little current in weedy areas over gravel, sand, and silt to feed on insects and lay reproduce.

Appendix E-2: Aggregated Aquatic Systems

- Dredging of headwater streams.
- Alterations of hydrology from land-use changes.
- Runoff.
Habitat modification.
- The top two threats for the species are threats to migration (aquatic passage problems through stream crossing structures) and threats to the breeding habitat (high quality riffles). Threats to riffle habitat result from water quality degradation and loss of stream channel stability due to land management activities such as dredging, channelization, roads, and clearing of riparian vegetation.; The top two threats for the species are threats to migration (aquatic passage problems through stream crossing structures) and threats to the breeding habitat (high quality riffles). Threats to riffle habitat result from water quality degradation and loss of stream channel stability due to land management activities such as dredging, channelization, roads, and clearing of riparian vegetation.; The top two threats for the species are threats to migration (aquatic passage problems through stream crossing structures) and threats to the breeding habitat (high quality riffles). Threats to riffle habitat result from water quality degradation and loss of stream channel stability due to land management activities such as dredging, channelization, roads, and clearing of riparian vegetation.
- Habitat loss (breeding and foraging/feeding areas): Siltation of small headwater streams is limiting the population of southern redbelly dace because the species spawn over gravel substrates. Also, the removal of vegetation could decrease food availability to the herbivorous species. They occupy streams that have a permanent flow of clear water; thus siltation or alterations in flow regimes could also affect the species.
- Hellbenders have a small geographic range and population sizes in Indiana. In many locations there is concern about low reproductive rates, but this is unknown in Indiana populations.
- Runoff.
- Habitat modification.
- Runoff introducing sediments, even if only temporary.
- In-stream modifications.
- Pollution within the Tippecanoe River system in Indiana.
Any factor which reduces the reproductive population size.
- Pollution.
- Habitat loss - siltation of spawning areas and pools, loss of in-stream cover, riparian destruction, channelization.
- Point source pollution, which triggers fish kills or repels rock bass from the area.
- Habitat loss and degradation are serious threats to rock bass. They prefer silt free streams to reproduce and thrive. They also relate closely to structure/cover therefore any habitat loss is a threat.
- Habitat Loss - The Eastern Sand darter requires sandy bottoms in fast flowing streams to bury eggs, hide from predators, ambush prey, conserve energy, and maintain position in unstable/shifting sandbars. Low reproductive rates/small populations - reach maturity at age 1, but only lives a few years.
- Breeding and feeding/foraging habitat loss due to sedimentation from farm fields and stream banks as well as the removal of natural riparian vegetation; breeding and feeding/foraging habitat loss due to sedimentation from farm fields and stream banks as well as the removal of natural riparian vegetation.

Appendix E-2: Aggregated Aquatic Systems

- Habitat loss - siltation which reduces spawning areas and fills pools, loss of in-stream cover (snagging and log removal), riparian destruction which allows water to warm and will reduce opportunity for logs and woody debris to enter stream, channelization.
- Pollution which triggers fish kills or repels smallmouth from the area.
- Zebra mussels.
- Instream dredging.
- Zebra mussels.
- In-stream modifications.
- Pollution.
- Possible lack of reproductive success as indicated by poor length frequency distribution.
- Possible sensitivity to pollution as indicated by its rarity in the Ohio River reach in Indiana.
- Habitat loss and pollution.
- Degradation of nesting and staging sites- pools or riffles with slow current beneath flat rocks.
- Low reproductive rates-Males reach sexual maturity at 2 while females can reproduce at 1 and they only have a life span of about 3 years.
- Commercial type fishing devices - trot lines, branch lines, big nets, other passive fishing
- Extreme depredation by overabundant raccoons (on eggs) - maybe by coyotes, too.
- Extant population (if any) far below level for unassisted recovery.
- Nest depredation mainly by raccoons = very low recruitment.
- Nest/embryo/hatchling loss associated with attraction to row crop land for nesting.
- Potential loss of adults to road kill and to rogue raccoons (kill adults for their eggs)
- Insuring that populations maintain critical larva-host connections.
- Habitat loss for both breeding and feeding/foraging areas. The slough darter prefers a mud or silt bottom with little current velocity and vegetation to deposit eggs on. They also spawn few eggs so reproduction is lower in places where vegetation is lacking. They also compete with other darters for insects and have a high mortality due to stagnation and freezing in the pools they desire to live in.

Total Respondents

60

Appendix E-2: Aggregated Aquatic Systems

10. Please rank the following threats to the HABITAT of ALL wildlife in all Aquatic Systems Habitats in Indiana.

	Critical threat	Serious threat	Somewhat of a threat	Slight threat	No threat	Unknown	Response Total
Commercial or residential development (sprawl)	13% (8)	36% (23)	30% (19)	13% (8)	9% (6)	0% (0)	64
Counterproductive financial incentives or regulations	2% (1)	9% (6)	13% (8)	3% (2)	20% (13)	53% (34)	64
Invasive/non-native species	9% (6)	6% (4)	20% (13)	28% (18)	15% (10)	22% (14)	65
Nonpoint source pollution (sedimentation and nutrients)	21% (14)	29% (20)	31% (21)	12% (8)	1% (1)	6% (4)	68
Habitat fragmentation	8% (5)	31% (20)	28% (18)	11% (7)	11% (7)	11% (7)	64
Successional change	2% (1)	11% (7)	11% (7)	16% (10)	36% (23)	25% (16)	64
Diseases (of plants that create habitat)	0% (0)	0% (0)	3% (2)	14% (9)	37% (23)	46% (29)	63
Habitat degradation	31% (21)	40% (27)	21% (14)	4% (3)	1% (1)	1% (1)	67
Climate change	2% (1)	0% (0)	11% (7)	15% (10)	40% (26)	32% (21)	65
Stream channelization	38% (25)	30% (20)	18% (12)	6% (4)	3% (2)	5% (3)	66
Impoundment of water/flow regulation	13% (8)	22% (14)	29% (18)	17% (11)	29% (8)	6% (4)	63
Agricultural/forestry practices	13% (8)	36% (23)	28% (18)	14% (9)	6% (4)	3% (2)	64
Residual contamination (persistent toxins)	3% (2)	14% (9)	29% (19)	24% (16)	3% (2)	27% (18)	66
Point source pollution (continuing)	12% (8)	24% (16)	26% (17)	21% (14)	2% (1)	15% (10)	66
Mining/acidification	2% (1)	17% (11)	19% (12)	20% (13)	22% (14)	20% (13)	64
Drainage practices (stormwater runoff)	8% (5)	32% (21)	30% (20)	15% (10)	8% (5)	8% (5)	66
Unknown	0% (0)	0% (0)	0% (0)	4% (1)	0% (0)	96% (23)	24
Other (please specify below)	0% (0)	0% (0)	0% (0)	4% (1)	0% (0)	94% (17)	18
						Total Respondents	1,081

11. Other HABITAT threats to ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Competition with round goby for near-shore habitat.
- Riparian corridor destruction. Loss of shading and sedimentation.
- Sand and gravel operations could destroy preferred habitat.

Appendix E-2: Aggregated Aquatic Systems

Total Respondents

3

12. Please briefly describe the top two HABITAT threats to ALL wildlife in all Aquatic Systems Habitats in Indiana identified above.

- Habitat degradation & fragmentation.
- Urban sprawl and regulations that allow loss of habitat. The human/beaver interface usually results with either the habitat being eliminated or the beaver being eradicated.
- Urbanization.
- Water pollution not only impacts otter reproduction (see previous section), but may also impact the quantity/quality of aquatic prey for otters. Loss of wetland habitats reduces amount of suitable habitat for otters.
- Factors that affect food availability.
- Modification of stream shoreline habitats.
- Regulation of impounded water - extreme water fluctuations in mainly the Army Corps reservoirs can negatively effect crappie populations especially if the water fluctuations occur during spawning.
- Habitat degradation - the natural decomposition of flooded timber and woody debris is lessening the available cover for crappie. Also, siltation covers root wads left in the bottom of an impoundment, which eliminates useable crappie cover.
- Habitat loss/degradation due to a variety of circumstances.
- Residential development around lake shorelines. Degradation of aquatic plants and wetlands around lake shorelines.
- Commercial and or residential development.
- Habitat fragmentation.
- Agricultural practices.
- Urban development.
- Competition with non-native species for habitat. Need a quality place to live that is not in competition with round goby.
- Identification of habitat along Indiana's near-shore area.
- Habitat degradation.
- Successional change.
- Water quality degradation that leads to cloudy water is the key threat.
- Emergent bulrush and wetland habitat loss. It has been well documented in northern states that northern pike prefer flooded vegetation for spawning during the spring. Loss of this habitat from boating and wildlife (waterfowl and muskrat feeding) may reduce reproductive habitat for northern pike in some natural lakes.
- Bulkhead seawall development reduces emergent vegetation used by northern pike for reproduction and for cover during feeding.
- Shoreline and labeled alterations.

Appendix E-2: Aggregated Aquatic Systems

- Habitat loss & degradation.
- Stream channelization removing nesting sites and destroying brood habitat. Soil runoff caused by poor agricultural practices and urban development.
- Channelization removes and/or changes the vegetative and invertebrate communities. Channelization also alters the natural water flow which results in a much degraded habitat.
- The loss of bottomland hardwoods continues to be a threat. These areas provide a high quality food source and nesting sites for woodies.
- Drainage Practices.
- Stream channelization.
- The participant is forced to speculate about the meaning of successional and climate change. Agriculture/Forestry practices have different effects. Grouping these practices as a single category does not appropriately represent the individual practice. Point and non-point pollution may have a positive or negative impact.
- Sedimentation and dams fragmenting habitat.
- Invasive species competition, specifically round goby interactions. Stream channelization resulting in loss of habitat.
- Invasive species, non-point source pollution
- Sedimentation and loss of habitat due to development in headwater areas
- Habitat degradation and non-point source pollution
- Non-point source pollution- sedimentation and agricultural practices- again sedimentation.
- Loss of riparian corridor and runoff.
- The channelization of many streams in the upper Kankakee watershed and the associated fragmentation of wetland habitat has severely altered the state of the aquatic habitat in general.
- Non-point source pollution (sedimentation resulting in smothering of substrates and turbidity).
- Habitat degradation (removal of vegetation and shallow water).
- Stream channelization (straightening the channels to move water faster) and Habitat degradation (removal of debris in the stream to speed up the transfer of water off of the land and into the receiving stream).
- Habitat degradation, stream channelization-cause temporary loss of habitat and impact the mussels directly by killing them or taking them out of the habitat
- Non-point source pollution (sedimentation resulting in smothering of substrates and turbidity).
- Habitat degradation (removal of vegetation and shallow water).
- Stream channelization (straightening the channels to move water faster) and Habitat degradation (removal of debris in the stream to speed up the transfer of water off of the land and into the receiving stream).
- Runoff, mostly agricultural.
- Channelization.

Appendix E-2: Aggregated Aquatic Systems

- Top two threats from the list up above are habitat degradation and stream channelization
- Non-point source pollution in the form of sedimentation.
- Destruction of clear shaded waters by forestry/agricultural practices or stream channelization.
- Habitat degradation of streams.
- Instream modifications, runoff, both agricultural and residential, agricultural runoff.
- Impoundment.
- Any significant sedimentation into the stream can become a major threat.
Any toxins or pollutants are a critical threat.
- Any channelization which reduces the shallow (less than 1.5 feet) sand/gravel substrate can critically reduce or fragment habitat.
- Habitat degradation - sedimentation, channelization, cover removal, riparian removal.
- Point source pollution - waste water treatment plants and confined feeding operations.
- Any practices that create more erosion/sediment deposition and eliminates instream cover is a serious threat.
Therefore, I'd have to say nonpoint source pollution and habitat degradation are the most serious threats.
- Habitat degradation and stream channelization because this will directly affect the sediment transfer within the stream and microhabitat of the Eastern Sand Darter.
- Breeding and feeding/foraging habitat loss due to sedimentation from farm fields and stream banks as well as the removal of natural riparian vegetation especially thru drainage maintenance activities.
- Habitat degradation by sedimentation, channelization, cover removal, riparian removal.
- Point source pollution - these eco-regions have major threats from large cities causing fish kills from waste water treatment plans. Also, confined feeding operations in the rural areas are a major threat to the stream fish communities.
- Impoundment, in-stream modifications.
- Dredging (mining, COE).
- Impoundment.
- Stream channelization.
- Non-point source pollution.
- Loss of high quality riffles and outside bend deep fast runs, loss of riparian zone and siltation.
- Habitat degradation in terms of removal of substrate for spawning and sedimentation for covering the substrate needed to spawn.
- Channelization.
- Drain/cut off oxbow ponds.
- Trample sandbars or remove other nesting areas along banks.
- Habitat loss through channelization and draining of oxbow ponds and elimination of flows that create point bars on rivers.

Appendix E-2: Aggregated Aquatic Systems

- Rowcrop practices: crushing nests during ground insect/weed control; crushing overwinter hatchlings during harvest & early spring plowing
- Pollutants and toxins are major threats.

Habitat degradation may be a factor, since there are large expanses in the Wabash and East Fork White River where relic valves are common, but the living species is absent.

- Habitat degradation and stream channelization as development continues in the Ohio River Drainage Habitat.

Total Respondents

56

Appendix E-2: Aggregated Aquatic Systems

13.	What current monitoring efforts by state agencies are you aware of for ALL wildlife in all Aquatic Systems Habitats in Indiana?	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
	Statewide year-round monitoring conducted by state agencies	11% (7)	89% (57)	64
	Statewide once a year monitoring conducted by state agencies	8% (5)	92% (57)	62
	Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	13% (8)	87% (53)	61
	Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	28% (17)	72% (43)	60
	Regional or local year-round monitoring conducted by state agencies	8% (5)	92% (58)	63
	Regional or local once a year monitoring conducted by state agencies	23% (13)	79% (48)	61
	Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	45% (28)	55% (34)	62
	Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	70% (43)	30% (18)	61
			Total Respondents	494

Appendix E-2: Aggregated Aquatic Systems

14. What current monitoring efforts by other organizations are you aware of for ALL wildlife in all Aquatic Systems Habitats in Indiana?			
	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by other organizations	2% (1)	98% (62)	63
Statewide once a year monitoring conducted by other organizations	8% (5)	92% (59)	64
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (62)	62
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	2% (1)	98% (61)	62
Regional or local year-round monitoring conducted by other organizations	8% (5)	94% (58)	63
Regional or local once a year monitoring conducted by other organizations	23% (14)	79% (49)	63
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	18% (11)	84% (52)	63
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	32% (20)	68% (42)	62
		Total Respondents	502

15. How crucial are these monitoring efforts by state agencies for the conservation of ALL wildlife in all Aquatic Systems Habitats in Indiana?						
	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
Statewide year-round monitoring conducted by state agencies	11% (7)	3% (2)	11% (7)	53% (34)	22% (14)	64
Statewide once a year monitoring conducted by state agencies	10% (6)	3% (2)	11% (7)	51% (31)	25% (15)	61
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	7% (4)	13% (8)	18% (11)	36% (22)	26% (16)	61
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	3% (2)	16% (10)	10% (6)	44% (27)	26% (16)	61
Regional or local year-round monitoring conducted by state agencies	3% (2)	13% (8)	13% (8)	45% (28)	26% (16)	62
Regional or local once a year monitoring conducted by state agencies	1% (6)	22% (13)	22% (13)	23% (14)	23% (14)	60
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	18% (11)	34% (21)	19% (12)	15% (9)	15% (9)	62
Occasional regional or local (less than once a year and not regularly scheduled)	26% (16)	24% (15)	13% (8)	15% (9)	23% (14)	62

Appendix E-2: Aggregated Aquatic Systems

monitoring conducted by state agencies

Total Respondents 493

16. How crucial are these monitoring efforts by other organizations for the conservation of ALL wildlife in all Aquatic Systems Habitats in Indiana?

	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
Statewide year-round monitoring conducted by other organizations	3% (2)	5% (3)	11% (7)	47% (29)	34% (21)	62
Statewide once a year monitoring conducted by other organizations	6% (4)	2% (1)	15% (9)	44% (27)	34% (21)	62
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	3% (2)	5% (3)	13% (8)	44% (27)	34% (21)	61
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	3% (2)	3% (2)	13% (8)	47% (28)	33% (20)	60
Regional or local year-round monitoring conducted by other organizations	2% (1)	7% (4)	13% (8)	44% (27)	34% (21)	61
Regional or local once a year monitoring conducted by other organizations	8% (5)	8% (5)	19% (12)	37% (23)	27% (17)	62
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	5% (3)	11% (7)	15% (9)	36% (22)	33% (20)	61
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	7% (4)	11% (7)	20% (12)	31% (19)	31% (19)	61
				Total Respondents		490

Appendix E-2: Aggregated Aquatic Systems

17. Regional or local state agency monitoring for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- State and county highway dept. monitor beaver activity only as flooding of roadways occur. IDNR property monitor and attempt to eliminate problems associated with flooding of adjacent private property. State Furbearer Biologist tracks and monitors trapping harvest data.
- IDNR personnel monitor otter mortality (road-kills, trap-related, etc.) at a statewide level. Also, IDNR personnel conduct winter bridge/stream surveys for otter sign. These are conducted on a county basis at a statewide level.
- Breeding Bird Atlas statewide every 20 years.
- Patoka Lake
Hovey Lake
Dogwood Lake
Lake Sullivan
Many other lakes
- IDNR - Division of Fish and Wildlife
- Many impoundments throughout the state have general fisheries survey conducted on them and crappie are caught during these.
- Fish and Wildlife properties in northern Indiana
- Tri-County Fish and Wildlife Area, Division of Fish and Wildlife.
- Lake Michigan proper out of Michigan City.
- Spring assessment out of Michigan City. Fall spawning assessment, Indiana waters of Lake Michigan. 9 month creel survey for harvest information. These efforts are conducted by the IDNR-Fish and Wildlife division.
- Division of Fish and Wildlife at cisco lakes.
- Department of Environmental Management water quality monitoring.
- NE Indiana by DFW (Jed Pearson).
- Northern Pike are monitored via general fish surveys conducted to update lake status. There is now monitoring of northern pike on a general schedule.
- There was a tracking study conducted in two Indiana natural lakes in the late 1990's by the IDNR to better understand reproductive habitat of northern pike.
- Division of Fish and Wildlife standardized largemouth bass sampling protocol.
- Tournament fishing monitoring by the Division of Fish and Wildlife.
- None.
- Patoka River watershed.
- State monitoring- banding and nest box surveys.
- Several Fish & Wildlife Areas across the state perform annual wood duck banding. These properties include Hovey Lake FWA, Glendale FWA, Minnihaha FWA, Willow Slough FWA, Jasper-Pulaski FWA, LaSalle FWA, Pigeon River FWA, Tri-County FWA, and there may be others.
Many of these properties also conduct nest box monitoring activities on an annual basis.

Appendix E-2: Aggregated Aquatic Systems

Additionally, Indiana participates in the Harvest Information Program which can provide information about migration, population index and/or trends, as well as information about the amount of hunting pressure.

- Hovey Lake
Tri-county
Jasper Pulaski
Pigeon River
Winimac
Willow Slough
LaSalle
- IDEM annual eco-region sampling.
- IDNR-Fish and Wildlife, Lake Michigan Fisheries office.
- Headwater streams surveys were conducted in 2001 through 2004 by IDNR-Fish and Wildlife, Lake Michigan Fisheries Office.
- IDEM eco-region sampling.
- IDNR periodically conducts fish stream surveys. IDEM conducts stream health surveys using fish and invertebrates.
- IDEM monitors the Great Lakes Drainage once every five years; thus, they may have data available for hornyhead chub captured in the basin as part of the fish community assessments. IDNR may also sample fish communities in this area and have data on the hornyhead chub.
- Maumee system.
- DNR fishery surveys are occasionally conducted on the Iroquois River, the Yellow River, and the Kankakee River. IDEM occasionally samples fish for contaminants analysis for the annual Fish Consumption Advisory.
- IDEM and IDNR collect fish community samples in this area; thus, they may have data on the distribution of Least darters.
- IDEM monitors the Kankakee River basin once every five years to determine if the stream are supporting a well-balanced warmwater aquatic community. Tadpole madtoms may have been captured while sampling headwater streams.
- Random locations within the Kankakee drainage.
- IDEM and IDNR collect fish community samples in this area; thus, they may have data on the distribution of Least darters.
- IDNR non-game biologist does mussel surveys. But, he is only one person and there are thousands of miles of streams in state.
- Wabash system.
- IDEM and the DNR Nongame program also conduct monitoring during the field season, once a year for fish. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter.; IDEM and the DNR Nongame program also conduct fish monitoring during the field season. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter.
- IDEM monitors the health of major river basins every 5 years by looking at chemical, physical, and biological data collected at random locations within the watershed. Southern redbelly dace have been captured in the Ohio River Drainage Habitat; however, specific monitoring for the species has not occurred to my knowledge by anyone state or other organization.

Appendix E-2: Aggregated Aquatic Systems

- IDNR Fish & Wildlife Division.
- Wabash system.
- Tippecanoe River, Maumee system.
- Periodic (usually annual) monitoring in the Tippecanoe River by IDNR.
- Blue River (Harrison County)
Sugar Creek (Shelby County)
Indian Creek (Greene County)
- IN early to mid 1990's, Division of Fish and Wildlife conducted fish community inventories on the major streams throughout the state.
- Game fish population estimates (including rock bass) have been conducted on 5 streams every other year from 1998 through 2004.
- Various streams throughout the region, some are sampled more regularly than others IDEM probabilistic sampling.
- Indiana DNR Special Studies on T&E species- IDNR, Brant Fisher, did a study on the population of Eastern Sand Darters in Indiana over the past five years. IDNR- regional fish collection surveys may have collected some specimens of the Eastern Sand Darter. Indiana Department of Environmental Management (IDEM) occasionally collected Eastern Sand Darters as part of their Surface Water Quality Monitoring Strategy evaluating fish community structure in certain watersheds every 5 years.
- See IDEM OWO's Surface Water Quality Monitoring Strategy and project work plans and IDNR Fisheries Section Work Plans.
- Blue River (Harrison County).
- In early to mid 1990's the Division of Fish and Wildlife conducted a smallmouth bass inventory.
- 5 streams have been sampled every other year from 1998 to 2004 to estimate smallmouth bass populations to determine the effect of smallmouth bass population changes due to the imposition of a 12-inch black bass size limit in 1998.
- Ohio River, Wabash system.
- Ohio River, Wabash.
- Wabash River
West Fork White River
East Fork White River
Ohio River
- Ohio, White and Wabash rivers.
- Occasional stream surveys.
- INDFW, 1999 Wabash River, 2003 East Fork White River, 2004 West Fork White River, 2004 Main Stem White River, 1993 Patoka River, 2004 Ohio River Cannelton Pool, annual commercial fish harvest monitoring.
- Ohio River, Newburgh and McApline Tailwater fall/winter annual monitoring, occasional stream surveys
- IDNR I believe has conducted special studies on some wildlife species IDEM has record of some wildlife species being caught in that area.
- I'm unaware of any. Perhaps some occur coincident with large fish survey.

Appendix E-2: Aggregated Aquatic Systems

- Ask Zack Walker, I believe there was an accidental capture near Shoals.
- IDNR non-game biologist continually monitors fishes and mussels throughout the state, including Yellow Sandshell habitat. Two surveys have been done- ten years apart, completed last year - by IDNR biologists in the Wabash, Tippecanoe, and East Fork White Rivers; results are pending. This is in prime Yellow Sandshell habitat.
- Blue River (Harrison County)
East Fork White River
West Fork White River

Total Respondents

60

Appendix E-2: Aggregated Aquatic Systems

18. Regional or local monitoring by other organizations for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Brodman, Saint Joseph's College.
- Cortwright, IUN.
- None that I am aware of.
- Federal Breeding Bird Survey, state May Day counts, Summer Bird Counts.
- None.
- None known.
- Not aware of any.
- F&W properties in northern Indiana, natural lakes, nature preserves.
- Unknown.
- Out of Michgian City and near Gary by Ball State University.
- USFWS and Illinois natural history survey egg and fry assessments at the Port of Indiana. This is part of a Fish and Wildlife Restoration Grant.
- Newton, Jasper, Pulaski, Starke, Lake & Porter Counties.
- Muskatatuck NWR also perform wood duck banding operations.
- Muscatatuck NWR.
- City of Elkhart-Elkhart & St. Joseph counties.
- In some cities stream health is also assessed by fish and invertebrate surveys.
- Elkhart Public Works and Utilities has a fisheries biologist on staff that actively collects fish community samples from the Great Lakes Basin (1-2 times in the summer). He may have data on the hornyhead chub as well.
- Maumee system.
- None.
- Commonwealth Biomonitoring frequently does habitat evaluations in small streams as part of watershed studies. If I happen to see a shell, I make a note of it in field notes. These are NOT official mussel surveys.
- Wabash system.
- The Hoosier National Forest conducts yearly fish surveys within two or more 5th level HUCs that encompass the Hoosier National Forest, which includes the Ohio River Drainage, Eastern Corn Belt/Interior Plateau Ecoregions. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter; The Hoosier National Forest conducts yearly fish surveys within two or more 5th level HUCs that encompass the Hoosier National Forest, which includes the Ohio River Drainage, Eastern Corn Belt/Interior Plateau Ecoregions. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter.
- Wabash system.
- Tippecanoe River, Maumee system.

Appendix E-2: Aggregated Aquatic Systems

- Uncertain.
- None known to occur that specifically target rock bass.
- West Fork White River & tributaries(Muncie area).
- Ball State University fish sampling.
- While collecting fish community samples to evaluate the community structure and ability of the stream to support a healthy fish community, these organizations may have collected Eastern Sand Darters: Soil and Water Conservation Districts within those Ecoregions, Purdue University, Wildcat Creek Watershed Alliance? I would check with the Scientific Collectors Permit office for a list of organizations collecting in those ecoregions and also check with the IDEM Section 319 webpage for project summaries where fish or habitat in those ecoregions were studied.
- US Environmental Protection Agency; USGS Water Resources Division; Ohio River Valley Water Sanitation Commission; Midwest Biodiversity Institute, US Army Corps of Engineers; Muncie Bureau of Water Quality; City of Elkhart Water Quality; various universities; various consulting firms.
- None known to occur that specifically target smallmouth bass.
- Ohio River.
- Ohio River, Wabash.
- Ohio, White and Wabash rivers.
- I'm unaware of any.
- None.

Total Respondents

35

Appendix E-2: Aggregated Aquatic Systems

19. Please list organizations that are monitoring ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Brodman, Saint Joseph's College.
- Cortwright, IUN.
- IDNR.
- USGS (Breeding Bird Survey) and volunteers with Indiana Audubon Society.
- DNR/DFW.
- None known.
- Not known.
- Audubon Society, Ducks Unlimited, Indiana Division of Fish and Wildlife.
- Unknown.
- BBS.
- IDNR-Fish and Wildlife, Ball State University, University of Michigan through a coastal program grant. USFWS
- Indiana DNR, Division of Fish and Wildlife. Illinois Natural History Survey, USFWS.
- Bass fishing clubs who hold tournaments on Lake Wawasee and Syracuse Lake.
- Robert Brodman, Saint Joseph's College.
- DNR/DFW.
- IDNR.
- USFW.
- USFWS.
- Indiana Division of Fish and Wildlife. Population monitoring efforts at the state, regional and local scales are to monitor annual trends. Monitoring programs are not limited to river and stream habitats for mink.
- City of Elkhart - Elkhart and St. Joseph counties.
- IDNR-Fish and Wildlife.
- IDNR, IDEM, City of Elkhart and South Bend.
- TNC.
- DNR and IDEM.
- None.
- None than I know of. Most mussel surveys are on bigger rivers. I was contacted by a college prof. interested in taking a class out to a small stream to learn about mussels. I discouraged him from doing so unless he followed DNR regulations concerning collectors' permits. I haven't heard any more from him.
- Consultants, perhaps TNC.

Appendix E-2: Aggregated Aquatic Systems

- USDA Forest Service, Hoosier National Forest; USDI Fish and Wildlife Service; IDEM; IDNR; USDA Forest Service, Hoosier National Forest; USDI Fish and Wildlife Service; IDEM; IDNR.
- Consultant.
- TNC.
- TNC, USFWS.
- Uncertain.
- DNR/DFW.
- None known that specifically target rock bass.
- Muncie Bureau of Water Quality.
- DNR/DFW.
- None known that are specifically targeting smallmouth bass.
- USFWS.
- USFWS.
- Consultants.
- DNR/DFW.
- Electric utilities, Ball State University, Purdue University.
- None.
- IDEM monitors fish communities not particular species; however, the Slough darter has been captured by electrofishing in the Ohio River Drainage Habitat.
- DNR/DFW.

Total Respondents

40

Appendix E-2: Aggregated Aquatic Systems

20. What are the current monitoring techniques for ALL wildlife in all Aquatic Systems Habitats in Indiana?							
	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
Radio telemetry and tracking	0% (0)	7% (4)	52% (29)	5% (3)	20% (11)	16% (9)	56
Modeling	5% (3)	17% (10)	26% (15)	22% (13)	5% (3)	24% (14)	58
Coverboard routes	0% (0)	5% (2)	5% (2)	11% (4)	3% (1)	76% (28)	37
Spot mapping	5% (2)	20% (8)	25% (10)	0% (0)	3% (1)	48% (19)	40
Driving a survey route	13% (5)	5% (2)	8% (3)	23% (9)	10% (4)	41% (16)	39
Reporting from harvest, depredation, or unintentional take (road kill, bycatch)	27% (14)	15% (8)	6% (3)	29% (15)	8% (4)	15% (8)	52
Mark and recapture	17% (10)	34% (20)	27% (16)	2% (1)	5% (3)	15% (9)	59
Professional survey/census	51% (31)	38% (23)	5% (3)	0% (0)	0% (0)	7% (4)	61
Volunteer survey/census	2% (1)	37% (17)	24% (11)	2% (1)	2% (1)	33% (15)	46
Trapping (by any technique)	32% (15)	13% (6)	15% (7)	4% (2)	4% (2)	32% (15)	47
Representative sites	31% (16)	40% (21)	12% (6)	0% (0)	0% (0)	17% (9)	52
Probabilistic sites	19% (9)	17% (8)	32% (15)	0% (0)	0% (0)	32% (15)	47
Other (please specify below)	19% (4)	0% (0)	0% (0)	0% (0)	0% (0)	81% (17)	21
					Total Respondents		615

Appendix E-2: Aggregated Aquatic Systems

21. Other monitoring techniques for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Techniques currently in use in Indiana appear to be covered by the selections above.
- Unknown.
- Aerial surveys.
- Long term monitoring through gillnets, trawling has been conducted at 3 sites along the lake michigan lakefront since the mid 70's by Ball State University during the summer season. Creel census has been conducted by IDNR-Fish and Wildlife division for approximately 20 years. Commercial monitoring was conducted until the halt of the commercial fishing industry in 1996.
- Nest box survey.
- Nest box surveys.
- Electro-fishing and seining are appropriate methods for monitoring the Orangethroat darter.; Electro-fishing and seining are appropriate methods for monitoring the Orangethroat darter.; Electro-fishing and seining are appropriate monitoring techniques for the Orangethroat Darter.
- Unintentional take could be monitored from fish kill cadaver counts if the officers could be trained to identify norther hog suckers instead of not counting them or just lumping them into the generic class of "round bodied suckers"
- Larval sampling to check for reproduction.

Total Respondents

9

Appendix E-2: Aggregated Aquatic Systems

22. What one or two monitoring techniques would you recommend for effective conservation of ALL wildlife in all Aquatic Systems Habitats in Indiana?

- Aquatic surveys and minnow traps.
- Regulated trapping.
- Stream surveys for otter sign.
- Reporting (number, location, etc.) of unintentional take and biological data obtained from recovered specimens (reproductive parameters).

REFERENCE: Melquist, W.E., P.J. Polechla, Jr., and D. Toweill. 2003. River Otter. Pages 708-734 in Wild Mammals of North America: biology, management, and conservation. 2nd edition. G.A. Feldhamer, B.C. Thompson, and J.A. Chapman (eds.), John Hopkins University Press, Baltimore, MD, 1216 pages.

- Directed surveys (canoe surveys, migration counts) most intensive.
- General breeding bird surveys less intensive.
- Electrofishing survey.
- Trap netting survey.
- Gill netting surveys.
- Angler creel surveys.
- Population estimates.
- Reporting from harvest(angler creel surveys) - This survey will show angler exploitation.
- Professional survey (fish management surveys) - This survey will show size structure, relative abundance, and provide age and growth information.
- Professional surveys or counts on F&W areas during migration periods (tracks annual migration trends and is index to population levels). Harvest surveys on F&W areas (tracks annual numbers taken) "Wildlife Investigational Techniques" by The Wildlife Society.
- Mark/Recapture-Banding (intensive), Ducks, Geese & Swans of North America, Frank C. Bellrose.
- Harvest data collection (less intensive) Wildlife Management Vol 2, Reuben Edwin Trippensee.
- Banding.
- Brood surveys.
- Fall trawl sampling for young of the year production. Possible incorporation of hydroacoustic models for the near shore area.
- I would like to see all the lake trout stocked in Lake Michigan to be coded wire tagged. That will allow for better understanding of survival after stocking and movement of the fish. It will also allow for better understanding of spawning site fidelity.
- Occasional gill-netting to verify presence followed by intensive netting to confirm low levels or absence.
- Large fyke-nets are used in Lake Webster (Kosciusko Co.) to collect brood stock for muskellunge. These nets would be useful in capturing northern pike as well. This would allow biologist to capture enough fish to get a representative sample of adult fish. There is still no effective method of sampling young esocids without mortality.
- Springtime dc electrofishing according to DFW standard protocol.

Appendix E-2: Aggregated Aquatic Systems

- Standard DFW creel survey procedures.
- Tournament monitoring by the DFW and bass clubs.
- Minnow trapping and either mark recapture or telemetry.
- Electrofishing.
- Trap nets.
- Brood surveys.
- Continued participation in HIP is perhaps the most cost effective method for monitoring the flyway population.
- Banding operations help in determining the status of populations on a local or statewide level.
- Brood counts.
- Increased banding efforts.
- Radio telemetry or mark & recapture.
- Stream sampling using electrofishing techniques and seining. This should be done every 5 years to get a clear picture of changes that occur to habitat, water quality and invasive species introductions and distribution.
- Rotational sampling at reference sites along the headwaters. Historical comparisons from the early 80's will be compared with the sampling that was completed 2001-2004.
- Professional Fish Surveys and Creel Surveys.
- IDEM, IDNR, and Elkhart use electrofishing equipment to sample fish communities; however, a seine could probably be used as well as tagging and radio telemetry to track the species movement.
- Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.
- Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of some the clubshell. See same for protocols.
- Periodic electrofishing surveys and mark recapture techniques probably provide the best information about the pike populations.
- Representative sites or look for sites where the habitat is suitable for the least darter and seine in the vegetation over rocky substrate.
- Seining or kick net.
- Electrofishing.
- Professional surveys using timed searches, systematic sampling (Strayer and Smith 2003)-A guide to sampling freshwater mussel populations. American Fisheries Society Monograph 8. American Fisheries Society. Bethesda, Maryland. 103 pp.
- Representative sites or look for sites where the habitat is suitable for the least darter and seine in the vegetation over rocky substrate.
- Seining or kick net.
- Electrofishing.

Appendix E-2: Aggregated Aquatic Systems

- Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.
- Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of some wildlife species. See same for protocols.
- Electro-fishing streams. Take a random sampling of streams within a watershed (5th or 6th level HUC) and standardize the stream reach length for the survey...usually 15 times the stream width. Seining is also an appropriate method for sampling, especially in the riffle habitats.; Electro-fishing streams..take a random sampling of streams within a watershed (5th or 6th level HUC) and standardize the stream reach length for the survey...usually 15 times the stream width. Seining is also an appropriate method for sampling, especially in the riffle habitats.; Electro-fishing can be used to sample stream habitats. I suggest designing a random sample of all streams within a watershed (5th or 6th level HUC). The size of the stream reach sampled would be 15 times the stream width. Seining would also be an appropriate method for sampling.
- Target the habitat with seining equipment or electrofishing.
- Professional Survey.
- Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.
- Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of some wildlife species. See same for protocols.
- Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.
- Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of some wildlife species. See same for protocols.
- State DNR or professional census at representative or probabilistic sites.

Development of trained, select volunteer core to undertake surveys at probabilistic sites, particularly where the species should, or could occur and has not been documented in recent years.
- Stream fish community surveys.
- Rock bass population estimates.
- Electrofishing surveys.
- See where populations of the darter have been captured in the past and then with seines or electrofishing equipment mark and recapture the darter to document habitat characteristics, water quality information, and land use characterization where the darters occur. You will need to target the habitat and not the exact location since the sandbars will probably shift over time. Look on the web for mark and recapture surveys as well as other eastern sand darter publications. I found many by just searching the web for Eastern Sand Darter.
- Electrofishing results from probabilistic and representative sites.
- Electrofishing catch rate data.
- Population estimates.
- Angler creel surveys.
- Stream fish community surveys - To determine smallmouth bass distribution and abundance. There may be a correlation of smallmouth abundance to the species richness to the overall fish community.

Appendix E-2: Aggregated Aquatic Systems

- Smallmouth bass population estimates.
- Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.
- Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of the clubshell. See same for protocols.
- Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.
- Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of the clubshell. See same for protocols.
- Electrofishing swift water habitat.
- Hoop nets.
- Electrofishing river wide.
- Hoop-netting by scientists and commercial fishermen.
- Periodic stream surveys.
- Fall/winter Ohio River tailwater sampling and occasional stream surveys.
- Seining at representative sites.
- Occasional censusing with very large, heavily baited hoop nets left out overnight. Do not set during rising waters. Check within 12 hours.
- Search for nests in June (after determining any adults present at all) methods used in FL and LA for nests, in AR and LA for capturing adults.
- Looking for basking individuals with a spotting scope.
- Perhaps use of fyke nets with big leads, or basking traps to estimate numbers after visual spotting determines presence.
- Systematic monitoring of probabilistic sites (professional).
Use of volunteer census/monitoring.
- Seining or electrofishing representative sites using professionals.
- ELECTROFISHING CATCH RATES.
- POPULATION ESTIMATES.

Appendix E-2: Aggregated Aquatic Systems

23. What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for ALL wildlife in all Aquatic Systems Habitats in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide annual inventory and assessment conducted by state agencies	3% (2)	97% (61)	63
Statewide once a year inventory and assessment conducted by state agencies	2% (1)	98% (62)	63
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	3% (2)	97% (61)	63
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	13% (8)	87% (54)	62
Regional or local year-round inventory and assessment conducted by state agencies	3% (2)	97% (61)	63
Regional or local once a year inventory and assessment conducted by state agencies	10% (6)	90% (57)	63
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	29% (18)	71% (45)	63
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	43% (27)	57% (36)	63
	Total Respondents		503

Appendix E-2: Aggregated Aquatic Systems

24. What current HABITAT inventory and assessment efforts or activities by other organizations are you aware of for ALL wildlife in all Aquatic Systems Habitats in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide year-round inventory and assessment conducted by other organizations	2% (1)	98% (61)	62
Statewide once a year inventory and assessment conducted by other organizations	2% (1)	98% (61)	62
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	3% (2)	97% (61)	63
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	3% (2)	97% (61)	63
Regional or local year-round inventory and assessment conducted by other organizations	8% (5)	92% (58)	63
Regional or local once a year inventory and assessment conducted by other organizations	15% (9)	85% (53)	62
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	17% (11)	83% (52)	63
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	31% (20)	69% (45)	65
	Total Respondents		503

Appendix E-2: Aggregated Aquatic Systems

26.	How crucial are these HABITAT efforts by other organizations for the conservation of ALL wildlife in all Aquatic Systems Habitats in Indiana?	These efforts are very crucial for this HABITAT	These efforts are somewhat crucial for this HABITAT	These efforts are slightly crucial for this HABITAT	These efforts are not crucial for this HABITAT	Unknown	Response Total
	Statewide year-round inventory and assessment conducted by other organizations	2% (1)	3% (3)	13% (8)	29% (18)	52% (32)	62
	Statewide once a year inventory and assessment conducted by other organizations	3% (2)	3% (2)	11% (7)	29% (18)	53% (33)	62
	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	5% (3)	5% (3)	15% (9)	24% (15)	52% (32)	62
	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	3% (2)	3% (2)	16% (10)	25% (16)	52% (33)	63
	Regional or local year-round inventory and assessment conducted by other organizations	3% (2)	8% (5)	15% (9)	24% (15)	50% (31)	62
	Regional or local once a year inventory and assessment conducted by other organizations	3% (2)	8% (5)	16% (10)	21% (13)	52% (32)	62
	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	10% (6)	10% (6)	19% (12)	15% (9)	47% (29)	62
	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	8% (5)	8% (5)	14% (9)	21% (13)	49% (31)	63
Total Respondents							498

Appendix E-2: Aggregated Aquatic Systems

27. Regional or local state agency HABITAT inventory and assessment for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- I suspect some state agencies monitor and assess aquatic habitats at a statewide level ... maybe not on an annual basis, but perhaps every few years. No agency comes to mind though that does it. Nonetheless, this is an important component of inventorying otter habitat in Indiana.
- Unknown.
- None.
- None known to occur.
- Not familiar with habitat assessments that occur on impoundments.
- Natural lakes in northern Indiana.
- Unknown.
- Lake Michigan proper along the shoreline in nearshore area less than 30 feet in depth.
- Habitat mapping and shoreline aerial imagery.
- NE IN, DFW, Jed Pearson.
- Recently the IDNR has begun sampling/mapping emergent plant species in some Indiana natural lakes. These plants may be used as reproductive habitat for northern pike.
- Not aware of any.
- None.
- Nearly all of the river and stream habitats in Indiana fall under state and/or federal jurisdiction, so obtaining and maintaining accurate and current information on these habitats is always occurring on a statewide basis.
- Trail Creek, East Branch of Little Calumet river, Reynolds Creek, Salt Creek, West Branch of Little Calumet River, Deep River.
- IDEM ecoregion surveys.
- In all major tributaries of Lake Michigan.
- Like I mentioned in my survey for the Eastern Sand Darter, IDEM, IDNR, and Elkhart use the QHEI (Qualitative Habitat Evaluation Index) to assess habitat in streams.
- Maumee system.
- Habitat evaluations are conducted as part of general stream surveys by DNR biologists. Such surveys have been conducted on the Iroquois River, the Yellow River, and the Kankakee River.
- As I stated in previous surveys, the QHEI would provide a habitat assessment for sites where least darters were collected.
- IDEM conducts a habitat assessment while sampling stream for fish community assessments using the QHEI (Qualitative Habitat Evaluation Index).
- None.
- As I stated in previous surveys, the QHEI would provide a habitat assessment for sites where least darters were collected.

Appendix E-2: Aggregated Aquatic Systems

- IDEM conducts a habitat assessment while sampling stream for fish community assessments using the QHEI (Qualitative Habitat Evaluation Index).
- Wabash system.
- Wabash system.
- Tippecanoe River and Maumee system.
- (Usually species inventories are made, with relevant habitat information)
- Blue River (Harrison County)
Sugar Creek (Shelby County)
Indian Creek (Greene County)
- Indiana Department of Natural Resources - Division of Fish and Wildlife.
- Indiana Department of Environmental Management
- IDEM - statewide QHEI.
- I don't know of any Habitat Inventory or Assessment done specifically for the Eastern Sand Darter in the habitat you list; however, I do know that IDEM as well as IDNR and other organizations use the Qualitative Habitat Evaluation Index to document the habitat quality of the streams sampled for aquatic communities.
- IDEM/OWQ/BSS; IDNR/FWD/FS; ORSANCO.
- Blue River (Harrison County).
- Indiana Dept of Natural Resources - Division of Fish and Wildlife.
- Indiana Department of Environmental Management.
- Ohio River, Wabash system.
- Ohio River, Wabash.
- West Fork White River.
- East Fork White River
Wabash River
- Unknown.
- If any inventory is occurring, it's for water quality or fish contamination.
- I am assuming that the governmental division responsible for water pollution control conducts some sampling regarding organic and heavy metal toxins in the water.
- I'm unclear as to whether there is any survey on silting in or natural changes in river channels
- IDNR primarily monitors mussel species, making habitat notations. No real habit monitors made. However, Indiana Department of Environmental Management, IDNR Division of Water do monitor water quality (as a component of habitat).
- BLUE RIVER (HARRISON COUNTY)

Appendix E-2: Aggregated Aquatic Systems

28. Regional or local HABITAT inventory and assessment by other organizations for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Brodman, Saint Joseph's College in NW Indiana.
- Cortwright, IUN in Brown County
- Unknown.
- None.
- None known.
- Unknown.
- Lake Michigan proper along the shoreline in nearshore area less than 30 feet in depth.
- Not aware of any.
- Newton, Jasper, Starke, Pulaski, Lake & Porter counties.
- Many local zoning boards, planning commissions and drainage boards also keep and maintain their own records in regard to land use patterns within these habitats.
- City of Elkhart
- St. Joseph River
- Maumee system.
- None.
- We (Commonwealth Biomonitoring) do habitat evaluations on small streams as part of watershed studies. These evaluations are not specific to mussels, but are Ohio EPA QHEI methods.
- Wabash system.
- Two or more 5th level HUC watersheds a year that encompass the Hoosier National Forest are sampled; a random sampling of streams found within these 5th level HUCs occurs.
- Wabash system.
- Tippecanoe River and Maumee system.
- None known.
- Muncie BWQ - WFWR and tributaries in the Muncie area.
- None.
- None known.
- Ohio River.
- Ohio River, Wabash.
- West Fork White River
East Fork White River
Wabash River

Appendix E-2: Aggregated Aquatic Systems

- Unknown.
- USACOE Ohio River.
- USACOE Ohio River.
- If any inventory is occurring, it's for water quality or fish contamination.
- Occasional grants to universities?
- NONE

Total Respondents 31

29. Please list organizations that are monitoring this HABITAT for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Unknown.
- None.
- None known.
- Indiana Division of Fish and Wildlife.
- Unknown.
- IDNR, USFSW, Ball State, University of Michigan.
- Indiana DNR- Fish and Wildlife division. USFWS/GLFC.
- Not aware of any.
- Robert Brodman, Saint Joseph's College.
- None that I am aware of.
- IDNR
USFWS
USDA
IDEM
USACE
EPA
Local government entities (area plan commissions, zoning boards etc...)
- IDNR-Fish and Wildlife, USFWS
- IDNR-Fish and Wildlife, Lake Michigan Fisheries Office.
- IDNR, IDEM, City of Elkhart and South Bend.
- TNC.
- DNR division of Fish and Wildlife.
- None.
- Consultants, perhaps TNC.

Appendix E-2: Aggregated Aquatic Systems

- IDEM, IDNR, USDA Forest Service, USDI Fish and Wildlife Service.
- IDEM- Qualitative Habitat Evaluations completed at sites where southern redbelly dace may have been captured as part of the fish community sampling program.
- Consultants.
- TNC.
- TNC, USFWS.
- DNR/DFW.
- None known.
- Muncie; Elkhart; USGS/WRD.
- DNR/DFW.
- None known.
- USFWS
- USFWS
- Consultants.
- DNR/DFW.
- Unknown.
- USACOE Ohio River
- USACOE Ohio River
- IDEM performs habitat assessments in this area whoever samples for state water pollution control.
- Fish quality? State board of health??
- IDEM makes assessments of the habitat while doing fish community surveys in the Ohio River Drainage Habitat.
- DNR/DFW

Total Respondents

38

Appendix E-2: Aggregated Aquatic Systems

30.	What are the current HABITAT inventory and/or assessment techniques for ALL wildlife in all Aquatic Systems Habitats in Indiana?						
	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
GIS mapping	7% (4)	32% (19)	27% (16)	8% (5)	2% (1)	25% (15)	60
Aerial photography and analysis	3% (2)	24% (14)	17% (10)	10% (6)	2% (1)	43% (25)	58
Systematic sampling	20% (11)	33% (18)	11% (6)	2% (1)	0% (0)	35% (19)	55
Property tax estimates	2% (1)	0% (0)	0% (0)	19% (9)	10% (5)	69% (33)	48
State revenue data	0% (0)	0% (0)	0% (0)	19% (9)	11% (5)	70% (33)	47
Regulatory information	2% (1)	10% (5)	2% (1)	12% (6)	6% (3)	67% (33)	49
Participation in landuse programs	2% (1)	20% (10)	16% (8)	6% (3)	6% (3)	50% (25)	50
Modeling	2% (1)	30% (16)	22% (12)	0% (0)	4% (2)	43% (23)	54
Voluntary landowner reporting	0% (0)	19% (9)	6% (3)	6% (3)	11% (5)	57% (27)	47
Other (please specify below)	7% (2)	7% (2)	0% (0)	0% (0)	0% (0)	85% (23)	27

Appendix E-2: Aggregated Aquatic Systems

31. Other HABITAT inventory and assessment techniques for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- None
- Unknown
- Bottom mapping of habitat
- IBI, and QHEI for representative sites.
- Qualitative Habitat Evaluation Index(QHEI); REMAP protocols for Northern Forested Streams; stream channel cross-sections and longitudinal profiles; substrate analysis; descriptions of riparian vegetation; water quality parameters are measured using probes and Hydro-labs
- Water quality monitoring
- QHEI
- QHEI
- QHEI.

Total Respondents 9

32. What one or two HABITAT inventory and assessment techniques would you recommend for effective conservation of ALL wildlife in all Aquatic Systems Habitats in Indiana?

- Systematic sampling & GIS.
- GIS technology appears to be the most feasible means for inventory and assessment of otter habitat at a statewide scale. I suspect analysis of aerial photos could be useful also, perhaps at a local scale. Unfortunately, I do not have any references.
- Aerial imagery to identify and quantify habitat.
- Systematic sampling would probably be best to determine the abundance of cover that is available, but could be very difficult as most of the habitat is hidden under the surface of the water.
- GIS mapping(electronic data base of current habitat) Aerial photography and analysis (examine changes in habitat)
- "Wildlife Investigational Techniques" by The Wildlife Society.
- G.I.S. (intensive) Wildlife Management Techniques Manual, Fourth Edition, Sanford D. Schemnitz
- Aerial (less intensive) same.
- Spring counts- aerial.
- Lidar mapping would help identify spawning areas within the nearshore zone along Indiana's coastline.
- Digital satellite imagery to conduct bottom contour mapping in nearshore spawning areas.
- Emergent bulrush and wetland monitoring and protection via ecozones.
- Evaluate land and water use practices to reduce in lake and upstream degradation of vegetation and shoreline.

Appendix E-2: Aggregated Aquatic Systems

- Unknown.
 - Suvery (intensive) and GIS (less intensive).
 - GIS mapping.aerial photo. and analysis.
 - Developing and maintaining accurate GIS data sets on the habitat is very important.
 - Spring, summer, fall and winter surveys.
 - GIS mapping and aerial photography.
 - Sampling.
 - Sampling using electrofishing and seining in headwater areas. Completing IBI and QHEI and water quality analysis for these sites.
 - Assessment using the Qualitative Habitat Evaluation Index.
 - Assess riparian corridor and water quality.
 - Systematic sampling of the habitat along the length of the stream to provide baseline data for comparison across time.
 - GIS mapping of restored, fully connected wetland to provide an inventory of available spawning habitat.
 - Don't really think that a habitat inventory of any kind is necessary for creek heelsplitter habitat in the Kankakee drainage.
 - Assess riparian corridor presence.
 - Water quality.
 - Two protocols that I recommend for reference include the following:
Harrelson, C.C., C.L. Rawlins, and J.P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. USDA Forest Service. General Technical Report RM-245.
The above reference offers useful guidance on measuring stream channel cross-sections and substrate within the stream. This information can be used to determine if a stream channel is stable and if the substrate is available within riffle habitats, which are the preferred habitat of the Orangethroat Darter.
Simon, T. P. and P.M. Stewart. 1998. Standard Operating Procedures For Development of Watershed Indicators In REMAP: Northern Lakes and Forest Streams.
The above reference is very useful for developing a watershed level sampling design and includes useful methods for measuring stream channel and stream habitat parameters.
- The Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA is a useful qualitative field method that can be used to prioritize sites within a watershed for stream habitat or water quality improvement.
- Systematic survey & GIS.
 - Assess riparian corridor.
 - Water quality monitoring.
 - CREP, farmer incentives for no-till, riparian corridors, etc.
 - Strictly control instream modifications: mining, snagging, etc.
 - More extensive use of GIS- modeled habitat probabilities.
 - QHEI.

Appendix E-2: Aggregated Aquatic Systems

- QHEI.
- More habitat inventories and assessments.
- QHEI.
- GIS.
- Qualitative Habitat Evaluation Index (QHEI) in conjunction with a stream community survey or sampling specifically for smallmouth bass. This can show which habitat components most strongly correlate with smallmouth bass abundance and or size structure.
- Assess zebra mussel infestations. Contact P. Morrison, USFWS, Parkersburg, WV.
- Zebra mussel assessment. Contact P. Morrison, USFWS, Parkersburg, WV.
- QHEI.
- Recording GIS information.
- Record habitat when the species is collected during a survey.
- GIS mapping and aerial photography and analysis.
- GIS mapping and aerial photography and analysis.
- High resolution aerial photography DURING LOW WATER - digitized for GIS. locate:
 - 1) Deep river holes with woody debris (favored by adults)
 - 2) health/permanence of oxbow ponds
 - 3) nesting habitat
- High resolution aerial photography during low water periods – digitize and use in GIS - re. how lasting are oxbow ponds during droughts.
- Occasional site visits to assess vegetation quality for this herbivorous turtle.
- To look at saturation of potential habitat: with GIS construction of existing potential habitat(based upon known factors)and overlaying the current distribution of the Yellow Sandshell.
- QHEI.

Total Respondents

43

33. What is the current body of science for ALL wildlife in all Aquatic Systems Habitats in Indiana?

	Response Total	Response Percent
Complete, up to date and extensive	1	2%
Adequate	23	36%
Inadequate	32	50%
Nonexistent	5	8%
Other (please explain below) Unknown in the larger scale	3	5%
	Total Respondents	64

Appendix E-2: Aggregated Aquatic Systems

- 34.** Please provide a citation (title, author, date, publisher) that would give the best overview of ALL wildlife in all Aquatic Systems Habitats in Indiana, if available. This resource may be used if further detail is needed.

Title = Amphibians and reptiles from 23 counties of Indiana.;

Author = Robert Brodman;

Date = 2003;

Publisher = Proceedings of the Indiana Academy of Science, 112: 43-54.

Title = Ten- to eleven-year population trends of two pond-breeding amphibian species, red-spotted newts and green frogs. In Status & Conservation of Midwestern;

Author = Spencer Cortwright;

Date = 1998;

Publisher = University of Iowa Press, Iowa City

Title = Mammals of Indiana;

Author = Russell E. Mumford/ John Whitaker, Jr.;

Date = 1982;

Publisher = Bloomington Indiana University Press

Title = Indiana River Otter Reintroduction Program, 2000-2001;

Author = Scott A. Johnson;

Date = November 2001;

Publisher = Internal report, Indiana Department of Natural Resources, Bloomington, IN

Title = Restoring river otters in Indiana;

Author = Scott A. Johnson and Kim A. Berkley;

Date = 1999;

Publisher = Wildlife Society Bulletin 27:419-427.

Title = Atlas of Breeding Birds in Indiana

Author = Castrale, J.S., E. Hopkins, C.E. Keller

Date = 1998

Publisher = IDNR

Title = Many in AFS journal of fish management and transactions of AFS
Impoundments Strategic Plan

Author = IDNR - Fish and Wildlife

Date = 1997

Publisher = IDNR - Fish and Wildlife

Title = Ducks, Geese & Swans of North America

Author = Frank C. Bellrose

Date = 1976

Publisher = Stackpole Books

Title = Preliminary Results of 2004 Ball State University Yellow Perch Research in Indiana Waters of Lake Michigan;

Author = Paul Allen and Thomas Lauer;

Date = October 2004;

Publisher = Ball State University

Title = Yellow Perch Research and Management in Lake Michigan, Evaluating Progress in a Cooperative Effort, 1997-2001;

Author = David Clapp and John Dettmers;

Date = November 2004;

Publisher = American Fisheries Society, Fisheries

Title = Lake Trout Restoration Plan;

Date = In progress

Appendix E-2: Aggregated Aquatic Systems

Title = Lake Trout Impediments Document;
Author = Numerous,;
Date = 2003;
Publisher = Lake Trout Task group/LMTC

Title = Cisco population status and management in Indiana
Author = Jed Pearson
Date = 2001
Publisher = Division of Fish and Wildlife

Title = Northern Pike Spawning Habitat Investigations At Two Natural Lake In Indiana
Author = Cwalinski, Tim A.
Date = September 2001
Publisher = Indiana Department of Natural Resources

Title = DFW largemouth bass database
Author = Jed Pearson
Date = unpublished
Publisher = unpublished

Title = Amphibians and reptiles from 23 counties of Indiana.
Author = Robert Brodman
Date = 2003
Publisher = Proceedings of the Indiana Academy of Science, 112: 43-54

Title = Ecology and Management of the Wood Duck
Author = Bellrose and Holm
Date = 1994
Publisher = Stackpole Books

Title = Fisheries Survey of the East Branch of the Little Calumet River Watershed
Author = Neil Ledet
Date = 1978
Publisher = IDNR Fisheries Section

Title = Naiades of Pennsylvania
Author = Ortmann
Date = 1919
Publisher = Carnegie Museum

Title = Fishery, Habitat, and Recreational Use Surveys for the Kankakee River
Author = Price and Robertson
Date = 2005
Publisher = DNR - Division of Fish and Wildlife (in review)

Title = Occurrence and distribution of freshwater mussels in the small streams of Tippecanoe County, Indiana
Author = Myers-Kinzie, M., S. Wentz, & A. Spacie
Date = 2001
Publisher = Proc. Ind. Acad. Sci.

Title = Naiades of Pennsylvania
Author = Ortmann
Date = 1919
Publisher = Carnegie Museum

Title = Amphibians and reptiles from 23 counties of Indiana.
Author = Robert Brodman
Date = 2003
Publisher = Proceedings of the Indiana Academy of Science, 112: 43-54.

Appendix E-2: Aggregated Aquatic Systems

Title = Naiades of Pennsylvania
Author = Ortmann
Date = 1919
Publisher = Carnegie Museum

Title = Federal Recovery Plan
Author = USFWS
Date = 1993
Publisher = USFWS

Title = 'Clubshell'
Author = USFW, Division of Endangered Species
Date = 12/1997
Publisher = Online

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance
Author = Stuart T. Shipman
Date = December 1997
Publisher = DNR fisheries section

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance.
Author = Stuart T. Shipman
Date = December 1997
Publisher = DNR fisheries section

Title = The Fishes of Missouri
Author = William L. Plieger
Date = 1997
Publisher = Missouri Conservation Commission

Title = Handbook of freshwater fishery biology
Author = Kenneth D. Carlander
Date = 1997
Publisher = Iowa University Press

Title = Fishes of Ohio
Author = Milt Troutman
Date = 12/1997
Publisher = OSU Press

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance
Author = Stuart Shipman
Date = December 1997
Publisher = DNR/Fisheries section

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance
Author = Stuart Shipman
Date = December 1997
Publisher = IDNR

Title = Federal Recovery Plan
Author = USFWS
Date = 1991
Publisher = USFWS

Title = Freshwater mussels of Tennessee

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Author = Parmalee & Bogan

Date = 1998

Publisher = U of Tennessee Press

Title = Wabash River Catfish Reports

Author = Rob Columbo

Date = 2002,2003,2004,2005

Publisher = SIU/INDFW

Title = GIS mapping and aerial photography and analysis

Author = ORFMT

Date = annually since 1999

Publisher = ORFMT

Title =

Author = Minton

Date = 2001

Publisher =

Title = (Numerous internet sites, including USF&W)

Author =

Date =

Publisher =

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance

Author = Stuart Shipman

Date = 12/1997

Publisher = DNR/Fisheries section

Appendix E-2: Aggregated Aquatic Systems

- 35.** If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of ALL wildlife in all Aquatic Systems Habitats in Indiana. This resource may also be used if further detail is needed.

Title = Waterfowl & Wetlands an Intergarted review
Author = Theodore A. Bookout
Date = 1979
Publisher = LaCrosse Printing

Title = Yellow Perch Research and Management in Lake Michgian, Evaluating Progress in a Cooperative Effort, 1997-2001
Author = David Clapp and John Dettmers
Date = November 2004
Publisher = American Fisheries Society, Fisheries

Title = Lake Trout Impediments Documents
Author = Numerous,
Date = 2003
Publisher = Lake Trout Task group/LMTC

Title = Largemouth bass size limits at Indiana natural lakes - a 30-year history
Author = Jed Pearson
Date = 2003
Publisher = unpublished

Title = Ducks, Geese and Swans of North America
Author = Bellrose
Date = 1976
Publisher = Stackpole Books

Title = Stream Survey of the East Arm of the Little Calumet River
Author = Edward Braun
Date = 1974
Publisher = IDNR Division of Fish and Wildlife

Title = Freshwater mussels of the Midwest
Author = Cummings & Mayer
Date = 1992
Publisher = INHS

Title = A fishery survey of the Kankakee River in Indiana
Author = Robertson and Ledet
Date = 1981
Publisher = DNR - Division of Fish and Wildlife

Title = Freshwater Mollusca of WI
Author = Baker
Date = 1919
Publisher = WI Geol. Nat. Hist. Surv.

Title = Freshwater mussels of the Midwets
Author = Cummings & Mayer
Date = 1992
Publisher = INHS

Title = Field guide to freshwater mussels of Midwest
Author = Cummings & Mayer
Date = 1992
Publisher = INHS

Appendix E-2: Aggregated Aquatic Systems

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
 Author = Douglas C. Keller
 Date = 1999
 Publisher = IDNR

Title = fishes of Tennessee
 Author = Etnire and Starnes
 Date =
 Publisher =

Title = FW fishes of Canada
 Author = Scott & Crossman
 Date =
 Publisher =

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
 Author = Douglas C. Keller
 Date = 1999
 Publisher = IDNR

Title = Life history and propagation...
 Author = Jones & Neves
 Date = 2002
 Publisher = JNABS

Title = Freshwater mussels of the Midwest
 Author = Cummings & Mayer
 Date = 1992
 Publisher = INHS

Title = numerous INDFW FMR's
 Author = Numerous
 Date = numerous
 Publisher = INDFW

Title = various INDFW FMR's
 Author = various
 Date = various
 Publisher = INDFW

Title = Freshwater Mussels of the Midwest
 Author = Cummings & Mayer
 Date = 1992
 Publisher = Illinois Natural History Survey

36. What is the current HABITAT body of science for ALL wildlife in all Aquatic Systems Habitats in Indiana?

	Response Total	Response Percent
Complete, up to date and extensive		
Adequate	12	20%
Inadequate	34	56%

Appendix E-2: Aggregated Aquatic Systems

Nonexistent		10	16%
	The body of science is better than adequate, it is quite extensive and up to date, but by no means is it complete.		
Other (please explain below)	Unknown on the larger scale	5	8%
	not my expertise - look for historical geography/hydrology		
Total Respondents		61	

37. Please provide a citation (title, author, date, publisher) that would give the best HABITAT overview of ALL wildlife in all Aquatic Systems Habitats in Indiana, if available. This resource may be used if further detail is needed.

Title = Mammals of Indiana;
 Author = Russell E. Mumford;
 Date = 1982;
 Publisher = Bloomington Indiana University Press

Title = Soil Survey's of Indiana Counties
 Author = U.S. Dept. of Agriculture, SCS
 Date = 1990
 Publisher = U.S. Dept. of Agriculture

Title = Cisco population status and management in Indiana
 Author = Jed Pearson
 Date = 2001
 Publisher = Division of Fish and Wildlife

Title = Amphibians and reptiles from 23 counties of Indiana.
 Author = Robert Brodman
 Date = 2003
 Publisher = Proceedings of the Indiana Academy of Science, 112: 43-54

Title = Wetlands
 Author = Mitsch & Gosselink
 Date = 1993
 Publisher = Van Nostrand Rheinhold

Title = Fisheries Survey of the East Branch of the Little Calumet River Watershed
 Author = Neil Ledet
 Date = 1978
 Publisher = IDNR Fisheries Section

Title = Naiades of Pennsylvania
 Author = Ortmann
 Date = 1919
 Publisher = Carnegie Museum

Title = Fishery, Habitat, and Recreational Use Surveys for the Kankakee River
 Author = Price and Robertson
 Date = 2005
 Publisher = DNR - Division of Fish and Wildlife (in review)

Title = Naiades of Pennsylvania
 Author = Ortmann
 Date = 1919

Appendix E-2: Aggregated Aquatic Systems

Publisher = Carnegie Museum

Title = Naiades of Pennsylvania

Author = Ortmann

Date = 1919

Publisher = Carnegie Museum

Title = Federal Recovery Plan

Author = USFWS

Date = 1993

Publisher = USFWS

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance.

Author = Stuart T. Shipman

Date = December 1997

Publisher = IDNR

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance

Author = Stuart T. Shipman

Date = 12/1997

Publisher = DNR/Fisheries section

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance

Author = Stuart T. Shipman

Date = December 1997

Publisher = IDNR

Title = Federal Recovery Plan

Author = USFWS

Date = 1991

Publisher = USFWS

Title = Freshwater Mollusca of WI

Author = Baker

Date = 1928

Publisher = WI Geol. Nat. Hist. Surv.

Title = Ohio River Mainstem Study

Author = USACOE

Date = 2000?

Publisher = USACOE

Title = Ohio River Mainstem Study

Author = USACOE

Date = 2000?

Publisher = USACOE

Title = ??? Sugar Creek???

Author = ?

Date = late 1970s/early 1980s

Publisher = PhD thesis IU Bloomington

Appendix E-2: Aggregated Aquatic Systems

- 38.** If possible, please provide a second citation (title, author, date, publisher) that would give another good HABITAT overview of ALL wildlife in all Aquatic Systems Habitats in Indiana. This resource may also be used if further detail is needed.

Title = Management of Seasonally Flooded Impoundments
Author = Leigh H. Fredrickson, T. Scott Taylor
Date = 1982
Publisher = U.S. Fish and Wildlife Service

Title = Southern Forested Wetlands
Author = Messina & Conner
Date = 1998
Publisher = CRC Press LLC

Title = Stream Survey of the East Arm of the Little Calumet River
Author = Edward Braun
Date = 1974
Publisher = IDNR Division of Fish and Wildlife

Title = Freshwater Mollusca of WI
Author = Baker
Date = 1928
Publisher = WI Geol. Nat. Hist. Survey

Title = A fishery survey of the Kankakee River in Indiana
Author = Robertson and Ledet
Date = 1981
Publisher = DNR - Division of Fish and Wildlife

Title = Freshwater Mollusca of WI
Author = Baker
Date = 1919
Publisher = WI Geol. Nat. Hist. Surv.

Title = Freshwater Mollusca of WI
Author = Baker
Date = 1929
Publisher = WI Geol. Nat. Sci. Surv.

Title = Naiades of Pennsylvania
Author = Ortmann
Date = 1919
Publisher = Carnegie Museum

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
Author = Douglas C. Keller
Date = 1999
Publisher = IDNR

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
Author = Douglas C. Keller
Date = 1999
Publisher = IDNR

Title = Naiades of Pennsylvania
Author = Ortmann
Date = 1919
Publisher = Carnegie Museum

Appendix E-2: Aggregated Aquatic Systems

39. What are the research needs for ALL wildlife in all Aquatic Systems Habitats in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total
Life cycle	11% (7)	3% (2)	40% (26)	18% (12)	26% (17)	2% (1)	65
Distribution and abundance	11% (7)	22% (14)	41% (26)	13% (8)	13% (8)	2% (1)	64
Limiting factors (food, shelter, water, breeding sites)	15% (10)	32% (21)	32% (21)	11% (7)	8% (5)	2% (1)	65
Threats (predators/competition, contamination)	18% (12)	28% (18)	26% (17)	15% (10)	11% (7)	2% (1)	65
Relationship/dependence on specific habitats	15% (10)	20% (13)	38% (25)	12% (8)	12% (8)	2% (1)	65
Population health (genetic and physical)	6% (4)	12% (8)	29% (19)	32% (21)	17% (11)	3% (2)	65
Other (please specify below)	5% (1)	0% (0)	5% (1)	5% (1)	11% (2)	74% (14)	19
					Total Respondents		408

40. Other research needs for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Relationship(s) between population levels and population indices.
- How to produce more, larger crappie.
- Unknown.
- Harvest.
- Survival/nest success.
- Limiting factors and impacts of competition and predation.
- Very little is known about the basic natural history, population ecology and abundance in Indiana of the lesser siren.
- Research needs are not limited to river and stream habitats.
- Habitat needs are not completely understood. I have seen fresh dead cylindrical papershell in channelized ag ditches. Other small streams with good habitat have only weathered dead fragments.
- To find out why the Clubshell has depopulated most of its former distribution in Indiana. Developing some sort of timeline (late Pleistocene, Holocene (usually archaeological), or historic) for relic valve distribution might narrow the possibilities of critical limiting factors (post-settlement siltation, etc.).
- Determine population-limiting factors in the Ohio River.
- Cost effectiveness and periodic effective duration of local raccoon elimination.
- Socio-economic impacts of terminating commercial fishing use of commercial equipment in the lower West Fork and Middle East Fork White River.

Appendix E-2: Aggregated Aquatic Systems

43. How well do the following conservation efforts address the threats to ALL wildlife in all Aquatic Systems Habitats in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection (use below for details)	27% (16)	53% (31)	5% (3)	7% (4)	8% (5)	59
Population management (hunting, trapping)	20% (12)	31% (18)	2% (1)	39% (23)	8% (5)	59
Population enhancement (captive breeding and release)	2% (1)	8% (5)	2% (1)	83% (49)	5% (3)	59
Reintroduction (restoration)	10% (6)	14% (8)	3% (2)	68% (40)	5% (3)	59
Food plots	2% (1)	7% (4)	3% (2)	72% (42)	16% (9)	58
Threats reduction	7% (4)	25% (15)	5% (3)	46% (27)	17% (10)	59
Native predator control	2% (1)	7% (4)	5% (3)	80% (47)	7% (4)	59
Exotic/invasive species control	0% (0)	15% (9)	22% (13)	35% (21)	28% (17)	60
Regulation of collecting	7% (4)	37% (22)	20% (12)	24% (14)	12% (7)	59
Disease/parasite management	0% (0)	10% (6)	2% (1)	55% (32)	33% (19)	58
Translocation to new geographic range	5% (3)	8% (5)	2% (1)	75% (44)	10% (6)	59
Protection of migration routes	7% (4)	12% (7)	2% (1)	49% (29)	31% (18)	59
Limiting contact with pollutants/contaminants	9% (4)	49% (23)	6% (3)	30% (14)	6% (3)	47
Public education to reduce human disturbance	8% (5)	47% (28)	8% (5)	22% (13)	14% (8)	59
Culling/selective removal	3% (2)	10% (6)	3% (2)	69% (41)	14% (8)	59
Stocking	5% (3)	12% (7)	3% (2)	75% (44)	5% (3)	59
Other (please specify below)	0% (0)	0% (0)	4% (1)	9% (2)	87% (20)	23
				Total Respondents		954

44. Other current conservation practices for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Unknown
- Regulation of sport harvest. Closure of commercial fishery to allow spawning stock biomass to increase, thus allowing for the production of offspring that can eventually add to the spawning stock biomass.
- Habitat protection if it greatly reduced the turbidity in streams for hornyhead chub feeding and breeding behaviors. Also, exotic/invasive species control would help the hornyhead population. The hornyhead chub is sensitive to pollution so limiting contact with pollutants/contaminants would benefit the species. The hornyhead chub is also a popular bait fish, so regulation of collecting would be beneficial to the species.
- Habitat protection occurs in the form of the Clean Water Act, National Forest Management Act and other state and federal regulations that protect aquatic habitat and aquatic species. These regulations may or may not be enough for the sake of Orangethroat Darter conservation.
- Wildlife species listed as endangered are illegal to take/"collect." People need to be reminded of this.

Total Respondents

5

Appendix E-2: Aggregated Aquatic Systems

45. What one or two specific practices would you recommend for more effective conservation of ALL wildlife in all Aquatic Systems Habitats in Indiana?

- Habitat protection.
- Regulated trapping and nuisance animal control policies.
- Protection of aquatic and riverine habitats is essential. More programs or efforts to restore lost or degraded systems would be beneficial. Educational programs aimed to reduce incidental take would also benefit otters especially where population densities are lower.
- Prevention of stream channelization and other (pollution) habitat factors.
- Limit disturbance in nesting/migration habitat.
- Does not need conserving.
- Habitat protection - Actually, I mean habitat enhancement by adding more woody cover to the old impoundments where the former woody cover has decomposed.
- Habitat protection (without habitat the Mallard won't do well) Population management (makes use of surplus numbers and regulates take) "The Mallard" by John Madson Olin Mathieson Chemical Corporation.
- Habitat Protection (intensive) Reproduction and Protection, Ducks, Geese & Swans of North America, Bellrose Protection of Migrating Routes (intensive) Same
- Hen houses.
- Habitat conservation.
- Buffer zones.
- Completely eliminate commercial fishing. This appears to have reduced the spawning stock to a level that could not maintain a fishery.
- Habitat protection and education to reduce habitat disturbance.
- Assure there is no stocking of predator fish in cisco lakes.
- Greatly limit/mitigate any new development on cisco lakes, particularly addressing runoff from lawns and other water quality issues.
- Work to get any farmlands adjacent to cisco lakes into no-till.
- Implementation of ecozones in undeveloped areas to conserve that vegetation present.
- Implement a catch and release only regulation in lakes with low densities.
- Habitat management and harvest management.
- Habitat protection is the key, but we need to better understand factors that limit siren abundance & distribution.
- To best benefit the Wood Duck, one must first improve the habitat. This particular question seems redundant with #48.
- Therefore refer to my answer in box number 48.
- Habitat protection.

Appendix E-2: Aggregated Aquatic Systems

- Nest boxes.
- See #43. In addition, although not habitat specific, outreach programs are needed to effectively and accurately educate citizens about wildlife (game and non-game), the wildlife conservation model (for game and non-game), and the need for effective mink management programs.
- Protection of migration routes.
- Land use planning and education.
- Habitat protection through land use regulation. Agricultural runoff protection through education and land use planning.
- Habitat protection and Public Education.
- Habitat protection - erosion controls.
- Exotic species - possession of exotic species illegal (must dispose of fish properly and not release back to stream).
- Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.
- Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of some wildlife species. See same for protocols.
- Restoring the connection between the streams and the wetlands that were formerly associated with them to allow pike access to spawning areas. Current water management regimes often rely on pumping to fill restored wetlands, thus, fish passage is still restricted.
- Habitat protection and the possible reintroduction of the least darter into suitable habitats that have been restored.
- Habitat protection.
- Protect habitat by limiting the amount of dredging that occurs in the Kankakee watershed.
- Habitat protection and the possible reintroduction of the least darter into suitable habitats that have been restored.
- Habitat protection.
- The following applies to all mussel species. Educate anglers that it is ILLEGAL to use mussels as fishing bait.
- CREP, other incentives for BMP's.
- Limit instream modifications.
- See Watters, 2000. Proc. 1st FMCS Symposium.
- Restoration of stream channels, restoring or protecting stream channel function so that riffle habitats are enhanced or protected.
- Restoration or enhancement of riparian vegetation to enhance or protect stream channels from runoff or impacts to the channel.
- Maintenance of roads and stream crossings so that stream channel function and aquatic passage are maintained.
- Habitat protection.

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- Habitat protection.
- Eliminate instream modifications, including impoundment.
- Restore riparian corridor.
- See Watters, 2000. Proc. 1st FMCS Symposium.
- Strict enforcement of laws regulating instream modification; incentives to farmers.
- Propagation.
- Protect the shallow sand/gravel habitat from siltation and channelization, and keep the waters free of pollutants and toxins.
- Pollution control.
- Habitat protection or enhancement.
- Rock bass appear to be doing very well with little to no intensive management in streams where there is ample instream cover and good water quality. Therefore, habitat protection and contaminant reduction would be my recommendations.
- I am not sure what you are asking in this question. The best way to conserve the eastern sand darter would be to reduce sedimentation covering the sand substrate which the darter needs to survive and reproduce. Current efforts to reduce sedimentation in streams is somewhat effective, but I'm not sure if it is enough to keep the eastern sand darter from disappearing.
- Declare moratorium on channel/drainage "improvement" projects that do not mitigate losses.
- Pollution control - from waste water treatment plants and confined feeding operations.
- Habitat protection and enhancement.
- Strictly limit instream modifications.
- Remove existing dams wherever possible.
- See Watters, 2000. Proc. 1st FMCS Symposium.
- Limit instream modification.
- Restore free-flowing systems.
- See Watters, 2000. Proc. 1st FMCS Symposium.
- Public education.
- Regulation of collecting.
- Habitat protection/restoration and pollution control.
- Habitat protection and threats reduction.
- Re-stock, as too few if any turtles remain.
- End use of commercial fishing equipment.
- Do periodic local removal of raccoons.

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- Protection of the habitat against pollutants and toxins.
- Expand and liberalize the taking of raccoons so as to greatly reduce numbers associated with river cooter habitat.
- Raccoon reduction used re. sea turtles in FL and endangered Illinois mud turtle in IA, proposed for alligators. in LA
- Cease any future channelization plans and restore existing oxbow ponds - provide landowner financial incentive.
- Local restocking where raccoons reduced should hasten delisting criteria.
- Habitat protection.
- Threats reduction.

Total Respondents

51

Appendix E-2: Aggregated Aquatic Systems

46.	How well do the following conservation efforts address the HABITAT threats to ALL wildlife in all Aquatic Systems Habitats in Indiana?	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
	Habitat protection through regulation	14% (8)	58% (34)	12% (7)	3% (2)	14% (8)	59
	Habitat protection on public lands	20% (12)	53% (31)	5% (3)	12% (7)	10% (6)	59
	Habitat protection incentives (financial)	17% (10)	46% (27)	8% (5)	14% (8)	15% (9)	59
	Habitat restoration through regulation	16% (9)	40% (23)	5% (3)	17% (10)	22% (13)	58
	Habitat restoration on public lands	22% (13)	40% (27)	7% (4)	14% (8)	12% (7)	59
	Habitat restoration incentives (financial)	24% (13)	36% (20)	5% (3)	16% (9)	18% (10)	55
	Artificial habitat creation (artificial reefs, nesting platforms)	3% (2)	29% (17)	7% (4)	46% (27)	15% (9)	59
	Selective use of functionally equivalent exotic species in place of extirpated natives	0% (0)	5% (3)	3% (2)	68% (41)	23% (14)	60
	Succession control (fire, mowing)	2% (1)	9% (5)	7% (4)	71% (41)	12% (7)	58
	Corridor development/protection	12% (7)	37% (22)	3% (2)	32% (19)	15% (9)	59
	Managing water regimes	14% (8)	41% (24)	2% (1)	17% (10)	27% (16)	59
	Pollution reduction	20% (12)	60% (36)	2% (1)	7% (4)	12% (7)	60
	Protection of adjacent buffer zone	28% (17)	48% (29)	2% (1)	10% (6)	12% (7)	60
	Restrict public access and disturbance	7% (4)	20% (12)	17% (10)	41% (24)	15% (9)	59
	Land use planning	14% (8)	59% (35)	3% (2)	8% (5)	15% (9)	59
	Technical assistance	0% (0)	53% (31)	2% (1)	22% (13)	24% (14)	59
	Cooperative land management agreements (conservation easements)	19% (11)	46% (26)	4% (2)	12% (7)	19% (11)	57
	Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	100% (20)	20
Total Respondents							1,018

Appendix E-2: Aggregated Aquatic Systems

47. Other current HABITAT conservation practices for ALL wildlife in all Aquatic Systems Habitats in Indiana.

- Unknown
- Limiting disturbance through the construction (DOW) permit process.
- Habitat protection and restoration on all lands by any means necessary would benefit all species (except those that are exotic and more tolerant than others) not just the hornyhead chub. Pollution reduction, protection of adjacent buffer zone, land use planning, and conservation easements would all be beneficial practices to the Hornyhead chub.
- I am not aware of any of the above for which I marked "not used."
- Again, I don't know if these practices are working well in Indiana, but the best way to conserve the critical habitat for the eastern sand darter would be habitat protection on all lands through whatever means necessary, habitat restoration of the floodplain would also be critical to the amount of sedimentation reaching the stream bed, managing water regimes may also impact the settling of sediments in stream (thus dam removal may be appropriate), protection of adjacent buffer zone is key to stopping deleterious effects of erosion and sedimentation in the stream, land use planning and conservation easements would also keep the runoff to a minimum.

Total Respondents 5

Appendix E-2: Aggregated Aquatic Systems

48. What one or two specific HABITAT practices would you recommend for more effective conservation of ALL wildlife in all Aquatic Systems Habitats in Indiana?

- Habitat protection.
- Proper land use planning, at a watershed scale, would not only benefit otters but other aquatic and riparian species. Strict enforcement of existing pollution regulations, and if needed, development of stricter laws would be beneficial.
- Water regime management for migration habitat.
- Protection of nesting habitat along streams.
- Improve land use practices in watershed will reduce sedimentation in impoundments and reduce nutrient inputs.
- Reducing nutrient inputs will allow a deeper thermocline which is important for crappie growth. Crappie growth suffers when water temperatures become too high.
- Habitat restoration in the form of woody debris.
- In Army Corps of Engineers impoundments alterations in water level control would likely benefit crappie.
- Habitat protection through regulation (only sure way to protect habitat without public ownership) Purchase more public land.
- Habitat protection through regulation, (less intensive)cover a large geographic area. Ducks, Geese & Swans of North America, Bellrose.
- Habitat Protection through incentives, (intensive), best landowner cooperation, same.
- Landowner programs.
- Buffers.
- Habitat conservation regulations.
- Habitat creation, ie. artificial structures during lake construction projects.
- Pollution reduction and land-use zoning.
- Implementation of ecozones in undeveloped areas to conserve that vegetation present.
- Reduce inlet and upstream degradation. Increase awareness and cooperation of landowners to create better shoreline and tributary habitat.
- Habitat protection and restoration through regulation.
- Habitat protection. However more research is needed to address the effectiveness of habitat restoration on siren conservation.
- Corridor protection.
- Elimination of, or at the very least, reducing, the amount of stream channelization that occurs.
Restoration of bottomland hardwoods through the farmbill and other incentive type programs is also very good.
- Elimination of ditches and stream channelization.
- Protection of habitat through land use planning. Currently most of the headwaters areas run through agricultural

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areas and need to maintain riparian buffer strips.

- Protection and restoration of buffer zones.
- Protection of adjacent buffer zone.
- Non-point Source Pollution reduction.
- Assess riparian corridor and water quality monitoring (see Watters, 2000. Proc. 1st FMCS Symposium).
- Wetland restoration projects with connectivity to the stream or "corridor" development that allows passage to wetlands already restored. We need to move toward natural regulation of water levels instead of artificial means.
- Habitat protection through regulation.
- Protection of adjacent buffer zone.
- Habitat protection.
- Restrict disturbance to habitat (dredging, removal of debris).
- Any type of habitat protection/restoration-eliminate dredging.
- Habitat protection through regulation.
- Protection of adjacent buffer zone.
- Habitat protection.
- Restrict disturbance to habitat (dredging, removal of debris).
- Treat small streams as biological resources and not just drainage ditches. At the very least, require that a mussel survey be done before dredging.
- Promote riparian corridor.
- Limit habitat modifications.
- Streambank stabilization or stream restoration (reconstructing the channel to reconnect it to its natural floodplain elevation).
- Culvert or stream crossing structure improvement (replace non-functioning culverts or other crossing structures and replace with ones that function and are at the right elevation/location within the stream's longitudinal profile).
- Restoration of riparian vegetative communities through tree planting, etc.
- Habitat protection and Protection of adjacent buffer zone.
- Habitat protection.
- CREP and other incentives for BMP's.
- Restrict instream modifications.
- See Watters, 2000. Proc. 1st FMCS Symposium.
- No instream modifications.
- Limit runoff through incentives or other means.

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- See Watters, 2000. Proc. 1st FMCS Symposium.
- Manage pollutants and toxins, maintain available habitat through regulation and buffer zones, increase habitat through incentives, technical assistance and restoration.
- Protection of adjacent buffer zones (riparian corridor).
- Buffer/riparian zone protection - leads to improved water quality and more instream cover.
- Pollution reduction - improved water quality and fewer fish kills.
- Habitat protection.
- Land use planning.
- Protection of adjacent buffer zones (riparian corridor). More participation would likely occur with financial incentives.
- Restrict instream modifications.
- Restore free-flowing systems.
- Eliminate habitat modifications (in-stream dredging, channelization, etc.).
- See Watters, 2000. Proc. 1st FMCS Symposium.
- Buffer strips.
- Bank stabilization.
- Non-point source pollution reduction.
- Riparian conservation easements.
- Restoration of riparian zones, riffle protection/restoration.
- Habitat restoration and protection.
- Encourage return to natural meander channel (within flood control).
- Let dead trees in river stay; perhaps add some.
- Rehabilitate drained oxbow ponds through conservation easement.
- Oxbow pond conservation easements and restoration - prime feeding habitat.
- Enhance natural river channel evolution including point bar development and snags (downed trees in the water) - provides basking sites and nesting.
- Habitat away from row crop agriculture.
- Manage water quality and pollutants.
- Protection of adjacent buffer zones.
- Habitat protection.

Appendix E-2: Aggregated Aquatic Systems

49. Do you have any additional comments or information on ALL wildlife in ALL Aquatic Systems Habitat that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?
- Newts have a spotty distribution in Indiana. We need to better understand the factors that lead to this.
 - The IDNR reintroduction program appears to have successfully restored otters in select watersheds throughout the state. Populations are established near release sites, have expanded to adjacent habitats, and colonized areas not originally targeted for restoration. Public interest in this species remains high and the otter can serve as a profile species for wetland and riverine protection.
 - No.
 - No.
 - Kettle Lakes are limited in number, although habitat surrounding them can be manipulated. No new Kettle Lakes can be created so it is critical to provide protection through, regulations, incentives and management.
 - Provide information on habitat creation and farming techniques.
 - Provide incentives to create/maintain such habitat.
 - Much research work has been done on the yellow perch by Ball State University since the mid 1970's. This work serves as the framework for the management of the population in Indiana's waters of Lake Michigan. It is critical that funding for this project continue to maintain the dataset. It is the largest and longest dataset for yellow perch on all of Lake Michigan and has served as the foundation for many management decisions on sport and commercial harvest decisions.
 - We need to learn a lot more about lesser sirens in order to develop a good conservation design.
 - It has been over 20 years since the surveys were conducted, prior to the 2001-2004 surveys. It is important that surveys be conducted every 5 years or so to document changes to water quality, habitat and riparian zone protection.
 - The overall smallmouth bass population in this area is somewhat poor aside from the St. Joseph River. I believe this is mostly due to the lack of habitat and loss of buffer zones. Buffer zones are vital to the health of smallmouth bass populations. They supply and protect habitat that is vital to the survival of the smallmouth bass.
 - IDEM has collected hornyhead chubs from the Elkhart River (Elkhart & Noble counties), St. Joseph River (DeKalb County), Cedar Creek (Allen Co.), Yellow Creek (Elkhart Co.), and Pigeon River (Lagrange Co.). If you would like the data, we can provide water chemistry, biological, and habitat data assessments.
 - N/A
 - IDEM has captured least darters at the following locations: Ringeisen Ditch, Trib of Carpenter Cr, Keefe Ditch, Claude May Ditch, and Howe Ditch in Jasper County, Singleton Ditch in Lake Co., Weiss Ditch in Newton Co., and Minier Lateral in Benton Co.
 - IDEM has collected tadpole madtoms on the following streams: West Creek and Singleton Ditch in Lake County, Dausman Ditch in Kosciusko Co., Bogus Run in Starke Co., and Slough Creek in Jasper Co.
 - IDEM has captured least darters at the following locations: Ringeisen Ditch, Trib of Carpenter Cr, Keefe Ditch, Claude May Ditch, and Howe Ditch in Jasper County, Singleton Ditch in Lake Co., Weiss Ditch in Newton Co., and Minier Lateral in Benton Co.
 - IDEM has collected tadpole madtoms on the following streams: West Creek and Singleton Ditch in Lake County, Dausman Ditch in Kosciusko Co., Bogus Run in Starke Co., and Slough Creek in Jasper Co.
 - N/A
 - IDEM has captured many southern redbelly dace in their random fish sampling program. Most of these

Appendix E-2: Aggregated Aquatic Systems

specimens came from the Whitewater Basin in headwater streams <20 sq. miles with high gradient and high biological integrity.

- Too little is known about some wildlife species, especially Indiana populations.
- N/A
- N/A
- To find out just why the Clubshell depopulated so much of its former range, which once included much of the interior of Indiana. Knowing this "why" should disclose a critical limiting factor, and could lead to its future preservation.
- There is a great potential source for select avocational technical assistance (= volunteers) to undertake monitoring and survey where funding falls short.
- I would definitely search the internet for more information on specific studies done on the Eastern Sand Darter; however, I could not find much on the habitat itself in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage. IDEM has a list of sites of where Eastern Sand Darters have been collected with water chemistry and habitat (QHEI) assessments if interested.
- The length of this survey possibly destroys its usefulness as many/most experts will not have the time and or patience to do this for very many species; some may not even do it at all.
- No.
- N/A
- N/A
- No.
- The blue sucker population is doing well in the Wabash River and parts of the White River. Reintroduction into additional waterbodies is a possible option, but research is needed to determine why the population is healthy in the Wabash/White and not other Great Rivers.
- IDEM has collected spottail darters in Posey Co. on a tribe of Black River and Hawthorne Creek.
- Convince DNR that some restocking will be necessary (only known capture in Indiana in last 50 years died on DNR watch).
- Convince DNR that raccoon population reduction will be critical during early rehab (and important later on - increase recreational harvest).
- Put lower West Fork and Middle East Forks White River off limits to commercial fishing. Forget about Ohio R & lower Wabash (State cannot control).
- As with alligator snapping turtle, persuade DNR to take measures for significant raccoon reduction in/near river cooter habitat. Assuming cooter populations then increase, raccoon control remains desirable but less important. This species is herbivorous and thus not attracted to fish bait. Use of giant nets in oxbow ponds would trap cooters, which might then drown.
- This appears to be a resilient species that is relatively tolerant of some silt; it has expanded beyond rivers and streams and has taken up residence in reservoirs. If we afford it the broad protection (i.e., against pollutants and habitat destruction) that we attempt to give to mussels in general and to other components of our wildlife and environment, it should do well.
- IDEM has captured slough darters on the following streams: Turkey Cr (Clay Co.), Patoka R and N Fk Little Pigeon Cr (Dubois Co.), Patoka R and Yellow Cr as well as Smith Fk Pigeon Cr (Gibson Co.), Bruster Br and Flat Cr (Pike Co.), E Fk Crooked Cr (Spencer Co.), Busseron Cr (Sullivan Co.), and Lost Cr, Otter Cr, N Br Otter Cr in

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Vigo Co.

- No.

Total Respondents

35

Appendix E-3: Aquatic Systems

12. Please briefly describe the top two HABITAT threats to the Wildlife in Aquatic Systems Habitat in Indiana identified above.

Habitat degradation & fragmentation

1. Urban sprawl and regulations that allow loss of habitat. The human/beaver interface usually results with either the habitat being eliminated or the beaver being eradicated.

2. urbanization

Water pollution not only impacts otter reproduction (see previous section), but may also impact the quantity/quality of aquatic prey for otters. Loss of wetland habitats reduces amount of suitable habitat for otters.

Total Respondents 4

13. What current monitoring efforts by state agencies are you aware of for the Wildlife in Aquatic Systems Habitat in Indiana?

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by state agencies	50% (2)	50% (2)	4
Statewide once a year monitoring conducted by state agencies	25% (1)	75% (3)	4
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	25% (1)	75% (3)	4
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	100% (4)	4
Regional or local year-round monitoring conducted by state agencies	0% (0)	100% (4)	4
Regional or local once a year monitoring conducted by state agencies	0% (0)	100% (4)	4
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	100% (4)	4
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	100% (4)	4
		Total Respondents	32

Appendix E-3: Aquatic Systems

14. What current monitoring efforts by other organizations are you aware of for the Wildlife in Aquatic Systems Habitat in Indiana?

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by other organizations	0% (0)	100% (4)	4
Statewide once a year monitoring conducted by other organizations	0% (0)	100% (4)	4
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (4)	4
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (4)	4
Regional or local year-round monitoring conducted by other organizations	0% (0)	100% (4)	4
Regional or local once a year monitoring conducted by other organizations	25% (1)	75% (3)	4
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	25% (1)	75% (3)	4
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	25% (1)	75% (3)	4
	Total Respondents		32

15. How crucial are these monitoring efforts by state agencies for the conservation of the Wildlife in Aquatic Systems Habitat in Indiana?

	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
Statewide year-round monitoring conducted by state agencies	50% (2)	0% (0)	0% (0)	0% (0)	50% (2)	4
Statewide once a year monitoring conducted by state agencies	25% (1)	0% (0)	0% (0)	0% (0)	75% (3)	4
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	25% (1)	0% (0)	0% (0)	75% (3)	4
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Regional or local year-round monitoring conducted by state agencies	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Regional or local once a year monitoring conducted by state agencies	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4

Appendix E-3: Aquatic Systems

monitoring conducted by state agencies

Total Respondents 32

16. How crucial are these monitoring efforts by other organizations for the conservation of the Wildlife in Aquatic Systems Habitat in Indiana?

	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
Statewide year-round monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Statewide once a year monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Regional or local year-round monitoring conducted by other organizations	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Regional or local once a year monitoring conducted by other organizations	25% (1)	0% (0)	0% (0)	0% (0)	75% (3)	4
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	25% (1)	0% (0)	0% (0)	75% (3)	4
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	25% (1)	0% (0)	75% (3)	4
						Total Respondents 32

17. Regional or local state agency monitoring for the Wildlife in Aquatic Systems Habitat in Indiana.

State and county highway dept. monitor beaver activity only as flooding of roadways occur. IDNR property monitor and attempt to eliminate problems associated with flooding of adjacent private property. State Furbearer Biologist tracks and monitors trapping harvest data.

IDNR personnel monitor otter mortality (road-kills, trap-related, etc.) at a statewide level. Also, IDNR personnel conduct winter bridge/stream surveys for otter sign. These are conducted on a county basis at a statewide level.

Total Respondents 2

18. Regional or local monitoring by other organizations for the Wildlife in Aquatic Systems Habitat in Indiana.

Brodman, Saint Joseph's College
Cortwright, IUN

Appendix E-3: Aquatic Systems

None that I am aware of.

Total Respondents

2

Appendix E-3: Aquatic Systems

19. Please list organizations that are monitoring the Wildlife in Aquatic Systems Habitat in Indiana.

Brodman, Saint Joseph's College
Cortwright, IUN
IDNR

Total Respondents 2

20. What are the current monitoring techniques for the Wildlife in Aquatic Systems Habitat in Indiana?

	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
Radio telemetry and tracking	0% (0)	0% (0)	50% (2)	25% (1)	0% (0)	25% (1)	4
Modeling	0% (0)	25% (1)	50% (2)	0% (0)	0% (0)	25% (1)	4
Coverboard routes	0% (0)	0% (0)	33% (1)	33% (1)	0% (0)	33% (1)	3
Spot mapping	0% (0)	0% (0)	33% (1)	0% (0)	0% (0)	67% (2)	3
Driving a survey route	25% (1)	0% (0)	25% (1)	25% (1)	0% (0)	25% (1)	4
Reporting from harvest, depredation, or unintentional take (road kill, bycatch)	75% (3)	0% (0)	0% (0)	25% (1)	0% (0)	0% (0)	4
Mark and recapture	0% (0)	0% (0)	75% (3)	0% (0)	0% (0)	25% (1)	4
Professional survey/census	50% (2)	25% (1)	25% (1)	0% (0)	0% (0)	0% (0)	4
Volunteer survey/census	0% (0)	25% (1)	50% (2)	0% (0)	0% (0)	25% (1)	4
Trapping (by any technique)	50% (2)	25% (1)	25% (1)	0% (0)	0% (0)	0% (0)	4
Representative sites	0% (0)	33% (1)	33% (1)	0% (0)	0% (0)	33% (1)	3
Probabilistic sites	0% (0)	33% (1)	33% (1)	0% (0)	0% (0)	33% (1)	3
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1
							Total Respondents 45

Appendix E-3: Aquatic Systems

21. Other monitoring techniques for the Wildlife in Aquatic Systems Habitat in Indiana.

Techniques currently in use in Indiana appear to be covered by the selections above.

Total Respondents 1

22. What one or two monitoring techniques would you recommend for effective conservation of the Wildlife in Aquatic Systems Habitat in Indiana?

Aquatic surveys and minnow traps

Regulated trapping.

1. Stream surveys for otter sign.
2. Reporting (number, location, etc.) of unintentional take and biological data obtained from recovered specimens (reproductive parameters).

REFERENCE: Melquist, W.E., P.J. Polechla, Jr., and D. Towell. 2003. River Otter. Pages 708-734 in Wild Mammals of North America: biology, management, and conservation. 2nd edition. G.A. Feldhamer, B.C. Thompson, and J.A. Chapman (eds.), John Hopkins University Press, Baltimore, MD, 1216 pages.

Total Respondents 3

23. What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for the Wildlife in Aquatic Systems Habitat in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide annual inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Statewide once a year inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	25% (1)	75% (3)	4
Regional or local year-round inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Regional or local once a year inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
	Total Respondents		32

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24. What current HABITAT inventory and assessment efforts or activities by other organizations are you aware of for the Wildlife in Aquatic Systems Habitat in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide year-round inventory and assessment conducted by other organizations	0% (0)	100% (4)	4
Statewide once a year inventory and assessment conducted by other organizations	0% (0)	100% (4)	4
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	0% (0)	100% (4)	4
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	0% (0)	100% (4)	4
Regional or local year-round inventory and assessment conducted by other organizations	0% (0)	100% (4)	4
Regional or local once a year inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
	Total Respondents		32

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28. Regional or local HABITAT inventory and assessment by other organizations for the Wildlife in Aquatic Systems Habitat in Indiana.

1. Brodman, Saint Joseph's College in NW Indiana
Cortwright, IUN in Brown County

Total Respondents 1

29. Please list organizations that are monitoring this HABITAT for the Wildlife in Aquatic Systems Habitat in Indiana.

See #27.

Total Respondents 1

30. What are the current HABITAT inventory and/or assessment techniques for the wildlife in Aquatic Systems Habitat in Indiana?

	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
GIS mapping	0% (0)	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Aerial photography and analysis	0% (0)	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Systematic sampling	25% (1)	0% (0)	0% (0)	0% (0)	0% (0)	75% (3)	4
Property tax estimates	0% (0)	0% (0)	0% (0)	25% (1)	25% (1)	50% (2)	4
State revenue data	0% (0)	0% (0)	0% (0)	25% (1)	25% (1)	50% (2)	4
Regulatory information	0% (0)	0% (0)	0% (0)	25% (1)	0% (0)	75% (3)	4
Participation in landuse programs	0% (0)	0% (0)	25% (1)	25% (1)	0% (0)	50% (2)	4
Modeling	0% (0)	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Voluntary landowner reporting	0% (0)	0% (0)	0% (0)	25% (1)	0% (0)	75% (3)	4
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1
							Total Respondents 37

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31. Other HABITAT inventory and assessment techniques for the Wildlife in Aquatic Systems Habitat in Indiana.

No responses were entered for this question.

Total Respondents 0

32. What one or two HABITAT inventory and assessment techniques would you recommend for effective conservation of the Wildlife in Aquatic Systems Habitat in Indiana?

Systematic sampling & GIS

GIS technology appears to be the most feasible means for inventory and assessment of otter habitat at a statewide scale. I suspect analysis of aerial photos could be useful also, perhaps at a local scale. Unfortunately, I do not have any references.

Total Respondents 2

33. What is the current body of science for the Wildlife in Aquatic Systems Habitat in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		0	0%
Adequate		3	75%
Inadequate		1	25%
Nonexistent		0	0%
Other (please explain below)		0	0%
Total Respondents		4	

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- 34.** Please provide a citation (title, author, date, publisher) that would give the best overview of the Wildlife in Aquatic Systems Habitat in Indiana, if available. This resource may be used if further detail is needed.

Title = Amphibians and reptiles from 23 counties of Indiana.;

Author = Robert Brodman;

Date = 2003;

Publisher = Proceedings of the Indiana Academy of Science, 112: 43-54.

Title = Ten- to eleven-year population trends of two pond-breeding amphibian species, red-spotted newts and green frogs.
In Status & Conservation of Midwestern;

Author = Spencer Cortwright;

Date = 1998;

Publisher = University of Iowa Press, Iowa City

Title = Mammals of Indiana;

Author = Russell E. Mumford/ John Whitaker, Jr.;

Date = 1982;

Publisher = Bloomington Indiana University Press

Title = Indiana River Otter Reintroduction Program, 2000-2001;

Author = Scott A. Johnson;

Date = November 2001;

Publisher = Internal report, Indiana Department of Natural Resources, Bloomington, IN

Title = Restoring river otters in Indiana;

Author = Scott A. Johnson and Kim A. Berkley;

Date = 1999;

Publisher = Wildlife Society Bulletin 27:419-427.

- 35.** If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of the Wildlife in Aquatic Systems Habitat in Indiana. This resource may also be used if further detail is needed.

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36. What is the current HABITAT body of science for the Wildlife in Aquatic Systems Habitat in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		0	0%
Adequate		2	50%
Inadequate		1	25%
Nonexistent		0	0%
Other (please explain below)	Unknown - I suspect it exists, just not of aware of who or where!!	1	25%
Total Respondents		4	

37. Please provide a citation (title, author, date, publisher) that would give the best HABITAT overview of the Wildlife in Aquatic Systems Habitat in Indiana, if available. This resource may be used if further detail is needed.

Title = Mammals of Indiana;
 Author = Russell E. Mumford;
 Date = 1982;
 Publisher = Bloomington Indiana University Press

38. If possible, please provide a second citation (title, author, date, publisher) that would give another good HABITAT overview of the Wildlife in Aquatic Systems Habitat in Indiana. This resource may also be used if further detail is needed.

		Response Total	Response Percent
Title		0	0%
Author		0	0%
Date		0	0%
Publisher		0	0%
Total Respondents		0	

Appendix E-3: Aquatic Systems

39. What are the research needs for the Wildlife in Aquatic Systems Habitat in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total
Life cycle	0% (0)	0% (0)	25% (1)	25% (1)	25% (1)	25% (1)	4
Distribution and abundance	0% (0)	50% (2)	25% (1)	0% (0)	0% (0)	25% (1)	4
Limiting factors (food, shelter, water, breeding sites)	25% (1)	0% (0)	25% (1)	25% (1)	0% (0)	25% (1)	4
Threats (predators/competition, contamination)	25% (1)	25% (1)	0% (0)	25% (1)	0% (0)	25% (1)	4
Relationship/dependence on specific habitats	25% (1)	0% (0)	25% (1)	25% (1)	0% (0)	25% (1)	4
Population health (genetic and physical)	0% (0)	50% (2)	0% (0)	25% (1)	0% (0)	25% (1)	4
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1
							Total Respondents
							25

40. Other research needs for the Wildlife in Aquatic Systems Habitat in Indiana.

Relationship(s) between population levels and population indices

Total Respondents **1**

41. What are the HABITAT research needs for the Wildlife in Aquatic Systems Habitat in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total
Successional changes	0% (0)	0% (0)	25% (1)	25% (1)	25% (1)	25% (1)	4
Distribution and abundance (fragmentation)	25% (1)	0% (0)	25% (1)	25% (1)	0% (0)	25% (1)	4
Threats (land use change/competition, contamination/global warming)	25% (1)	25% (1)	0% (0)	25% (1)	0% (0)	25% (1)	4
Relationship/dependence on specific site conditions	0% (0)	25% (1)	0% (0)	50% (2)	0% (0)	25% (1)	4
Growth and development of individual components of the habitat	0% (0)	25% (1)	0% (0)	25% (1)	25% (1)	25% (1)	4
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1
							Total Respondents
							21

42. Other HABITAT research needs for the Wildlife in Aquatic Systems Habitat in Indiana.

No responses were entered for this question.

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Total Respondents 0

43. How well do the following conservation efforts address the threats to the Wildlife in Aquatic Systems Habitat in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection (use below for details)	25% (1)	75% (3)	0% (0)	0% (0)	0% (0)	4
Population management (hunting, trapping)	50% (2)	25% (1)	0% (0)	25% (1)	0% (0)	4
Population enhancement (captive breeding and release)	0% (0)	0% (0)	0% (0)	75% (3)	25% (1)	4
Reintroduction (restoration)	25% (1)	0% (0)	0% (0)	50% (2)	25% (1)	4
Food plots	0% (0)	0% (0)	0% (0)	75% (3)	25% (1)	4
Threats reduction	0% (0)	25% (1)	0% (0)	25% (1)	50% (2)	4
Native predator control	0% (0)	0% (0)	0% (0)	75% (3)	25% (1)	4
Exotic/invasive species control	0% (0)	0% (0)	0% (0)	50% (2)	50% (2)	4
Regulation of collecting	0% (0)	25% (1)	0% (0)	25% (1)	50% (2)	4
Disease/parasite management	0% (0)	0% (0)	0% (0)	50% (2)	50% (2)	4
Translocation to new geographic range	0% (0)	0% (0)	0% (0)	75% (3)	25% (1)	4
Protection of migration routes	0% (0)	25% (1)	0% (0)	25% (1)	50% (2)	4
Limiting contact with pollutants/contaminants	0% (0)	50% (2)	0% (0)	25% (1)	25% (1)	4
Public education to reduce human disturbance	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Culling/selective removal	25% (1)	0% (0)	0% (0)	50% (2)	25% (1)	4
Stocking	0% (0)	0% (0)	0% (0)	75% (3)	25% (1)	4
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
				Total Respondents		66

44. Other current conservation practices for the Wildlife in Aquatic Systems Habitat in Indiana.

No responses were entered for this question.

Total Respondents 0

45. What one or two specific practices would you recommend for more effective conservation of the Wildlife in Aquatic Systems Habitat in Indiana?

Habitat protection

Regulated trapping and nuisance animal control policies

Protection of aquatic and riverine habitats is essential. More programs or efforts to restore lost or degraded systems would be beneficial. Educational programs aimed to reduce incidental take would also benefit others.

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systems would be beneficial. Educational programs aimed to reduce incidental take would also benefit otters especially where population densities are lower.

Total Respondents 3

46. How well do the following conservation efforts address the HABITAT threats to the Wildlife in Aquatic Systems Habitat in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection through regulation	0% (0)	75% (3)	0% (0)	0% (0)	25% (1)	4
Habitat protection on public lands	75% (3)	0% (0)	0% (0)	0% (0)	25% (1)	4
Habitat protection incentives (financial)	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Habitat restoration through regulation	0% (0)	25% (1)	0% (0)	0% (0)	75% (3)	4
Habitat restoration on public lands	50% (2)	50% (2)	0% (0)	0% (0)	0% (0)	4
Habitat restoration incentives (financial)	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Artificial habitat creation (artificial reefs, nesting platforms)	0% (0)	0% (0)	0% (0)	50% (2)	50% (2)	4
Selective use of functionally equivalent exotic species in place of extirpated natives	0% (0)	0% (0)	0% (0)	75% (3)	25% (1)	4
Succession control (fire, mowing)	0% (0)	0% (0)	0% (0)	50% (2)	50% (2)	4
Corridor development/protection	0% (0)	25% (1)	0% (0)	0% (0)	75% (3)	4
Managing water regimes	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Pollution reduction	0% (0)	75% (3)	0% (0)	0% (0)	25% (1)	4
Protection of adjacent buffer zone	25% (1)	25% (1)	0% (0)	0% (0)	50% (2)	4
Restrict public access and disturbance	0% (0)	0% (0)	0% (0)	25% (1)	75% (3)	4
Land use planning	0% (0)	25% (1)	0% (0)	0% (0)	75% (3)	4
Technical assistance	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Cooperative land management agreements (conservation easements)	0% (0)	50% (2)	0% (0)	0% (0)	50% (2)	4
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1
						Total Respondents 69

47. Other current HABITAT conservation practices for the Wildlife in Aquatic Systems Habitat in Indiana.

No responses were entered for this question.

Total Respondents 0

48. What one or two specific HABITAT practices would you recommend for more effective conservation of the Wildlife in Aquatic Systems Habitat in Indiana?

Habitat protection

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Proper land use planning, at a watershed scale, would not only benefit otters but other aquatic and riparian species. Strict enforcement of existing pollution regulations, and if needed, development of stricter laws would be beneficial.

Total Respondents **2**

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- 49.** Do you have any additional comments or information on the Wildlife in Aquatic Systems Habitat that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?

Newts have a spotty distribution in Indiana. We need to better understand the factors that lead to this.

The IDNR reintroduction program appears to have successfully restored otters in select watersheds throughout the state. Populations are established near release sites, have expanded to adjacent habitats, and colonized areas not originally targeted for restoration. Public interest in this species remains high and the otter can serve as a profile species for wetland and riverine protection.

Total Respondents 2