

Facilitating the Effectiveness of State Wildlife Action Plans at Multiple Scales in the Upper Midwest/Great Lakes LCC:

Findings and Recommendations



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Facilitating the Effectiveness of State Wildlife Action Plans at Multiple Scales in the Upper Midwest/Great Lakes LCC:

Findings and Recommendations

Executive Summary

Overview

State Wildlife Action Plans (SWAPs) were developed in 2005 to address key wildlife issues in each state and meet eligibility requirements for state wildlife grant funding. These SWAPs, however, were not designed or intended to meet the conservation needs of biodiversity at the regional scale, nor did they provide the necessary detail to address threats at the local scale. Additionally, there has been no assessment of opportunities for action at a regional scale within the Upper Midwest/Great Lakes Landscape Conservation Cooperative (UM/GL LCC) region, and little coordination between the states and the LCC to address biodiversity conservation at the regional scale.

To facilitate more effective regional conservation, we first assessed and summarized the ongoing SWAP revisions across states in the Upper Midwest and Great Lakes LCC region via an online survey followed by targeted interviews with individuals. We shared that information with SWAP coordinators throughout the region, and then engaged them in a series of webinars and discussions covering topics identified by the SWAP coordinators. Once the draft of the SWAP revisions were completed in fall of 2015, we completed a meta-analysis of Species of Greatest Conservation Need (SGCN), habitats, geospatial frameworks, conservation opportunity areas, threats, and actions across the nine states. We also conducted a preliminary species prioritization assessment for the UM/GL LCC region and facilitated information sharing among SWAP Coordinators and LCC workgroups regarding conservation, information management, research priorities and key strategies.

Findings

Findings from the surveys, interviews, interactive webinars, and review of final draft SWAPs demonstrate the independent nature of SWAPs. By design, SWAPs focus conservation priorities and actions within their respective state borders. As a result, methodology to develop each SWAP is inconsistent from state to state. With few exceptions, each state took an independent approach in addressing the eight required elements. For example, each state utilized a different set of criteria for prioritizing SGCN and identifying conservation opportunity areas (COAs). The majority even used completely different habitat types and habitat classifications. The exceptions were New York and Pennsylvania; these states used the habitat classification system and mapping developed by The Nature Conservancy for the thirteen Northeast Region states.

Despite these inconsistencies, several states used similar criteria for prioritizing threats and actions, and a few states utilized the same or similar ecological frameworks. Most importantly, all nine states showed strong interest in and support for the development of a conservation network within the UM/GL LCC region. However, most states noted that regional collaboration needed to demonstrate significant benefits at the state and local scale as well as the regional scale in order for it to be successful.

Regarding SGCN, we found that 54 SGCN are common among at least 7 states; 29 are shared by at least 8; and 15 are shared by all 9 states within the UM/GL LCC region. Birds are, by far, the most numerous of shared SGCN (18 species). While this pattern did not result from any coordination among the states, it provides a potentially important foundation on which to build collaboration. A key step towards a priority list of regional SGCN is to collaboratively develop the criteria to identify and prioritize species at the multi-state scale.

Recommendations

Three broad recommendations are presented in the report to both enhance future SWAPs and facilitate a regional approach to conservation within the UM/GL LCC region. The first is for the states to adopt a consistent approach when addressing each of the eight elements. For example, developing and/or adopting a common habitat classification would give states a better understanding of habitat condition and trends in neighboring states and across the region. This in turn could be used as a criterion for prioritizing regional SGCN. Another example is using a consistent lexicon and prioritization method for addressing threats and conservation actions, allowing states to communicate across jurisdictions, and identify priority actions and threats at the regional scale. Ideally, the most significant threats and conservation actions would be linked to priority regional SGCN, habitats, and even conservation opportunity areas (COAs). The good news is that most states appear to already be using the standard threats and actions lexicon and taxonomy developed by Salafsky et al. (2008).

The second recommendation is to develop a regional conservation network; something that was strongly supported by most SWAP coordinators. A key element in the development of such a network is the adoption of a common, ecologically based geospatial framework. A common geospatial framework could provide one of the strongest foundations for promoting multi-jurisdictional collaboration in the region. As a terrestrial framework, the authors recommend the adoption of an existing nationwide framework, specifically the US Forest Service ecoregion classification (Bailey 1995). In considering aquatic frameworks, although most states are already using some level of USGS HUC watershed units (typically level 8), we recommend the Ecological Drainage Units (EDUs) developed by the National Fish Habitat Partnership (NFHP) as a more applicable framework for SWAPs. EDUs reflect similarities in geology and climate and are assumed to capture finer scale similarities between aquatic fauna within watersheds. If states are unwilling to adopt the EDU framework, the HUC watershed units are a good alternative. These national frameworks are both based on several ecological criteria and are spatially hierarchical, allowing states to apply different scales for different issues and purposes. Once adopted,

states would have ecologically defensible frameworks for identifying and prioritizing regional COAs that cross state boundaries.

Common geospatial frameworks would also provide an important tool for states to assess and prioritize both SGCN and habitats at multiple ecological scales, rather than being limited to prioritizing within each respective state. In addition, regional COAs provide a solid rationale for the prioritization of threats and actions. Many threats vary by intensity, severity, and scope across the landscape. Identifying a key set of threats that are specifically impacting a well-defined regional scale COA is an effective method for identifying and applying the most applicable conservation actions.

Third, in order to accomplish the goals and recommendations mentioned above, we also recommend that the SWAP coordinators and UM/GL LCC staff adopt the Collective Impact approach described by Kania and Kramer (2011). This approach is based on five major components that the authors feel are critical to successful collaboration, particularly for difficult, complex issues: 1) common agenda; 2) shared measurement system; 3) mutually reinforcing activities; 4) continuous communication; and 5) a backbone support organization. Despite the typical issues and obstacles associated with long-term collaborative efforts, the authors are highly optimistic that this group of SWAP coordinators will succeed in creating and maintaining a regional collaboration, ultimately resulting in a regional conservation network in the UM/GL LCC region.

Introduction

State Wildlife Action Plans (SWAPs) were developed in 2005 to address key wildlife issues in each state and meet eligibility requirements for state wildlife grant funding. These SWAPs, however, were not designed or intended to meet conservation needs of biodiversity at the regional scale, nor did they provide the necessary detail to address threats at the local scale. Additionally, there has been no assessment of opportunities for action at a regional scale within the Upper Midwest/Great Lakes Landscape Conservation Cooperative (UM/GL LCC) region, and little coordination between the states and the LCC to address biodiversity conservation at the regional scale.

By ignoring the regional scale issues of biodiversity, we risk spending limited resources in the wrong places, losing key wildlife populations, and missing critical opportunities for long-term conservation. The national network of LCCs was designed to address large scale natural resource challenges, and LCCs present a great opportunity to facilitate the identification and prioritization of regional conservation needs and development of regional strategies and actions, as well as securing necessary funds and resources. The SWAP revisions, due in late 2015, represent a tremendous opportunity for individual states to address biodiversity conservation at the multi-state scale, and likewise take a more regional perspective when developing their SWAP.

SWAPs were first developed by each state in 2005 to meet the eligibility requirements for state wildlife grant funding. SWAPs were designed to address key wildlife issues within each state and had no incentives for reaching out and collaborating with neighboring states. To develop the SWAP, each state in the region used a variety of data, information, methods, and tools resulting in several inconsistencies related to: 1) species of greatest conservation need (SGCN); 2) goals; 3) threats; 4) strategies; 5) geospatial frameworks; 6) conservation opportunity areas; 7) habitat classification; and 8) public participation.

To facilitate more effective regional conservation, we first assessed and summarized the ongoing SWAP revisions across states in the Upper Midwest and Great Lakes LCC region via an online survey followed by targeted interviews with individuals. We shared that information with SWAP coordinators throughout the region, and then engaged them in a series of webinars and discussions about: 1) barriers and constraints to SWAP development and implementation; 2) best management practices for addressing each of the eight elements; 3) recommendations for improving regional consistency and coordination; and 4) development of a regional conservation collaborative.

Project Objectives:

1. Ensure SWAP coordinators are properly informed and fully supportive of the project;
2. Complete a regional assessment of the most recent version of SWAPs in the UM/GL LCC in regards to the required SWAP elements, opportunities for regional approaches, and barriers and constraints to SWAP development and implementation;

3. Engage SWAP Coordinators in deliberative discussions to address: 1) recommendations for improving regional consistency and coordination; 2) roles for the LCC related to regional support and facilitation of conservation; and 3) barriers and constraints to SWAP development and implementation, including regional information management and delivery needs;

4. Compile information gained from Objectives 1 through 3 into a final report.

Additional Objectives:

Due to project efficiencies, additional funds were available to continue working with the SWAP coordinators and UM/GL LCC staff beyond the initial end date of the grant. Together, a set of additional tasks were identified to continue advancing knowledge about the SWAPs in the region. It is important to note that none of the draft SWAPs were completed until the fall of 2015 and these drafts may be revised again based on the final review. Below are the additional objectives:

1. Compile information of SGCN, habitats, and geospatial frameworks from all SWAPs and share with states and LCC workgroups;
2. Drawing on the SWAP data and other sources of information, conduct a species prioritization assessment at the regional scale;
3. Work with the LCC workgroups to integrate SWAP based priorities into Landscape Conservation Designs currently underway;
4. Facilitate information sharing among SWAP Coordinators and LCC workgroups regarding conservation and information management and research priorities and key strategies.

Anticipated Outcomes:

As a result of this work, the authors and funder anticipate the following long-term outcomes:

- Future SWAP revisions will incorporate new, regionally based information as it becomes available.
- Information sharing between states and the LCC will become a common business practice.
- Limited conservation resources will be directed to the most important places for biodiversity conservation in the region, and address regionally significant threats, strategies, conservation actions, and monitoring activities.
- Conservation investments in the region will be more targeted, strategic and collaborative.

Approach

The approach to achieving the objectives of the project was broken into three major categories: 1) preliminary assessment of the current status of SWAPs including insights into future directions for the region via surveys and interviews; 2) development and delivery of interactive webinars focused on the key issues identified by the SWAP coordinators; and 3) a meta-analysis across the nine states of specific required elements based on information provided in the final drafts of the 2015 SWAP revisions. Each of these tasks is discussed below, followed by the findings.

Early Assessment of 2015 SWAP Revisions

In March and April of 2014, we conducted a survey of SWAP Coordinators (and consultants where applicable) in all nine states via the online web service SurveyMonkey. The purposes of the survey were: 1) provide an early summary of 2015 SWAP revisions within the UM/GL LCC region; 2) identify innovations across states as they pertain to the eight required elements; and 3) evaluate the potential for regional conservation collaboration. Fortunately, we were able to collect survey responses from all nine states. Additionally, we followed up with short, targeted phone interviews to clarify certain responses or to gather additional information. The survey comprised 57 questions divided into three major sections:

- I. The eight required elements of SWAPs:
 1. Species of Greatest Conservation Need (SGCN);
 2. Habitats and Natural Communities;
 3. Threats;
 4. Conservation Actions;
 5. Monitoring
 6. Plan review (not included in surveys);
 7. Partnerships; and
 8. Public participation.
- II. General SWAP questions; and
- III. Regional collaboration.

After evaluating survey responses, to fill in gaps and answer questions raised by particular responses, we conducted phone interviews with a few Coordinators.

Interactive Webinars

To better engage SWAP Coordinators in the project, enhance their familiarity with each other and improve cross-boundary learning, we organized six webinars on topics identified as priorities by the Coordinators (Table 1). Through these webinars, we hoped to address best practices (Association of Fish and Wildlife Agencies 2012) for completing each of the eight required elements, identify novel or innovative approaches in use by states, identify barriers and constraints to SWAP development and implementation, and begin to formulate recommendations for improving regional consistency and coordination.

Presentations

To raise awareness of our project and gain insight from wildlife experts and SWAP practitioners, we presented our approach and interim findings in a variety of venues, including:

- Upper Midwest and Great Lakes LCC, SWAP Working Group (November, 2013)
- 2014 State Wildlife Action Plan National Workshop (July, 2014)
- Midwest Association of Fish and Wildlife Agencies (February, 2015)
- Biodiversity without Borders (April, 2015)
- Upper Midwest and Great Lakes LCC, Forest Conservation Working Group (January, 2016)

Review and Summary of 2015 Final Draft SWAP Revisions

Beginning in June of 2015 and continuing to the end of the project, we received drafts of SWAP chapters or entire reports from the SWAP coordinators. The final draft reports were due to USFWS by October 30, 2015, and revisions continued up until that date (and after in some cases). We set out to develop regional summaries by considering patterns, consistencies and inconsistencies among states for each of the SWAP components under review (SGCN, natural communities/habitats, threats, actions, conservation opportunity areas, and spatial frameworks).

In reviewing SGCN, habitats and natural communities, threats, and actions, we considered whether the SWAPs utilized common classifications (e.g., the IUCN taxonomies of threats and actions; Salafsky et al. 2008) and geographic frameworks (e.g., Bailey 1995). We also provided recommendations for moving towards regional collaboration under each of the SWAP components under review.

Findings and Recommendations

The findings from the tasks described above are summarized below and organized into three major categories: preliminary assessment of current status of SWAPs as well as insights into future directions for the region via surveys and interviews; summary of interactive webinars with an emphasis on regional collaboration; and a meta-analysis of specific elements within the final draft of the 2015 SWAP revisions. Recommendations for moving forward with regional collaboration are included within each element.

Regional Assessment of 2015 SWAPs and Perspectives of SWAP Coordinators Beginning 2015 Revisions

We completed a regional assessment of the 2015 SWAP revisions by conducting a survey of SWAP coordinators, and then followed up with phone interviews with specific Coordinators to fill in gaps. As described above, our survey was organized in three parts, and we have summarized the responses below with respect to each part. Following our compilation of survey responses, we conducted phone interviews with six of the nine state Coordinators to clarify some responses and gather additional information. These phone interviews provided additional insights that are incorporated into the summaries below. Survey questions and additional information regarding responses from each state can be found in Appendix A.

Survey Part 1. Eight Required Elements of SWAPs

1. Species of Greatest Conservation Need

All nine states are revising their SGCN, using different approaches that share some common components, and seven of the nine states are prioritizing the SGCN to focus on a subset. Most states have employed filters in developing the full list of SGCN, though one state is considering all native and naturalized species as SGCN. In prioritizing among SGCN, most states are incorporating information and data from species assessments and are still developing their criteria. Some are using a scoring approach, assigning point values to categories related to each of the criteria. Many states are using regional data, and most are also using new data and information, including climate change vulnerability ratings, new surveys, and updated species status ranks.

Challenges for SGCN include inadequate time to develop criteria, limited species data, coordinating with necessary experts, and building consistency across taxa. Coordinators recognize the importance of maintaining a consistent approach across taxa, prioritizing species so that actions will be focused, and employing a transparent, science driven approach. They also report that many partners will focus on habitats rather than species, so connecting the two is important, and that identifying SGCN that are data deficient is very important for filling those gaps.

SGCN Highlights

- Ohio applied the approach of scoring SGCN for biological and action importance, following Milsap et al. (1990)
- Pennsylvania developed a decision-making flowchart to aid in assessing and prioritizing SGCN

2. Habitats and Natural Communities

All states are updating their assessment of habitats and natural communities, employing several methods and approaches. Overall it seems that most states are struggling with habitat classification, accurate land cover data, and evaluating habitat condition. It also appears that each state is taking an independent approach to applying an ecoregional framework. The most common challenges include the quality of land cover data layers, availability of a standardized habitat framework, and addressing disturbed and changing (due to climate change and other factors) natural communities. There is strong recognition that species habitat requirements can differ from natural community types, and that tracking land cover change doesn't necessarily reflect species status. However, a standardized classification adopted by multiple divisions and agencies within a state can be a very powerful tool that meets a number of conservation needs. One state (IN) suggested keeping this section of the plan simple by only using major habitat types, and applying ecoregional boundaries to address any heterogeneity within these major habitat types. Most states are incorporating the most current version of data layers they typically use in such analyses such as heritage data, land cover, and revised natural community classification. Only one state mentioned identifying and mapping priority habitat areas in their SWAP revision (however, we understand most states have or will be taking this approach).

Habitats and Natural Community Highlights

- Illinois organized their SWAP by Campaigns that reflect issues related to wildlife management
- Indiana evaluated landscape condition via focal species models

3. Threats

All states are updating their threat assessments, with most employing the IUCN taxonomy of threats and vulnerability assessments. Several distinct challenges were identified, including limited staff time, inadequate climate change impact data, political sensitivity (including the word "threat"); integration of threats at the species, natural community or landscape level; lack of quantitative data on threat severity and extent; lack of standard definitions of threats across taxa and threat rating categories. Several states noted that they haven't reached this point in the process yet. Coordinators offered several lessons learned, including using standard language, framework, and definitions to allow for cross-state consistency; strongly link threats and conservation actions (to enable measuring effectiveness); and limit threats to just high-priority. States are incorporating new information from funded SWG projects and climate vulnerability information, among other sources. Two novel approaches include 1) prioritizing threats by major habitat type and planning area, and 2) adopting a "healthy systems" approach to avoid alienating partners.

Threats Highlights

- Minnesota, recognizing that "threat" can be a politically loaded term, chose a "healthy systems" approach

4. Conservation Actions

Most states are utilizing or plan to utilize as many tools as possible to adequately address conservation actions (e.g., spatial prioritization, ranking, IUCN taxonomy, and results chains). Of all the elements in

the plan, states acknowledged that this is the section where “the rubber meets the road.” Due to limited resources, most states recognized that they need to avoid the lengthy, laundry list of things that could be done, and instead work out a process that prioritizes the most significant conservation actions. A common theme was the importance of making a strong connection between SGCN, priority threats, specific actions to mitigate those threats, and quantifiable outcomes of those actions. This is the section of the Plan that conservation partners also tend to focus on the most. It was suggested that it would be beneficial to identify existing efforts, plans, and programs that could help implement specific actions mentioned in the Plan. Overall, states recommended that this section needs to be concise, prioritized, well-organized, and as user-friendly as possible to help ensure a high level of conservation impact.

Conservation Action Highlights

- Michigan developed actions for each of their “Priorities”, which are generally habitats or natural communities

5. Monitoring

Monitoring is probably the most problematic and complex of all the required elements. It involves tracking three major elements of the Plan: 1) SGCN; 2) habitats and natural communities; and 3) conservation actions. With so much that needs to be monitored, it’s difficult to stay focused, develop a succinct set of clear questions, and remain diligent on tracking trends over time. A specific challenge mentioned is the difficulty in collecting data on all ongoing, recent, and planned monitoring efforts in the state. Not surprisingly, most states are struggling with this section and are unsure of how best to approach it. For monitoring SGCN, some examples included: conservation based monitoring (CBM) and focusing only on existing monitoring efforts. For monitoring habitats, specific examples included: a volunteer based natural areas stewards program, focusing on monitoring the effectiveness of specific habitat management actions, and using an existing systems based monitoring project as a model for other ecosystem types in the state. For monitoring actions, examples not mentioned previously included: developing results chains from Open Standards, determining a set of outputs that should be monitored at different spatial scales, and applying the effectiveness measures framework developed by AFWA.

Despite the challenges associated with monitoring, states provided a number of lessons learned:

- Focus monitoring on the effectiveness of your actions
- Document benchmarks early on and make sure monitoring questions are very clear
- Have a communication PROCESS in place to share monitoring results in order to facilitate adaptive management across divisions and organizations
- Take advantage of established or new Citizen Science Programs
- Partnerships are critical to success

Monitoring Highlights:

- Wisconsin is implementing a Community-Based Monitoring and Stewards program
- Minnesota has developed a Grasslands Monitoring project with multiple partners

- Iowa is gaining efficiency through a Multi-Species Inventory and Monitoring project in which species that co-occur are monitored together

6. Review Process (did not address this element in the survey)

7. Partnerships

The most popular forms of partnerships mentioned were: working groups, communities, and the collaborative conservation model. Also mentioned were MOUs and other type of formal interagency agreements. Numerous challenges were mentioned. The biggest challenges are time and funding both for agency staff and partners. However, there were many lessons learned as well. One of the most common lessons learned was that good coordination requires a common focus, beneficial outcomes for all members, and effective people and communication skills. There were also numerous suggestions mentioned for maintaining partnerships. Most of these suggestions revolve around the idea of putting more agency resources into tracking and facilitating implementation of the Plan.

Partnership Highlights:

- Minnesota has created a Long-term Driftless Areas Timber Rattlesnake Partnership to monitor and conserve this SGCN
- As mentioned above, Minnesota’s Grasslands Monitoring project involves multiple projects

8. Public Participation

Across the board it was recognized that it’s very difficult to engage the general public in any type of large scale plan. Lack of time, staff, and expertise in public outreach are common challenges. As a result, one of the most common approaches mentioned in addressing public participation was to have targeted partnerships with a limited but diverse set of conservation organizations. This common response however, is actually more in line with element 7 – Partnerships. Other common approaches were public notification, a website, and targeted presentations. One of the key lessons learned was that in order for public input to be useful it needs to be targeted to a specific issue rather than input on the whole plan. Another suggestion was to take your message to the public via existing groups by getting on their agenda and attending their meetings. For maintaining partnerships included: website, social media, newsletter, stakeholder meetings, and mechanisms already established in the agency.

Public Participation Highlights

- Pennsylvania Game Commission Communication staff are developing a communication plan that will serve as a template for the Northeast region

Survey Part 2. General SWAP Questions

SWAP Coordinators identified various important focal issues for this revision including making the plan more user-friendly, repackaging content and clarifying messages, and better linking SGCN to habitat types, threats, conservation actions and outcomes. They also recognized the importance of setting priorities and focusing on habitat needs, conservation areas and critical actions to ensure long-term

viability. Improving monitoring and developing better data and access to tools were also mentioned. Staff time and resources are the major limiting factors.

To adjust to these challenges, many Coordinators are increasing focus or limiting scope to priority habitats and actions, and some are simply lowering expectations or working harder. Additional strategies include gaining early support within their agency, communicating regularly, reallocating staff, developing working groups, and putting resources towards building a robust database. Almost every state mentioned successes of their SWAPs:

- IN - highly committed WAP advisory committee of approximately 30 partners
- WI - provides an annual update on implementation of the WAP
- MI - targeted insect surveys and updated S-ranks (using NatureServe S-rank calculator) have led to several species that can be taken off the SGCN list. Promoted by press releases, government delivery stories and a 5-year highlight report.
- IL - several partners have embraced the plan and use it as an operational guide, and the IDNR Wildlife Division has realigned key staff positions to parallel the plan
- IA - increased information on species occurrences due to the Multi-Species Inventory and Monitoring project
- MN - in the process of developing a new funding and marketing strategy to help communicate successes to non-scientists
- NY - population restoration of both spruce grouse and Hellbender; promoted via press releases
- PA - targeted surveys have led to the delisting of 10 state listed species (details in 2013 summary report)

Survey Part 3. Regional Collaboration

All participants described various models that could be used to help increase regional collaboration within the Upper Midwest/Great Lakes LCC region. However, there was a wide range of recommendations from very formal (e.g., formal organization with defined governance structure) to less formal (e.g., informal but regular meetings) arrangements. A common thread among the recommendations was having a dedicated facilitator to lead the effort. Numerous challenges were also mentioned. The most commonly mentioned challenges were time, travel restrictions, tight budgets all of which lead towards state priorities trumping regional priorities. The most popular opportunity mentioned for establishing a regional collaboration was the UM/GL LCC. Several states mentioned that the LCC could play a leadership role, and should be strengthened with respect to both its role and funding. In addition, research and information delivery were also both mentioned several times as good opportunities along with well-established funding sources (Cooperative State Wildlife Grants, Great Lakes Restoration Initiative, Joint Venture, etc.). The most commonly mentioned priorities for the collaboration to focus on were: 1) climate change and 2) regional coordination of priority species and

habitats. In regards to a specific regional model, only two existing regional collaborations were identified as potential models to learn from: the Northeast Regional Conservation Needs Partnership, and the Western Governors Association. Most importantly, SWAP Coordinators appeared to be highly motivated in developing a regional collaboration in the UM/GL LCC region.

Summary of Interactive Webinars

As the primary tool for sharing informing and best management practices across the nine states, a total of six webinars were developed and presented to the SWAP coordinators between July, 2014 and December, 2015. The topics of the webinars were chosen by the SWAP coordinators (Table 1).

Table 1. Dates and topics of webinars conducted during the UM/GL LCC SWAP regional coordination project.

Date	Topic
7/30/2014	SGCN and Habitats
8/20/2014	Threats and Actions
9/17/2014	Monitoring
10/15/2014	Regional collaboration
11/19/2014	Climate change
12/17/2014	Maintaining momentum

Most webinars consisted of the project leaders and a subset of the SWAP Coordinators, depending on their availability. These webinars were generally well attended and coordinators participated freely in discussions. We gained significant insight into the progress and challenges experienced by the Coordinators regarding each individual topic.

A key theme that was consistently shared with the coordinators throughout the first two webinars was applying the Open Standards for Conservation Practices (Open Standards) methodology whenever practical. Open Standards is a standardized conservation planning tool that has been adopted by over two dozen international and national conservation organizations, and been applied across the globe at multiple scales. Many of the best practices promoted by AFWA for SWAP development originate from Open Standards. For example, the standard lexicon for threats and actions (developed by Salafsky et al. 2008) that is promoted by AFWA is an integral part of Open Standards. In addition to the standard lexicon, the webinars promoted the use of 1) standardized prioritization criteria for conservation targets (SGCN, habitats) threats, and actions; 2) situation diagrams for priority threats; and 3) results chains for priority strategies. Information was also shared about the Miradi software program that was developed to develop, organize and track all information related to Open Standards.

The remaining four webinars primarily focused on moving forward once the SWAP is completed. The one exemption was the special topic of climate change. Each state recognized the significance of climate

change to SGCN and their habitats; they also equally recognized the difficulty in addressing climate change in a meaningful way. To provide the best information on climate change, experts were brought in to share their knowledge and insights. Dr. Kimberly Hall (Climate Change Ecologist for The Nature Conservancy) and Dr. Michelle D. Staudinger and Dr. Alexander Bryan of the Northeast Climate Science Center provided the latest science on climate change and how best to integrate the information and tools into SWAPs.

Regional collaboration webinar

Prior to launching into the additional objectives, we conducted one last survey of the nine SWAP coordinators. This was done as part of the monthly webinar focused on regional collaboration. Although several questions regarding regional collaboration were included in the initial survey (see above), the authors thought that a meaningful group discussion about regional collaboration could build the foundation for real collaboration in the future.

The beginning of the regional collaboration webinar was spent discussing goals and obstacles. The primary goal identified by the group was the “strategic conservation of multi-state priorities.” The biggest threat to achieving that goal was lack of effective coordination on multi-state threats and conservation priorities. Contributing factors included: 1) lack of shared goals; 2) inconsistent frameworks, classifications, and prioritization methods; 3) fragmented management/conservation of large or widely distributed targets; 4) inadequate ability to address large scale threats; 5) inconsistent communication; 6) fragmented information; and 7) lack of a lead organization (figure 1).

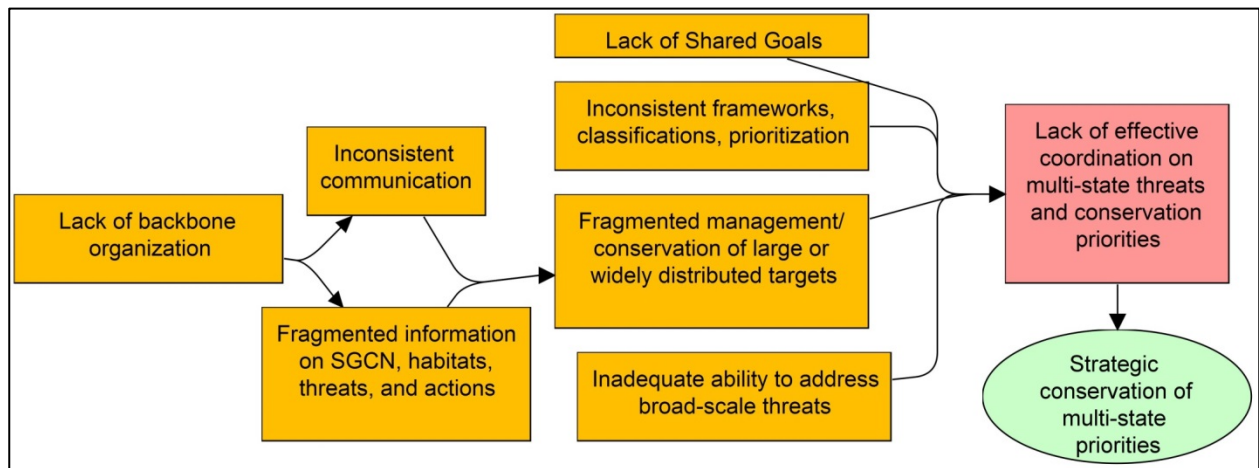


Figure 1. Situation Diagram for the development of a regional conservation network within the UM/GL LCC region.

Additional obstacles, not mentioned previously, to developing a regional conservation network within the UM/GL LCC were: 1) lack of interest, political will and commitment from upper levels of management; and 2) working within a state agency culture that doesn’t reward proactive planning, innovation, or risk. These are both large, difficult, high level factors, that will require a major cultural shift in Wildlife agencies across the country.

A recent paper, *Collective Impact* (Kania and Kramer 2012), was chosen to help frame the discussion on regional collaboration within the context of financial, policy, political, structural and cultural challenges. Collective Impact encompasses five key components that lead to successful collaboration: 1) Common agenda; 2) shared measurement system; 3) mutually reinforcing activities; 4) continuous communication; and 5) backbone support organization. The premise behind Collective Impact is that a complex problem requires a diverse set of organizations to resolve it. Each organization brings their own set of strengths to the table, together providing the right set of skills and resources. A summary of findings for each Collective Impact component follows.

1. Common Agenda

Common agenda refers to a shared vision for change; one that includes a common understanding of the problem and a joint approach to solving it through agreed upon actions. The group mentioned several items as a common agenda for a multi-state SWAP collaboration:

- Regional set of priority SCGN and natural communities/habitats
- Common threats, conservation actions, and implementation plan
- Regional level goals that ensure the long term viability of priority habitats
- Addressing important migration corridors

2. Shared Measurement System

According to Collective Impact, a shared measurement system should: 1) collect data and measure results on a consistent basis; 2) use a short list of indicators to minimize confusion and focus limited resources; and 3) hold each other accountable and learn from each other's successes and failures. SWAP coordinators have a shared measurement system for tracking and reporting actions for the conservation of species (Wildlife TRACS), which has standardized language, measurements and indicators. It is envisioned that Wildlife TRACS will allow states to summarize work being done across the UM/GL LCC region via Wildlife TRACS. If states can agree to set regional goals and objectives, they will also need to be able to measure their progress at the regional scale.

Another way to approach a shared measurement system is from the bottom up. Once each state has determined their priorities, it could be easier to reach across state lines to see what states have in common in terms of SGCN, habitats, threats, and conservation actions. This type of information sharing could lead to shared goals and landscape conservation tools that identify where states should prioritize their efforts.

Perhaps more important than a software program for tracking actions within states, is common language shared across states. As presented earlier, each state has and will be taking an independent approach to each of the eight required elements. Given the nature of SWAPs, this is not a surprising outcome. However, regional scale conservation would benefit tremendously from a common language, methodology, and/or classifications across the states. Ideas provided by the SWAP coordinators for a shared measurement system included:

- Shared natural community/habitat classification

- Common spatial frameworks (aquatic and terrestrial)
- Common terminology to assist with communication and monitoring

3. Mutually Reinforcing Activities

In regards to mutually reinforcing activities, each participant undertakes the specific set of activities at which it excels in a way that supports and is coordinated with the actions of others in the group. Competitive State Wildlife Grants (cSWGs) may be one example of that. Competitive SWGs have provided examples of funding across state boundaries for a common priority species. States agree to do similar work for species or habitat and set common benchmarks. However, certain elements appear to be missing to meet the definition of true collaboration. States may have a common approach, common species, metrics, and activities, but mainly states come together to do things they are already doing. There needs to be a discussion on how to take collaboration to the next level. Several coordinators felt that mutually reinforcing activities can only happen if states have a regional set of priorities they are all working towards. A good example that was provided by the group is the Great Lakes Piping Plover Working Group which consists of multiple states, universities and the USFWS.

4. Continuous Communication

Everyone in the group agreed that they are ready and willing to regularly communicate with their SWAP counterparts. Most agreed that they already have support and resources necessary to participate in regular communication (phone, webinar). However, many stated a lack of travel approval which limits direct, face-to-face communication. Also, several noted insufficient buy in (consent, agreement) from their supervisors, and that overcoming this constraint would be aided by making the case and explaining the benefits to the state agency. Suggestions for fostering continuous communication across the UM/GL region include:

- Monthly calls, 1 hour in length
- Agency staff working groups (e.g., invasive species, forests, river systems, prairies and savannas)
- Make it part of daily work flow
- Continue UM/GL LCC SWAP focal area
- Continue monthly webinars on focused topics
- Hire a facilitator to organize and run purposeful meetings
- Make the effort sound important

5. Backbone Support Organization

A backbone support organization refers to a separate organization and staff with a very specific set of skills to serve as the backbone for the entire initiative. According to Kania and Kramer (2012), the expectation that collaboration can occur without a supporting infrastructure is one of the most frequent reasons why it fails. A key factor for success is that dedicated staff, separate from the participating organizations, plan, manage, and support the initiative. All but one participant agreed that successful regional collaboration will require a backbone organization to provide leadership and support across the nine state region. Suggestions for a potential backbone organization included:

- UM/GL LCC
- Midwest Association of Fish and Wildlife Agencies
- Third party entity made up of all partners in the SWAP, conservation groups, and agencies. Make sure that collaborative entity represents all potential users (inside and outside the agencies)
- USFWS directly or by contracting with an organizer

Potential Outcomes of Regional Collaboration:

Once all of the five components of collective impact were discussed in detail on how they could be applied to regional collaboration, the group discussed potential outcomes of adopting this type of collaborative framework for the UM/GL LCC framework. Below is a list of tangible outcomes developed by the SWAP coordinators that could result from adopting a framework, such as Collective Impact, and working towards the high level goal of a regional conservation network.

- Process and methodology for setting regional priorities
- Regional set of SGCN and habitat priorities
- Multi-state habitat connectivity strategy
- Knowledge of how each SWAP is connected to other SWAPs
- Understanding of how each state is working towards LCC priorities and tracking joint progress
- Regional collaboration becomes part of daily work flow for each state
- Effective learning environment for SWAP coordinators

Summary of Final Draft 2015 SWAP Revisions and Recommendations for moving forward at the Regional Scale

This section essentially addresses the additional project objectives identified at the end of the original project period. First and foremost, we wanted to gain a better understanding of how each state actually addressed each of the key required SWAP elements in their 2015 update. This information allowed us to examine the similarities and differences amongst states, as well as identify the next steps for moving forward at the regional scale.

SGCN Summary

Selecting Species of Greatest Conservation Need (SGCN) is a key feature of State Wildlife Actions Plans (SWAPs). SGCN provide the foundation for each of the seven required elements that follow, and provide the basis for why SWAPs exist in the first place. Information was received from all nine states regarding SGCN. The number of SGCN by state ranged from a high of 891 (Ohio) to a low of 259 (Michigan) (Table 2). The average number of SGCN across the nine states was 497. In all states but two, insects and other invertebrates comprised the most numerous group of SGCN. In New York, birds were the most numerous, and in Iowa, fish outnumbered birds, with insects and other invertebrates placing third in total number. Across all states, insects and other invertebrates averaged double the number of SGCN (231) relative to birds, which had the second highest average (92).

Table 2. Summary of SGCN by taxonomic grouping and state.

Taxon Groupings	IL	PA	WI	IA	OH	IN	MI	MN	NY	Avg.
Amphibians	15	18	3	16	39	13	9	8	12	15
Birds	83	91	67	107	195	48	45	90	103	92
Fish	80	64	26	142	164	25	26	42	64	70
Freshwater Mollusks	38	50	24	37	79	24	38	30	27	39
Insects/invertebrates	213	400	262	65	314	494	111	131	93	231
Mammals	12	19	13	17	56	21	13	27	11	21
Reptiles	25	22	18	39	44	20	17	15	24	25
Marine Life	0	0	0	0	0	0	0	0	32	4
Totals	466	664	413	423	891	645	259	343	366	497

In total, there were 2,434 different species identified as SGCN across the nine states within the LCC region (Table 3). Insects and other invertebrates (e.g., snails) topped the list with 1,468 SGCN. This group was followed by birds (298) and fishes (268). There were an additional 96 species included in the state lists, however these species were identified as data deficient; states needed additional information on these species before determining whether or not they should be listed as a SGCN.

As a first step in identifying regional priority SGCN, we summarized the number of species shared across multiple states (Table 3). Birds are the most numerous of common SGCN, with 10 species that are common to all 9 states; 7 shared among 8 states; and 11 shared among 7 states (for a total of 28 out of the 54 species that are shared by at least 7 states; Table 3). This pattern is not surprising, given that birds are the most mobile of taxonomic groups, and many avian SGCN – though rare or declining – have relatively large ranges. More details on these shared SGCN appear below in our recommendations for regional SGCN.

Table 3. Number of SGCN shared by one or more states, by taxonomic grouping.

Taxon Groupings	Number of states with common SGCN									Total SGCN*
	9	8	7	6	5	4	3	2	1	
Amphibians	0	1	0	1	5	4	9	9	33	62
Birds	10	7	11	12	21	26	31	52	128	298
Fish	1	1	3	10	8	23	42	97	83	268
Freshwater Mollusks	0	2	3	12	10	22	12	16	32	109
Insects/inverts	1	0	5	7	16	32	79	224	1,104	1,468
Mammals	1	2	2	0	4	7	6	16	52	90
Reptiles	2	1	1	3	3	6	14	23	46	99
Marine Life	0	0	0	0	0	0	0	0	40	40
Total	15	14	25	45	67	120	193	437	1,518	2,434

*Total does not include data deficient SGCN.

Identifying and Prioritizing SGCN

Although each state used a slightly different approach to identifying and prioritizing their SGCN, there are several similarities (Table 4). One of the biggest similarities is the consideration of all species within six major taxonomic groupings (amphibians, birds, fish, freshwater mollusks, mammals, and reptiles). Due to the large number of invertebrates (typically > 10,000 per state) coupled with the lack of information on many of these species, each state only reviewed a subset of invertebrates. Additionally, New York is the only state that contains habitat for marine life. All states considered rarity at the federal and state scales, albeit in different ways. Most states simply considered a species legal listing, however some states such as Pennsylvania considered global and state rarity ranks (NatureServe) as an alternative approach. The majority of states also considered if a species was experiencing significant declines over the past couple of decades. In addition, the majority of states also considered the importance of their state to the long-term viability of a taxon. This included the percentage of the state compared to the taxa’s overall range, and the importance of the state in regards to the taxa’s population distribution. A few states also considered other factors such as vulnerability to genetic isolation, and the level of impact a significant external threat may pose to a taxa’s long-term viability, such as climate change, pollution, invasive species, disease, urban development, or pest outbreak.

Table 4. Summary of criteria used to identify SGCN in each state.

Criteria	MN	IA	WI	IL	MI	IN	OH	PA	NY
Complex Method							X*		
Federally E, T, or C	X	X		X	X	X		X	X
State E, T, or SC	X	X		X	X	X		X	X
Declining population trends	X	X	X	X	X			X	X
Expert Opinion		X							
State Responsibility	X		X					X	X
Global rarity			X	X				X	
National rarity		X							
State rarity		X	X						
Vulnerability			X						
Dependent on Rare, vulnerable, or declining habitats				X					
Endemic				X					
Significant Threats								X	
Prioritization				X	X		X	X	X

* based on Milsap’s (1980) approach.

Five of the nine states employed some type of prioritization process to help focus future conservation, research, and outreach efforts on a subset of SGCN. These states recognized that due to limited financial, institutional, and staffing resources, they couldn't possibly address the needs of every SGCN on their respective lists. States that prioritized included: Illinois, Michigan, Ohio, Pennsylvania, and New York, with each state taking a different approach to prioritization. Michigan, for example, used targeted habitats and issues to limit their number of SGCN, and then identified a small subset (3-4) of focal species within each of these categories. The assumption was that actions taken to conserve the focal species will also benefit all (or most) species associated with each habitat or issue. Other states, such as Ohio, took a more methodical approach. Ohio applied an established methodology developed by Milsap (1980) that reviewed all 891 SGCN. The result is that each species receives a score and relative ranking based on eight key criteria.

The broad scale habitat with the highest number of associated regional SGCN was grasslands. If you include prairies and savannas with the general category of grasslands (which includes anthropogenic grasslands such as pasture and hayfield), the total number of SGCN associated with that system is fourteen. This represents 41% of the priority regional species. Based on this quick analysis, it appears that grasslands, savannas and barrens (including all variations) should be targeted as priority habitats for conservation at the regional scale. Given the relatively high number of rare bird, insect, reptile, and plant species associated with grassland and savanna systems, this is not a surprising result. Native grassland and savanna systems in the upper Midwest region have suffered major habitat losses since the early 1800's, and are considered to be some of the most imperiled ecosystems in the world (Bachland 2001). Habitat losses were primary caused by the conversion of native prairies and savannas to agriculture due to their highly productive soils and lack of trees to clear for soil preparation. Native grasslands have also suffered from fire suppression, habitat fragmentation, invasive species, and urban development.

Recommendation: Develop Regional SGCN

Table 5 presents a subset of SGCN across the nine states based on several criteria. The first criterion was the number of states that listed the species as a SGCN, drawing from the set of 54 SGCN that are shared by at least 7 states. The second criterion was the number of states that listed the species as a high priority. However, only five of the nine states were willing to prioritize SGCN at the regional scale. The primary issue for developing regional SGCN was sensitivity to the individual state decision making process. Another issue mentioned by several states was lack of an agreed upon set of criteria for prioritizing species at the regional scale. Utilizing these two simple criteria, a total of 34 species were identified as a potential set of priority regional SGCN for the nine states located within the UM/GL LCC region (Table 5). Birds was the taxon with the highest number of priority regional SGCN (18).

Table 5. Summary of potential priority SGCN within the nine states of the Upper Midwest Great Lakes LCC region.

Scientific name	Common name	Major Habitat Type	MN	WI	IA	IL	IN	MI	OH	PA	NY	# States listing species as SGCN	# States listing species as priority SGCN	Total # States listing species as SGCN
Birds														
<i>Ammodramus henslowii</i>	Henslow's sparrow	Gr	1	1	1	2	1	2	2	2	2	4	5	9
<i>Chlidonias niger</i>	Black tern	NFW	1	1	1	2	1	2	2	2	2	4	5	9
<i>Rallus elegans</i>	King rail	NFW	1	1	1	1	1	2	2	2	2	5	4	9
<i>Nycticorax nycticorax</i>	Black-crowned night-heron	W	1	1	1	2	1	2	2	2	1	5	4	9
<i>Ammodramus savannarum</i>	Grasshopper sparrow	Gr	1	1	1	2	0	2	1	2	2	4	4	8
<i>Bartramia longicauda</i>	Upland sandpiper	Gr	1	1	1	2	1	0	2	2	2	4	4	8
<i>Dolichonyx oryzivorus</i>	Bobolink	Gr	1	1	1	2	0	0	2	2	2	3	4	7
<i>Melanerpes erythrocephalus</i>	Red-headed woodpecker	Sa, Gr	0	1	1	2	0	1	2	2	2	3	4	7
<i>Sturnella magna</i>	Eastern meadowlark	Gr	1	1	1	2	0	0	2	2	2	3	4	7
<i>Asio flammeus</i>	Short-eared owl	Gr	1	1	1	1	1	1	2	2	2	6	3	9
<i>Lanius ludovicianus</i>	Loggerhead shrike	Sa, Gr	1	1	1	1	1	1	2	2	2	6	3	9
<i>Setophaga cerulea</i>	Cerulean warbler	FF	1	1	1	1	1	2	2	2	1	6	3	9
<i>Charadrius melodus</i>	Piping plover	OB	1	1	1	1	1	2	1	2	2	6	3	9
<i>Vermivora chrysoptera</i>	Golden-winged warbler	ESF	1	1	1	1	1	2	0	2	2	5	3	8
<i>Protonotaria citrea</i>	Prothonotary warbler	FF	1	1	1	1	0	1	2	2	2	5	3	8
<i>Cistothorus platensis</i>	Sedge wren	NFW	1	0	1	1	1	0	2	2	2	4	3	7
<i>Sterna hirundo</i>	Common tern	OB	1	1	0	1	0	2	2	2	1	4	3	7
<i>Tyto alba</i>	Barn owl	Gr	0	0	1	1	1	1	2	2	2	4	3	7
Fish														
<i>Acipenser fulvescens</i>	Lake sturgeon	LR	1	1	1	2	1	2	2	2	1	5	4	9
<i>Polyodon spathula</i>	Paddlefish	LR	1	1	1	2	0	0	2	2	2	3	4	7
<i>Anguilla rostrata</i>	American eel	GL	1	1	1	1	0	0	2	2	2	4	3	7
<i>Clinostomus elongatus</i>	Redside Dace	R	1	0	1	1	1	2	2	2	0	4	3	7
Freshwater Mollusks														
<i>Epioblasma triquetra</i>	Snuffbox	R	1	1	1	1	1	2	2	2	0	5	3	8
Insects														
<i>Erynnis martialis</i>	Mottled duskywing	Sa, Pr	1	1	1	1	1	1	2	2	2	6	3	9
<i>Erynnis persius persius</i>	Persius duskywing	Sa, Ba	1	1	0	1	1	1	2	2	2	5	3	8
<i>Atrytonopsis hianna</i>	Dusted Skipper	Ba, Pr	1	1	1	1	1	2	2	2	0	5	3	8
<i>Plebejus melissa samuelis</i>	Karner Blue	Pr	1	1	0	1	1	2	2	2	0	4	3	7
Mammals (bats)														
<i>Myotis septentrionalis</i>	Northern myotis	F	1	1	1	1	1	2	2	2	2	5	4	9
<i>Myotis lucifugus</i>	Little brown myotis	F	1	1	1	1	1	2	2	2	2	5	4	9
<i>Perimyotis subflavus</i>	Eastern pipistrelle	F	1	1	1	1	1	2	2	2	2	5	4	9
<i>Myotis sodalis</i>	Indiana myotis	F	0	0	1	1	1	2	2	2	2	3	4	7
Reptiles														
<i>Sistrurus catenatus catenatus</i>	Eastern massasauga	NFW,	1	1	1	1	1	2	2	2	2	5	4	9
<i>Emydoidea blandingii</i>	Blanding's turtle	W	1	1	1	2	1	1	2	2	2	5	4	9
<i>Crotalus horridus</i>	Timber rattlesnake	DF	1	1	1	1	1	0	2	2	2	5	3	8

Scores: 1 = SGCN; 2 = priority SGCN. Habitat types (in alphabetical order): Ba = Barrens; DF = Deciduous Forest; ESF = Early Successional Forest; F = Forest; FF= Floodplain Forest FW = Forested Wetland; Gr = Grassland; Pr = Prairie; LR = Large River; NFW = Non-Forest; OB = Open Beach; R = River; Sa = Savanna; Wetland; W = Wetland; WP = Wet Prairie.

Habitats

For the 2015 SWAP revision, all states were required to “identify the extent and condition of wildlife habitats and community types essential to the conservation of the species identified under Element 1” (AFWA 2012). Although we found in our surveys that most states recognized the benefits of a common system for classifying habitats, and that a recommended best practice is to “use a well-accepted hierarchical vegetation classification standard to classify land cover or habitats for SWAPs” (Association of Fish and Wildlife Agencies 2012), six of the nine states employed classifications specific to their state, the only exceptions being Indiana, New York, and Pennsylvania (Figure 2). Indiana adopted the NatureServe ecological systems classification (Comer et al. 2003; Figure 4), whereas New York and Pennsylvania both used the Northeast regional classifications of aquatic and terrestrial habitats (Ferree and Anderson 2013). However, since the Northeast regional classification is based on NatureServe ecological systems, the classifications of these three states are very similar and represent a potential foundation on which the rest of the states in the region could build for the next SWAP revision. Below we describe the approaches used by each state.

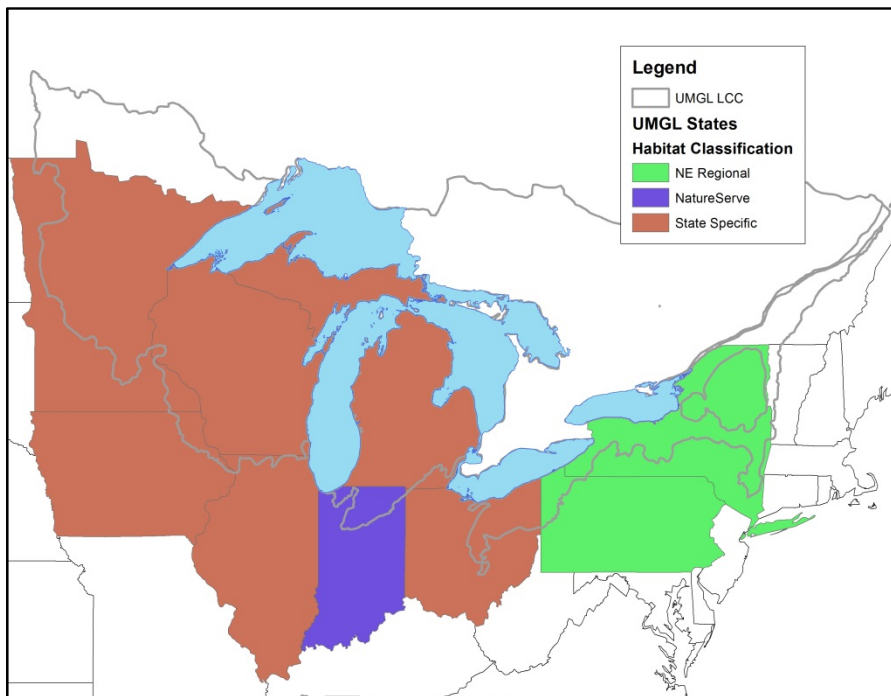


Figure 2. Habitat classification approaches used by states in the UM/GL LCC in their 2015 SWAP revisions.

The nine states varied with respect to their approach to identifying or classifying habitats and assessing extent and condition. Most states used a broad habitat classification (macro categories), augmented by a list of more specific habitats or natural communities (micro categories). The number of macro habitats ranges from 2 (in Iowa) to 39 (in New York) (Table 6), with these habitats numbering in single digits in all but two states (Pennsylvania and New York). Similarly, these two Northeastern states describe the most micro habitats – 54 and 85, respectively. This pattern reflects the level of detail in the northeast regional

classifications relative to those employed by Midwestern states in their SWAPs (see Appendix B for a full list of habitats).

Recognizing the inconsistency among states with respect to classification approaches, we cross-walked all named habitats in the micro category to 2011 NLCD land cover classes (US Geological Survey 2014; Figure 3). This cross walk (full details in Appendix 1) reveals much greater similarity in overall richness of land cover classes addressed in the SWAPs than suggested by the habitat classifications; NLCD classes number between 7 and 12 across all states (Table 6).

Table 6. Number of habitats (macro and micro categories) and NLCD land cover classes in each state in the UM/GL LCC.

State	# of Macro Categories	# of Micro Categories	# of NLCD Cover Classes
IA	2	18	8
IL	5	22	7
IN*	8	42	10
MI*	3	12	7
MN	2	16	7
NY*	39	84	12
OH	3	15	7
PA	27	54	11
WI*	8	101	9

*Some habitats or priorities did not match any NLCD classes (two in IN, three in MI, and one each in NY and WI), so those were eliminated from this tally.

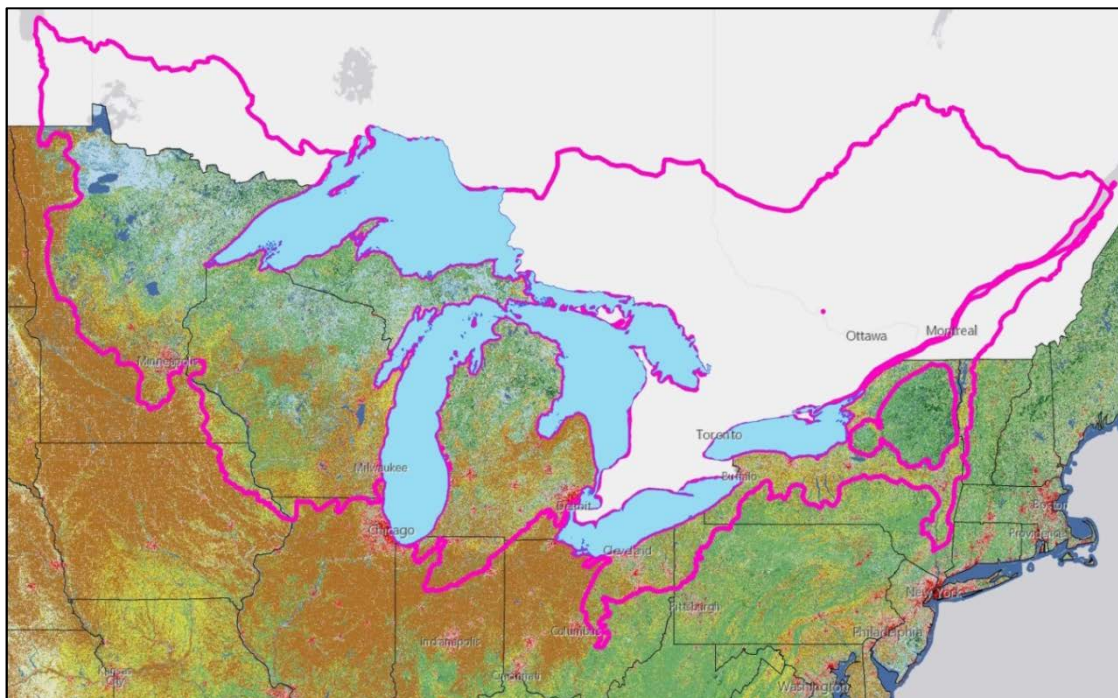


Figure 3. National Land Cover Dataset, Land Cover Classes in the UM/GL LCC.

Exploring a little more deeply using the NLCD classification, we found that aquatic habitats were the most numerous across the LCC, and that three states (NY, PA, and WI) incorporated at least twice as many aquatic habitats (streams, lakes, and a few marine systems in NY) than other states (Table 7). Again, the Northeast regional habitat classification provided NY and PA with a detailed, regional system, which they adopted. Wisconsin relied on their state Heritage program classification, which includes a detailed list of aquatic communities. Several NLCD classes were fairly numerous in multiple states (i.e., total 30-45 across the LCC) including Grassland/Herbaceous, Emergent Herbaceous Wetlands, and Woody Wetlands (all exceeding 40), and Barren Lands and Deciduous Forest. These classes are all quite common across the LCC and a few – especially grasslands and wetlands – contain numerous SGCN, as described in the section on SGCN. Not surprisingly, the NLCD cover classes with the lowest number of habitats and least frequency of use (Scrub/Shrub, Cultivated Crops, and Pasture/Hay) are very rarely linked to SGCN and are not typically a focus in the SWAPs. In this highly agricultural LCC, though, agricultural lands can't be ignored, and the Farmland and Prairie campaign in the Illinois SWAP is perhaps the most fully developed focus on these lands in the region. Illinois also chose to focus a campaign in urban areas – the Green Cities campaign – though not distinct urban habitats are identified in that SWAP. Several other states included developed lands as habitats and are beginning to recognize urban areas as an important focus.

Table 7. Tally of NLCD cover classes recognized as micro-habitats by states in the UM/GL LCC for the 2015 SWAP revisions.

NLCD Code	NLCD Cover Class	IA	IL	IN	MI	MN	NY	OH	PA	WI	Total
11	Open Water	11	4	10	4	2	51	7	23	26	138
21-24	Developed (all classes)	1		4			2	1	1	1	10
31	Barren Land		2	5	1	2	7	1	4	12	34
41	Deciduous Forest	1	5	3	1	2	3	2	9	5	31
42	Evergreen Forest	1		2	1	1	2	1	1	8	17
43	Mixed Forest			2			4		3	9	18
52	Shrub/scrub						2		1		3
71	Grassland/Herbaceous	1	4	9	2	2	4	2	2	17	43
81	Pasture/Hay	1	1				3				5
82	Cultivated Crops	1		1			1		1		4
90	Woody Wetlands		2	3	1	4	10		10	12	42
95	Emergent Herbaceous Wetlands	2	4	3	2	3	7	1	4	17	43
	Grand Total	19	22	42	12	16	96	15	59	107	388

The consistency of approaches used by PA and NY, as compared with the other seven states, reflects a long history of independent natural community and landscape classification in the Midwest relative to the Northeast. As compared with the Northeast region, states in the UM/GL LCC are larger and have a long history of independence with respect to landscape and natural community classification. The Great Lakes also impose significant physical barriers between Midwestern states and inhibit cross-boundary

coordination on these efforts. Nevertheless, there is substantial similarity across UM/GL states, and concurrence on a regional habitat classification would greatly facilitate comparisons and cross-boundary implementation of SWAP actions.

Minnesota

The Minnesota SWAP (Minnesota Department of Natural Resources 2015) employs a state-specific framework of broad “target habitats” based on habitats used by target species within each Conservation Focal Area (CFA). There is no statewide prioritization of habitats. Target habitats within each CFA description were cross walked to DNR Natural Plant Communities (Aaseng et al. 2011) to provide more specific guidance to managers.

Iowa

The Iowa SWAP uses the Iowa 2009 High Resolution Land Cover dataset (Iowa Departments of Natural Resources 2009) for terrestrial habitats. The classification of aquatic habitats in the Iowa SWAP was developed specifically for the SWAP. The SWAP identifies habitat preferences for each SGCN to inform habitat restoration, and recommends four principles for protecting lands in Iowa, in addition to listing five rare or sensitive natural communities (NatureServe) as most important. Maps and assessments of habitat distribution and abundance are presented in a framework of US EPA Level III and IV ecoregions and watersheds.

The Iowa SWAP establishes a goal to protect four percent of the state; currently only two percent is protected. This goal is predicated on the importance of protecting remnant or restored natural habitats, and is augmented by a second goal that “Protected habitats will be diverse, representative, native plant communities in large and small blocks on public and privately owned land and waters.”

Wisconsin

The Wisconsin SWAP (Wisconsin Department of Natural Resources 2015) defines habitats as natural communities, following the Wisconsin Natural Heritage classification system, and associates these natural communities with SGCN. These natural communities are grouped into eight broad habitat types and summarized with respect to: 1) association with ecological landscapes; 2) associations with SGCN; 3) issues and actions identified for each natural community type. Communities *per se* are not prioritized; rather, the relationships among SGCN, natural communities, and ecological landscapes were each scored, and those scores are intended to “*be used individually and in combination to make decisions about protection, resource use and land management at different scales.*”

Illinois

The Illinois SWAP Implementation Plan (Illinois Department of Natural Resources 2015) defines a broad set of habitats corresponding to five of the eight SWAP campaigns, augmented by more specific habitat types within each campaign. Within the descriptions of each campaign, the Implementation Plan links SGCN to both broad and specific habitat types, and provides results of threat assessments for these.

Indiana

The Indiana SWAP (Indiana Department of Natural Resources 2015) employs NatureServe ecological systems (Comer et al. 2003) as habitats, grouped within eight major habitat types, plus some special

habitats and new unique habitats (mud flats and Lake Michigan). The SWAP stratifies assessments of habitat location, condition, and threats within custom planning regions, which are described in the section below on Ecoregional Frameworks. In addition, it presents an assessment of change in habitats by cross-walking the National Land Cover Database (US Geological Survey 2014) to eight major habitat types within these same planning units. The assessment of habitat condition is based on the findings of two surveys: 1) evaluation of habitat condition relative to individual SGCN, and 2) evaluation of the condition of each major habitat type within each planning unit.

Michigan

Of the 15 priorities in the Michigan SWAP, 12 are habitats (four aquatic, four terrestrial, and four wetlands). Most of these are broadly defined, and for each terrestrial and wetland habitat, the SWAP provides a list of associated natural communities as defined by the Michigan Natural Features Inventory (Cohen et al. 2015). Maps of the distribution of these habitats are provided; terrestrial habitats are mapped in an ecoregional context (Albert 1995) and aquatic habitats are mapped within each of the four Great Lakes basins that surround Michigan. Habitats are not directly prioritized, but the priorities within the SWAP are mostly habitats that were identified based on an assessment of SGCN.

Ohio

The Ohio SWAP presents fifteen broad habitat categories based on Ohio's pre-settlement habitat, habitat information from the ODNR Division of Natural Areas and Preserves Natural Heritage Database Program, and expert opinions. These often include several sub-habitat categories. An assessment of threats and actions is presented for each habitat category, as is information on distribution – including a map – status, description, associated SGCN (comprehensive list), and a description of the Conservation Opportunity Areas (COAs) that contain each major habitat.

Pennsylvania

The SWAPs for Pennsylvania and New York each define habitats based on the terrestrial and aquatic habitat classifications for the Northeastern United States (Ferree and Anderson 2013). They also both characterize distribution and condition of these habitats within state-specific physiographic regions (for terrestrial habitats) and watersheds (for aquatic habitats). These two states represent the only ones in the UM/GL LCC that share a common, regional classification system for habitats.

New York

(See narrative for Pennsylvania, above).

Recommendations for Regional Habitats

Although most states chose to utilize a state-specific system for classifying habitats, a standardized regional habitat classification for the nine states was strongly recommended by the coordinators as a key outcome of regional collaboration. Three states chose some type of existing regional classification system to represent habitats: Indiana, New York, and Pennsylvania. Indiana adopted the NatureServe ecological systems classification (Comer et al. 2003), whereas New York and Pennsylvania both used the Northeast regional classifications of aquatic and terrestrial habitats (Gawler et al. 2008; Olivero and Anderson 2008; Ferree and Anderson 2013).

New York and Pennsylvania benefited from regional efforts to standardize habitat mapping data for both streams and terrestrial ecosystems. In addition, a geospatial condition analysis for the Northeastern region was recently completed (Anderson et al. 2013). This analysis project assesses several important condition metrics of 116 terrestrial and aquatic habitats across the Northeast, and the final report is a companion to the Northeast Habitat Guides and presents additional information on the different levels of condition and human impact upon the habitats in the region:

<https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Pages/geospatial.aspx>.

No such standardization exists for the Upper Midwest and Great Lakes region. The SWAP coordinators recognize the benefits of a common habitat classification, and we recommend that the UM/GL LCC SWAP working group evaluate the costs and benefits of such regional standardization. Two nationwide systems – the National Land Cover Dataset (figure 3) and NatureServe’s Ecological Systems (Figure 4) – would seem to hold the most promise. We’ve completed a preliminary crosswalk of the micro-habitats in the 2015 SWAPs to the NLCD (Appendix B), which could serve as a starting point towards use of that system. Perhaps more effective would be to dovetail to the Northeast regional terrestrial and aquatic habitat classifications, which are based on NatureServe’s Ecological Systems.

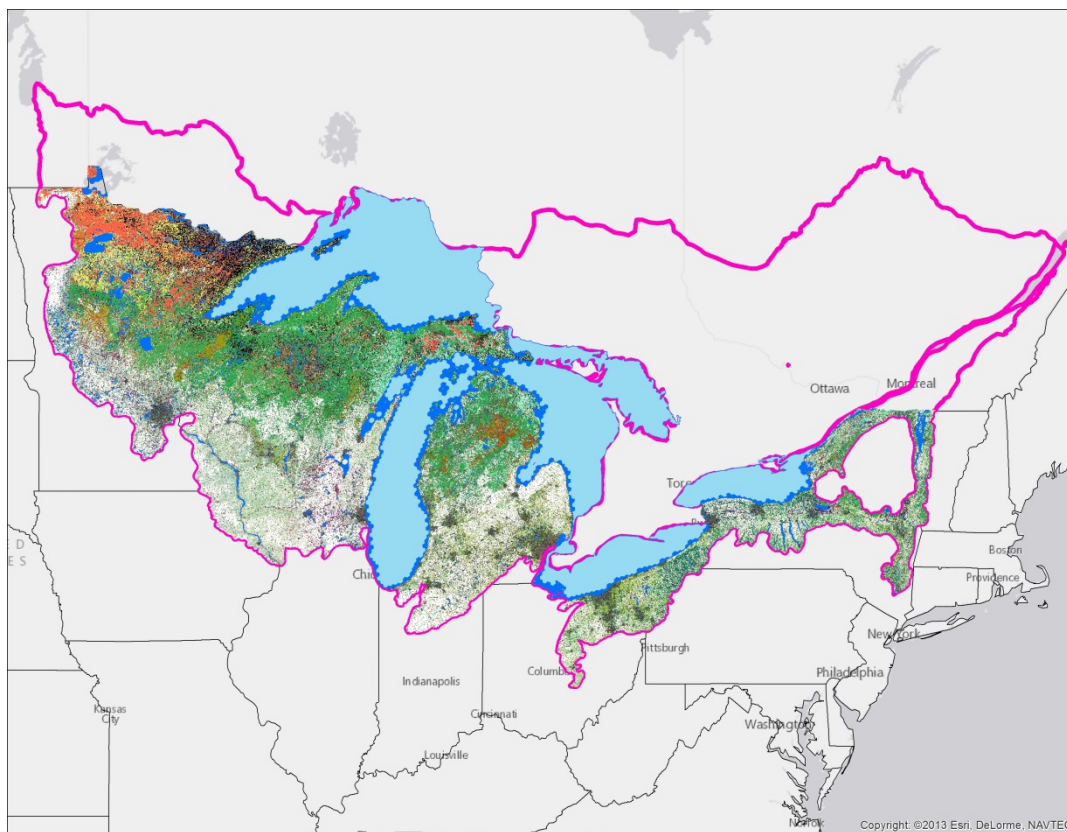


Figure 4. NatureServe Habitat classification for the Upper Midwest Great Lakes LCC region.

Ecoregional Frameworks

Landscape-scale management of wildlife often necessitates working across geopolitical boundaries. Geographic frameworks that are based in ecological principles, such as climate, physiography, soils, vegetation, and hydrology or some combination of these (e.g., Bailey 2004), can provide a common system for setting priorities, planning actions, and measuring progress. These ecologically based frameworks are usually referred to as ecoregions – when based on terrestrial factors – or watersheds or hydrologic units when based on surface drainage systems. Other examples, such as Bird Conservation Regions (Bird Studies Canada and the North American Bird Conservation Initiative 2014), are based on distributions and habitat for a particular group of species. Each of these frameworks is independent of geopolitical units and preferable for many reasons and can facilitate multi-jurisdictional, collaborative forest management. Moreover, these frameworks facilitate assessment and planning and are – for land and water management purposes – an important component of shared measurement systems, a condition of collective impact (Kania and Kramer 2011).

Broadly speaking, ecoregions and hydrologic units (i.e., watersheds or ecological drainage units) are used independently or jointly for a variety of management and planning purposes. These two broad kinds of frameworks can be misapplied; Omernik and Bailey (1997) point out several general advantages for using these frameworks and provide guidance for applying ecoregions and watersheds in combination or separately:

- Organisms do not follow geopolitical boundaries. Species ranges and the distribution of natural communities or habitats are governed by climate, soil, and biogeographic constraints. Management for species or natural community objectives therefore is most effectively conducted using ecological frameworks.
- At broad scales, ecologically based units correspond to broad patterns of biological distribution and land uses, thus informing assessments of integrity, threats and actions. These kinds of assessments, if conducted within geopolitical units, can be biased or misleading if only a portion of a species' range is contained within that unit, for example, whether it is the predominant portion or a tiny amount.
- At fine scales, repeating ecologically based units can be a basis for developing management and monitoring actions that would apply across multiple occurrences of the same 'type' of ecosystem or watershed. There are many examples of management recommendations for particular kinds of ecosystems or watersheds.
- Terrestrial ecoregions and watersheds provide two complementary frameworks, each with advantages for particular applications (Omernik and Bailey 1997).

At the continental or national scale, there are two commonly used ecoregional frameworks, including the US Forest Service Ecoregions (Bailey 1995, McNab et al. 2007) and US Environmental Protection Agency ecoregions (Omernik and Griffith 2014, Wiken et al 2011). There are other continental frameworks that have been developed for specific purposes, such as the Bird Conservation Regions (BCRs) developed by the Joint Venture programs. BCRs are aggregations of Level III ecoregions

developed by the Commission for Environmental Cooperation, of which the US units are the EPA ecoregions cited above, and are published by Bird Studies Canada and NABCI (2014).

Some states also have developed their own frameworks that may share regionalization principles with one of the national systems but differ in the location of boundaries. This situation exists for state and Federal agencies that overlap the UMGL LCC; they use a variety of frameworks, including those mentioned above and others not mentioned (Table 8). Inconsistency in the use of these frameworks by SWAPs in adjoining states can impede collaboration; effective collaboration demands a common language and common measurement system (Kania and Kramer 2011), and geographic frameworks provide a component of both. We describe and provide examples of these frameworks for each state below.

Table 8. Terrestrial and aquatic ecological frameworks used in 2015 SWAP revisions in the UMGL LCC.

State	Terrestrial Framework	Aquatic Framework
MI	Ecoregions of Michigan, Minnesota, and Wisconsin (Albert 1995)	USGS HUC 12
WI	Ecological Landscapes of Wisconsin (Wisconsin DNR 2012)	None
IA	US EPA (Omernik and Griffith 2014)	USGS HUC 12
MN	None	None
NY	Terrestrial Ecoregions (The Nature Conservancy 2009)	HUC 8
PA	Physiographic Provinces and Sections (Sevon 2000)	HUC 8
OH	None	None
IN	State based planning regions	State based
IL	Natural Divisions of Illinois (Schwegman et al. 1973)	HUC 12?

Minnesota

The Minnesota SWAP does not use a consistent geographic framework, though it references ecoregions and HUCs, and uses both as stratification units in one criterion for ranking SGCN (Minnesota Department of Natural Resources 2015, p. 24):

“The population represents the only population in the region (ECS section or HUC 4 watershed) or one of three or fewer populations in the state regardless of viability/persistence.”

This SWAP also provides definitions of “ecological classification system” (ECS) and HUC in a glossary, but extremely limited use; references ECOMAP (1993) (though website points to Cleland et al. 1997). Some specific US Forest Service ecoregions are mentioned (the Laurentian Mixed Forest Province in the climate change section, and the Prairie Parkland and Tallgrass Aspen Parkland Provinces in the section on partnerships), and one TNC ecoregion – the Prairie Forest Border – is also mentioned in the climate change section (though TNC is not referenced as the source of that framework). Finally, one of the actions listed in Implementation section is: “Participate in Multistate, Ecoregional, and International Conservation Partnerships,” though in this case the term ecoregion is left undefined.

Iowa

The Iowa SWAP uses both terrestrial and aquatic frameworks “to provide useful information to users of watershed and ecoregional based approaches, and to illustrate the complementary use of these frameworks” (Iowa Department of Natural Resources 2015). Though the 2005 Iowa SWAP used the Landform Regions of Iowa (Iowa Department of Natural Resources 2000) to frame habitats, threats, and actions, the 2015 draft SWAP employs the US EPA ecoregional framework, levels III and IV (Figure 5; Omernik and Griffith 2014; Wiken et al. 2011). This transition was in response to the recommended SWAP best practice of utilizing a framework that would support integration of SWAPs across state boundaries (Association of Fish and Wildlife Agencies 2012). The Iowa SWAP also references USGS HUC 12 units in describing habitats and communities. Both of these terrestrial and aquatic frameworks are mentioned and briefly described with respect to habitats and natural communities, but neither the threats nor actions described in subsequent chapters reference these frameworks.

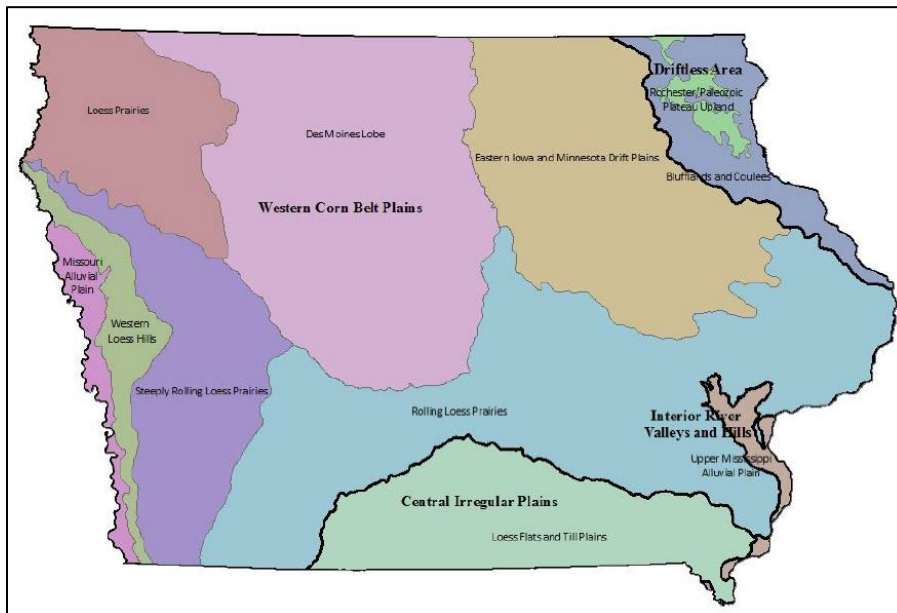


Figure 5. US EPA Level III (large, bold font, heavy lines) and Level IV (small, plain font, light lines) ecoregions, mapped in Iowa.

Wisconsin

The Wisconsin SWAP (Wisconsin Department of Natural Resources 2015) incorporates the Ecological Landscapes of Wisconsin (Wisconsin Department of Natural Resources 2012; Figure 6) – which are based on the National Hierarchical Framework of Ecological Units (Cleland et al. 1997) – in several ways. First, ecological landscapes were used to assess the distribution of each SGCN by scoring the association of each SGCN with each of the 16 ecological landscapes. SGCN may have been associated with ecological landscapes whether they had been observed in that landscape or not, based on a scoring of their association with natural communities that occur in those landscapes. Each SGCN was also scored with respect to the feasibility of sustaining its associated natural communities within each ecological landscape. These three scores (association of SGCN to ecological landscape; association of SGCN to natural community; feasibility of sustaining natural communities in an ecological landscape) are

provided independently for users of the Wisconsin SWAP. Wisconsin also framed the assessments of issues and actions for natural communities and SGCN within their defined ecological landscapes.

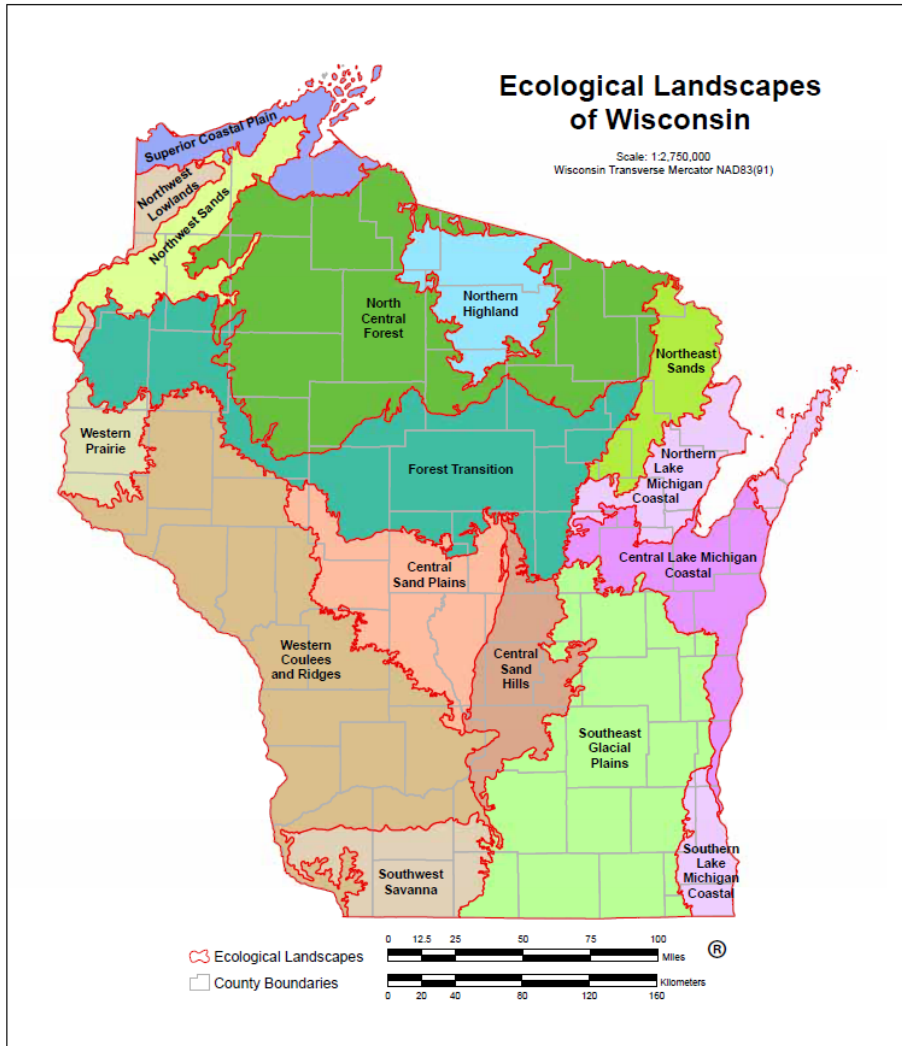


Figure 6. Ecological Landscapes of Wisconsin (Wisconsin Department of Natural Resources 2012).

Illinois

The Illinois SWAP Implementation Plan (Illinois Department of Natural Resources 2015) consistently references the Natural Divisions of Illinois (Schwegman et al. 1973; Figure 7). Natural Divisions are generally described as “geographic regions of a larger entity like a state or a continent. A division contains similar landscapes, climates, and substrate features like bedrock and soils that support similar vegetation and wildlife over the division’s area.” Many of the recommended actions in the SWAP Implementation Plan specify particular Natural Divisions for those actions, or that they should be implemented in “*within the natural divisions within which they [species or habitat] occur.*” As an example, restoration of habitat for example, within the Forests and Woodlands Campaign is the

recommendation: “Restore and manage high-quality examples of all forest, savanna and barrens communities, including all Grade A and B Illinois Natural Areas Inventory sites, in all natural divisions within which they occur.” (p 14).

For aquatic campaigns (i.e., Streams, Wetlands), the Implementation Plan does not employ an ecologically based framework such as HUCs or other watershed units. Many focal areas for implementation within the Streams campaign are watersheds – including those related to nutrient management – but there was no reference to a watershed framework or larger, regional drainage system (i.e., Great Lakes or Mississippi River Basin).

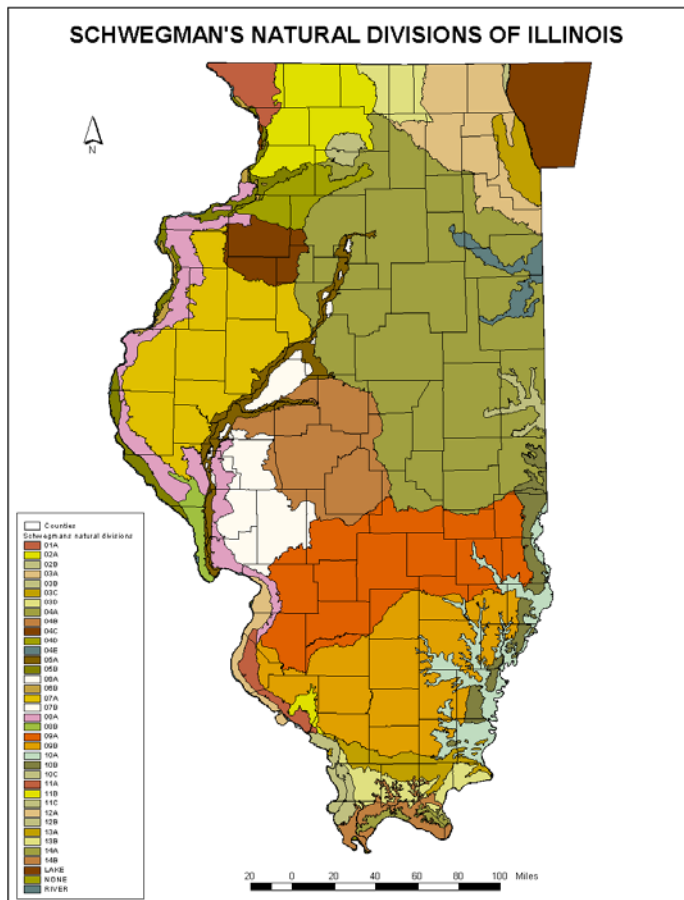


Figure 7. Natural Divisions of Illinois (Schwegman et al. 1973).

Indiana

To “better focus actions and priorities based on regional resources, needs, and threats” the Indiana SWAP (Indiana Department of Natural Resources 2015) uses six planning regions based on consideration of several existing national and statewide frameworks, including US EPA; USFS (Bailey); Bird Conservation Regions (Bird Studies Canada and the North American Bird Conservation Initiative 2014); HUCs (USGS); and the Natural Regions of Indiana (Homoya et al. 1985) (Figure 8). A committee began with the HUCs of the three major drainages within Indiana (Kankakee River, Great Lakes, Ohio River).

The Ohio River drainage covers two thirds of the state, so it was further subdivided using US EPA Level III ecoregions for southern Indiana to produce five initial planning regions. Recognizing that southeast Indiana should be further subdivided, the committee then used EPA Level IV ecoregions to create a sixth planning region.

For each of the six planning regions, a focus group identified habitat types of interest, conservation actions likely to be implemented to conserve these habitats over the next ten years, and a pool of candidate indicator species to refine the focus of landscape-level modeling (IN SWAP). The SWAP also provides a breakdown of SGCN by taxonomic group for each planning region.

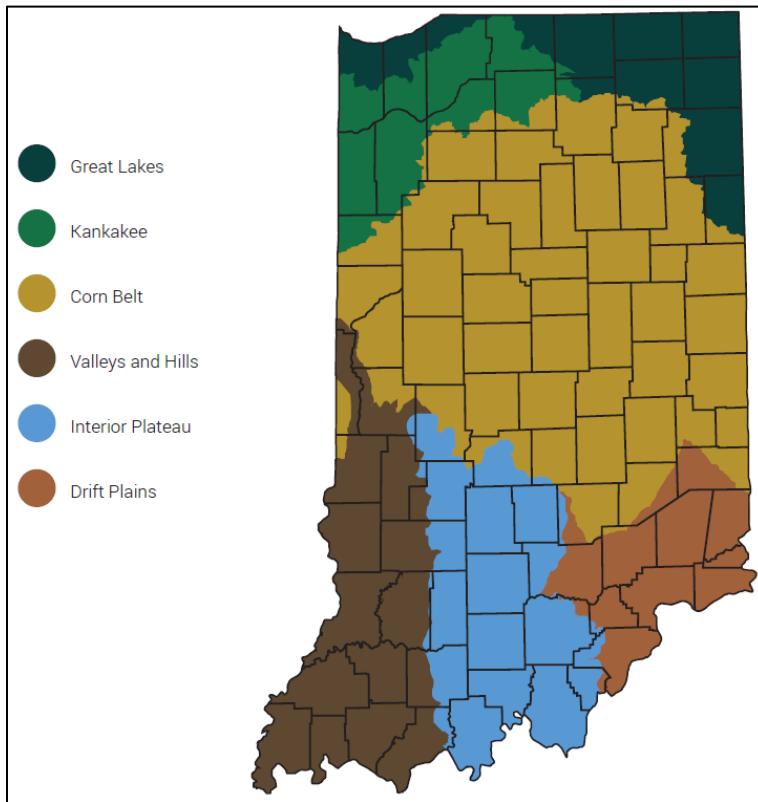


Figure 8. Planning regions used in the Indiana SWAP (from Indiana DNR 2015).

Michigan

Appendix four of the Michigan SWAP (Derosier et al. 2015) describes and maps habitat types within an ecoregional context, using the four ecoregional sections (northern and southern Lower Peninsula; eastern and western Upper Peninsula) of Albert’s (1995) Regional Landscape Ecosystems. Also, within reports for some of the 15 priorities, maps used to depict areas for partnership are based on these ecoregions (Albert 1995; Figure 9) or HUCs (USGS, Figure 10). These maps are intended to help partners “connect around important places for focal SGCN,” and SWAP authors “hope to focus 80% of conservation effort identified in the Wildlife Action Plan on these priority areas”.

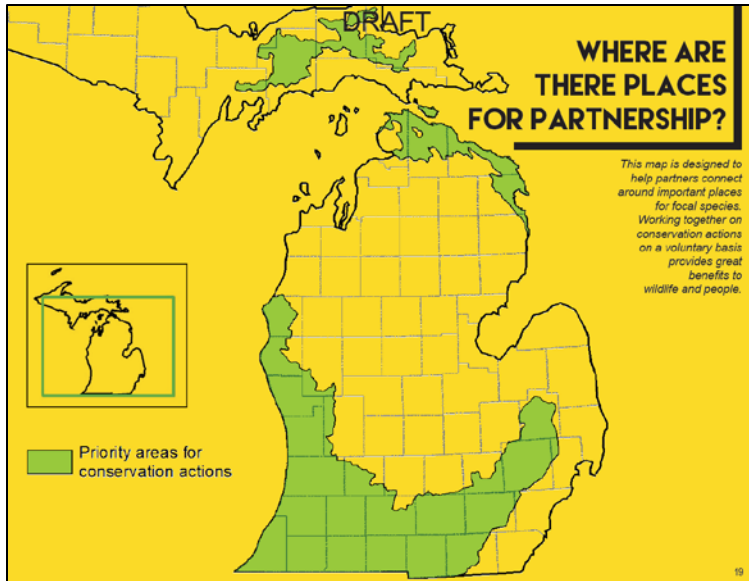


Figure 9. Map of areas for partnership for the Fens priority of the Michigan SWAP, using Regional Landscape Ecosystem units (Albert 1995) as a framework.

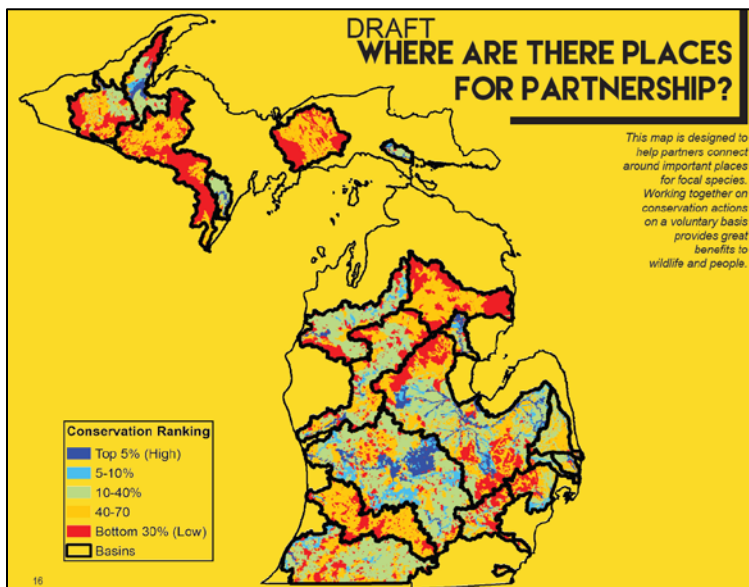


Figure 10. Map of areas for partnership for the Big Rivers priority of the Michigan SWAP, using HUC 8 watershed units as a framework.

Ohio

The Ohio SWAP does not explicitly employ terrestrial or aquatic ecological frameworks. The SWAP references US EPA ecoregions (citation) in describing status and conditions for the Lake Erie Tributary habitats. Most of the information in these tributary descriptions is drawn from watershed reports produced by the Ohio EPA and the US Army Corps of Engineers, and its appearance in the SWAP is incidental.

Pennsylvania

The Pennsylvania SWAP summarizes current conditions and trends of habitats within physiographic provinces and major watersheds (Figures 11 and 12). There are six physiographic provinces within Pennsylvania, each of which has been further divided into sections. These provinces are geographic regions in which all parts are similar in geologic structure and climate, and which have a unified geomorphic or surficial history (Sevon 2000).

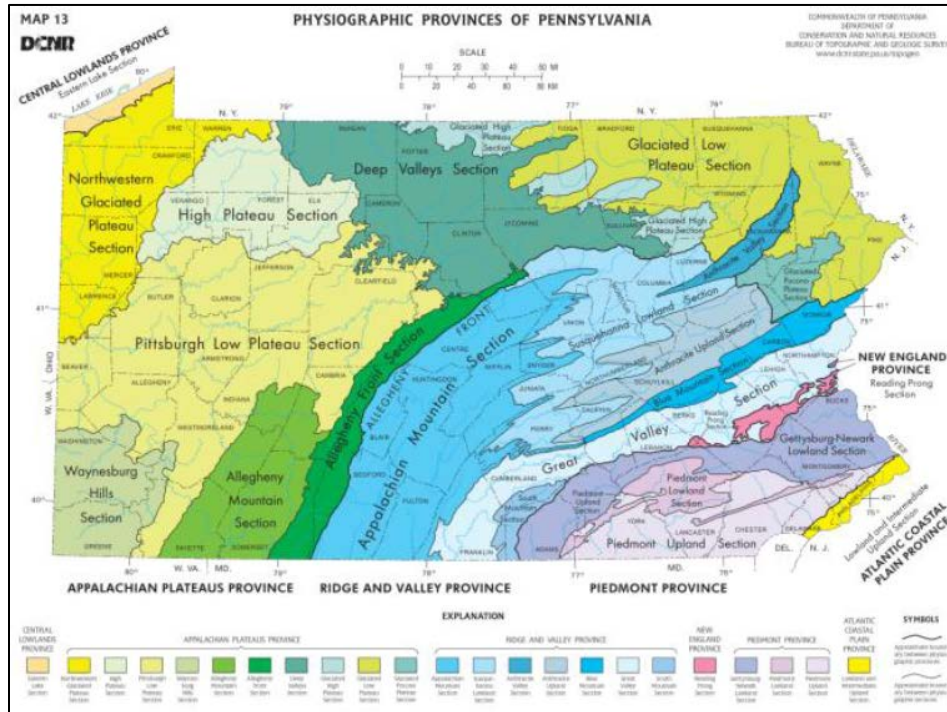


Figure 11. Physiographic provinces and sections of Pennsylvania (after Sevon 2000).

The framework of major watersheds (Figure 12) was further subdivided into Hydrologic Units at the HUC 8 level for summarizing habitat information; there are 57 of these HUCs in Pennsylvania (Seaber et al. 1987). The Pennsylvania SWAP did not use these frameworks in assessing threats or conservation actions.

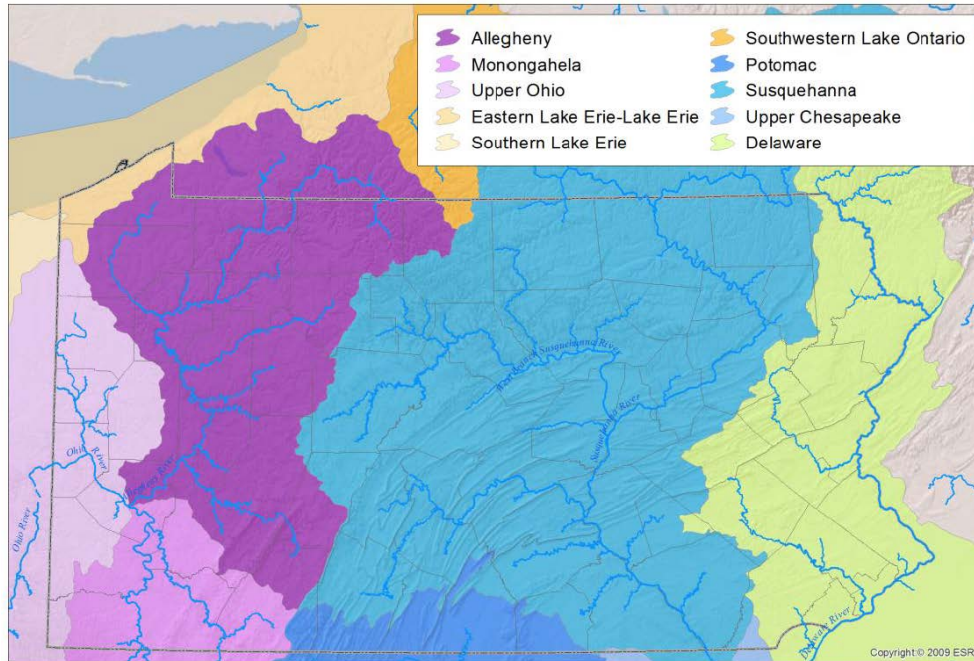


Figure 12. The ten major watersheds within the state of Pennsylvania.

New York

The New York SWAP (New York State Department of Environmental Conservation 2015) assesses distribution and condition of terrestrial habitat types using The Nature Conservancy’s terrestrial ecoregion map for the U.S. (The Nature Conservancy 2009) as a framework (e.g., Figure 13). Major watersheds (HUC 8 units) were used as a framework for assessing condition of freshwater habitats (Figure 14). Threat assessments were not stratified by ecoregion or watershed, but priority actions for implementation were identified within major watersheds (for freshwater habitats) and terrestrial ecoregions (for terrestrial habitats). Actions related to marine habitats were specified by habitat type, not using an ecoregional framework.

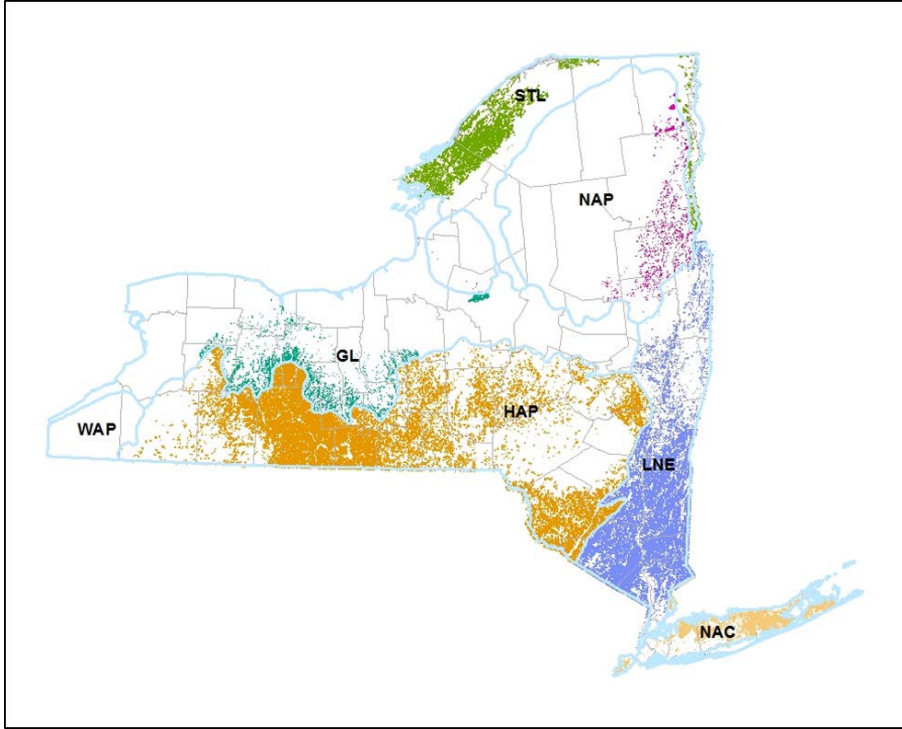


Figure 13. Distribution of the Central Oak-Pine Macrogroup throughout New York within TNC terrestrial ecoregions (The Nature Conservancy 2009). Habitat definitions based on the Northeast Terrestrial Habitat Map (Ferree and Anderson 2013).

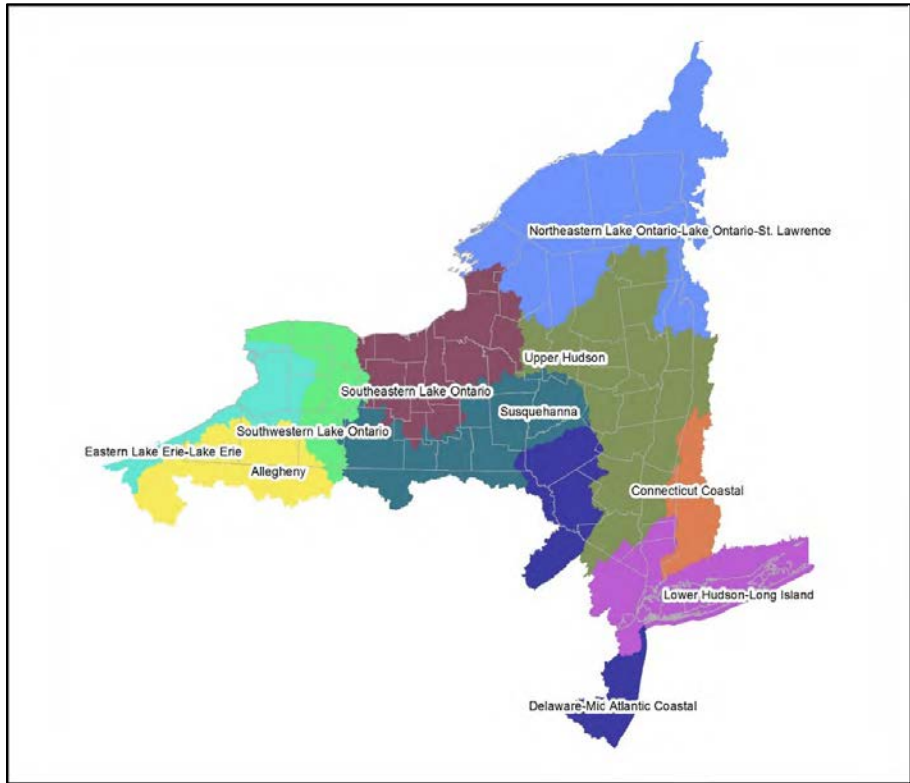


Figure 14. Major watersheds (HUC 8) of New York State.

Recommendations for Ecoregional Frameworks

Our primary recommendation is that the SWAPs in the UM/GL LCC region adopt common, ecologically based geographic frameworks for assessment of SGCN, habitats, threats, and actions. We recommend one for terrestrial species and habitats, and one for aquatic species and habitats.

Aquatic Framework

Six of the nine states are using watershed units – either a national system (US Geological Survey HUCs) or a state-based system. Achieving consensus on a common aquatic framework seems like a relatively straightforward first step. Given the relevance of Ecological Drainage Units (EDUs) to SWAPs, we recommend the adoption of NFHPs EDU classification (Figure 15). EDUs reflect similarities in geology and climate and are assumed to capture finer scale similarities between aquatic fauna within watersheds. If states are reluctant to adopt EDUs, we recommend the US Geological Survey HUC units; level 6 or level 8 would seem most appropriate at the regional scale, and finer-level units (e.g., HUC 12) could be adopted within a particular SWAP for more precise assessments and prioritization.

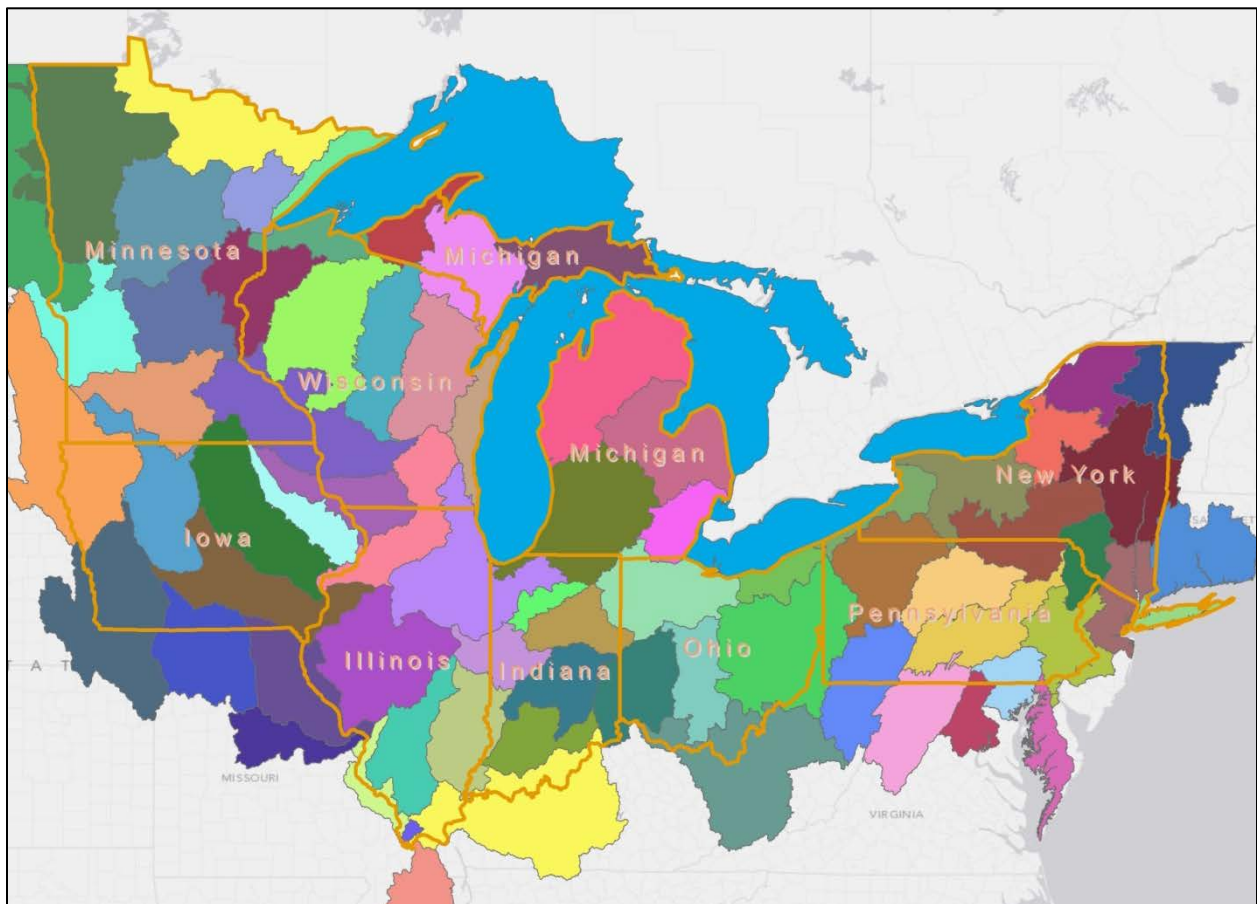


Figure 15. Ecological drainage units (EDUs) of the conterminous U.S. with a focus on the nine state UM/GL LCC region. Source: http://ecosystems.usgs.gov/fishhabitat/nfhap_download.jsp#menuitem4.

Terrestrial Framework

As a terrestrial framework, we recommend the US Forest Service ecoregions (Bailey 1995) as updated in the National Hierarchical Framework of Ecological Units (NHFEU) (Cleland et al. 1997) (Figure 16). Several of the state-based systems in use were based almost entirely (Wisconsin, Michigan, and New York) or partly (Pennsylvania, Indiana) on this framework. Additionally, the UM/GL LCC Forest Conservation working group is using the NHFEU, focusing its current major project on the “Northwoods” – Province 212 of the NHFEU. Consistency within the UM/GL LCC region would facilitate integration of research and strategic priorities.

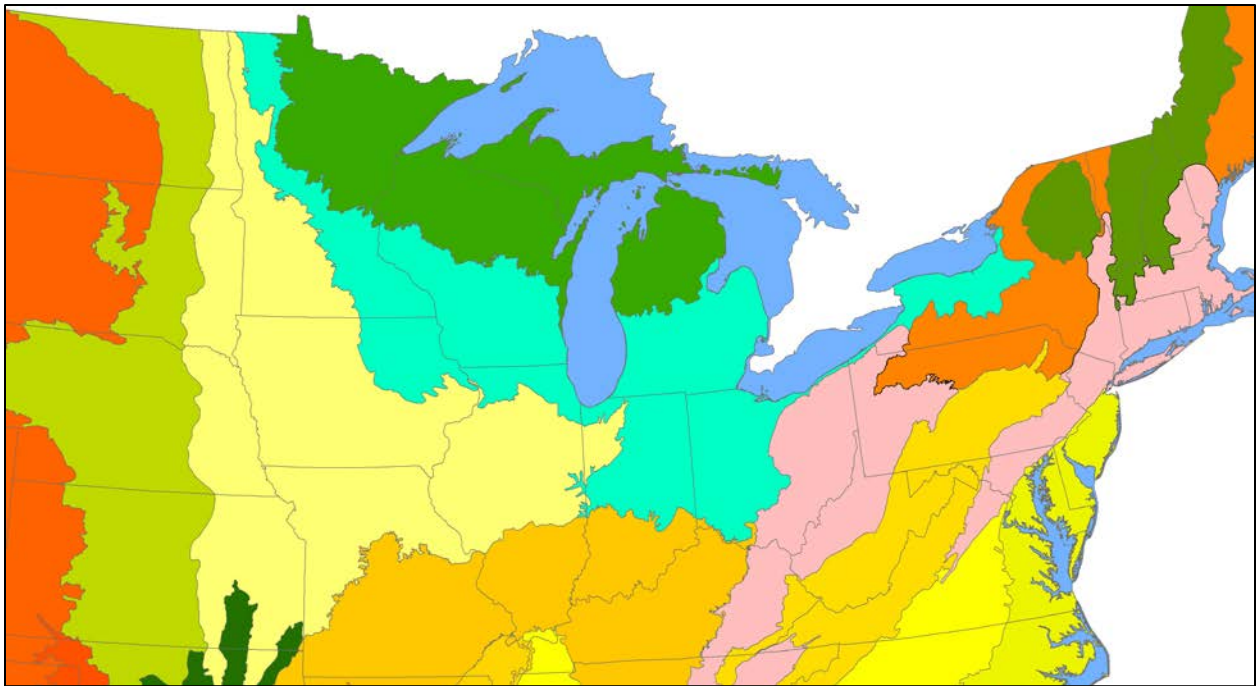


Figure 16. National hierarchical framework of ecological provinces level III with a focus on the nine states within the UM/GL LCC region. Source: <http://www.fs.fed.us/rm/ecoregions/products/map-ecoregions-united-states/>.

Threats

Classification of threats

Adoption of a standard taxonomy of threats was identified as a best practice for developing the 2015 SWAP revisions (SWAP Best Practices Working Group 2012). While the majority of states used the standard classification of threats developed by the Conservation Measures Partnership (Salafsky et al. 2008) and adopted by the International Union for Conservation of Nature (IUCN), Minnesota and Illinois continued to use their own classification. The remaining states classified threats based on the IUCN taxonomy (Table 9), although approaches varied.

Approaches to assessing threats

The approaches taken by states to address threats to habitats generally focused on major habitats, although the specific approaches varied considerably across SWAPs. Most states addressed threats to SGCN in addition to those affecting habitats, although their approaches likewise varied. Michigan identified major threats to focal species within each of fifteen priorities (which are mostly broadly defined habitats). Minnesota identified a subset of species affected by specific threats. In contrast, New York linked each SGCN to associated threats which resulted in a total of 2,829 unique species-threat combinations. Iowa and Wisconsin addressed threats to species at a taxonomic level.

Ranking and/or prioritizing threats

The ranking and prioritizing of threats was inconsistent across the states as only five states explicitly ranked or prioritized threats (Table 9). Of the five states that explicitly ranked or prioritized threats in some way, Ohio and Iowa showed consistency as they calculated impact scores using the IUCN threats calculator which assigns a score of low to very high based on the scope, severity, and timing for applicable threats to the species or ecosystem in question (Master et al. 2012). Pennsylvania also used a threat impact score to help identify a short list of imminent level 1 IUCN threats and associated vertebrate species. Indiana surveyed experts and stakeholders to identify threats for species and major habitat types within each of their planning regions, using the results to identify a subset of top threats to SGCN, as well as a list of top threats within each major habitat type. Illinois also used surveys to rank threats within each of the more than 30 delineated conservation opportunity areas.

Table 9. Summary of approaches used by states to address threats to SGCN and their habitats

State	Classification used	Explicitly ranked and/or prioritized
IA	IUCN	yes
IL	other	yes
IN	IUCN	yes
MI	IUCN	no
MN	other	no
NY	IUCN	no
OH	IUCN	yes
PA	IUCN	yes
WI	IUCN	no

Preliminary List of Common Priority Threats Across the Region

With varied approaches taken to identify, rank, and discuss threats to species and habitats, a methodical compilation and analysis to identify the top regional threats was not possible. However, some common threats were identified across the four states that both adopted a common threat classification and ranked those threats (PA, OH, IN, IA). The primary threats across those four states were: 1) agriculture and aquaculture; 2) residential and commercial development; 3) natural systems modifications; and 4)

invasive and other problematic species, genes, and diseases. This list is actually very similar to the list of top threats identified in the Northeast Region following the 2005 SWAPs: invasive species; industrial effluents; commercial and industrial areas; housing and urban development; and agricultural and forestry effluents (AFWA unpublished). In addition to these four, we also summarize the threat of climate change as described in all nine SWAPs.

Agriculture and aquaculture

As many of the states in this report are located in the Midwestern U.S., it is no surprise that agriculture and aquaculture was commonly identified as a major threat to SGCN and their habitats. Although not a Midwestern state, Pennsylvania identified this as an imminent threat to birds and mammals, and ranked it among the top five threat categories for invertebrates. In the Iowa SWAP, for aquatic taxonomic groups, agriculture and aquaculture was assigned a very high threat impact score for mussels, and a high impact score for fish. For terrestrial taxonomic groups, this threat was ranked high for mammals, but some impact scores for specific grassland and wetland mammals were ranked very high. Agriculture and aquaculture was additionally ranked a very high or high threat when considering grassland, shrubland, and woodland birds in Iowa. While Ohio ranked this threat medium for both aquatic and terrestrial habitats overall, they also ranked level-2 IUCN sub-categories and considered annual and perennial non-timber crops as high threats for both aquatic and terrestrial habitats. Additionally, the level-2 IUCN sub-category, agricultural and forestry effluents, was ranked as a very high threat to aquatic habitats in Ohio. In Indiana, agriculture and aquaculture was ranked as a high threat across habitats statewide, and considered the most significant threat category in 4 of their 6 planning regions. In addition, the level-2 threat of agricultural and forestry effluents was considered the biggest threat to fish, mollusks, and amphibians across Indiana.

Residential and commercial development

While the majority of land use in the region is agricultural, this area also supports some of the most heavily urbanized areas in the country. Highly urbanized landscapes have the potential to alter physical and chemical characteristics of natural ecosystems and ultimately stress wildlife. Pennsylvania identified this threat category as an imminent threat to a single amphibian species (hellbender). Residential and commercial development and pollution (at 16%) accounted for the two highest threat categories identified for invertebrate SGCN in Pennsylvania. Although residential and commercial development was ranked a medium threat impact overall across aquatic habitats in Ohio, the level-2 category of housing and urban areas was ranked high. The level-2 category of household waste and urban wastewater was also ranked as a high threat to Ohio's aquatic habitats. Across all terrestrial habitats in Ohio, residential and commercial development was ranked a high threat along with level-2 categories housing and urban areas and commercial and industrial areas. While Iowa generally ranked this threat as medium, it was given a high threat impact score for fish. While the level-2 housing and urban development threat was identified as a specific threat to species in Indiana, the level-2 threat of residential effluent was considered the most specific threat to fish, mollusks, and amphibians.

Natural systems modifications

Within this broad threat category, the most commonly cited level-2 threats were hydrologic alteration and fire suppression. Pennsylvania considered it an imminent threat to multiple vertebrate SGCN,

mostly wetland birds. It additionally accounted for 14% of the threat categories identified for invertebrate SGCN in Pennsylvania. In Iowa, natural system modifications was ranked high overall for mammals, and very high when considering wetland mammals and grassland birds. Natural system modifications ranked high or very high for all aquatic taxa in Iowa. Similarly, for aquatic habitats in Ohio, the level-2 category dams and water management/use was given a high impact score. Although this category was rated a moderate threat to habitats across Indiana, it was the 2nd ranking threat when considering all taxonomic groups. In addition, dams and water management/use was included as part of a large group of threats impacting SGCN and habitats across the state of Indiana.

Invasive and other problematic species, genes, and diseases

Invasive and problematic species, genes, and disease were highly cited among the SWAPs. Michigan elevated disease as a SWAP priority, one of fifteen – most of which are broadly defined habitats. Michigan also listed invasive species as a threat to multiple habitats and species throughout their priorities. Pennsylvania considered invasive and other problematic species and genes the most imminent threat category and cited a suite of vertebrate species for which this threat was assigned a very high or high impact score with a high certainty of affecting the species. Within this level-1 threat, Ohio considered the level-2 category invasive non-native/alien species as having a high threat impact score across both aquatic and terrestrial habitats. Iowa ranked this level-1 category as very high or high for grassland, shrubland, and woodland birds, and high for both fish and crayfish. While this category was generally mid-ranked across taxa in Indiana, it was considered the most significant threat to mammals and to habitats in general across Indiana.

The climate change threat

As the scope of climate change crosses state boundaries and has the potential to intensify current threats to wildlife, it was considered a best practice to give climate change special consideration within the 2015 SWAP revisions (SWAP Best Practices Working Group 2012). All nine states within the region addressed climate change, although their approaches varied. In Indiana, climate change was generally ranked a moderate to minor threat across all regions and across all taxonomic groups. In Iowa, climate change threats were on average ranked either medium or high across habitats and taxonomic groups, though it was ranked higher for taxa associated with aquatic habitats (e.g., mussels, fish, dragonflies). The ranking of level-2 climate change threats across Ohio's habitat types was much more variable than in other states; they ranked high within wetlands, natural lakes and artificial man-made environments in Ohio. Michigan assessed the vulnerability of focal species to climate change. Illinois seemed to put less emphasis on climate change within their assessments than the other states. Minnesota addressed climate change as a unique threat within their SWAP, and summarized both the vulnerability of wildlife to climate change as well as the general impacts of climate change on habitats. Wisconsin identified climate change as a threat within some taxonomic groups and habitat categories, often describing how other threats will likely be exacerbated by climate change. Wisconsin also identified specific habitat types that are most vulnerable under low and high degrees of climate change (e.g., Mesic Prairies within the Grasslands habitat group is highly vulnerable, even under a low degree of climate change). When considering the number of times a threat category was linked to species in the New York SWAP, climate change was ranked fourth, being cited 420 times. Pennsylvania put an extensive amount of effort into

addressing climate change within their SWAP and summarized regional climate change trends across the Northeast and Midwest regions. Pennsylvania also discussed traits and characteristics of habitats and species at greatest risk to climate change within the two regions.

Recommendations for Regional Threats

Our first recommendation is for all nine states to adopt the IUCN taxonomy of threats (Salafsky et al. 2008). Currently, seven of the nine states have adopted that standard. This taxonomy is like a language; if all states are speaking the same language it becomes much easier to communicate effectively and share information, as well as prioritize and measure progress across jurisdictions.

Based on the Conservation Action Planning (CAP) process and the Open Standards for Conservation Practice (OS), threats should be directly linked to conservation targets. In the case of SWAPs, this would be priority SGCN and habitats. This linkage allows practitioners to better understand and rank threats across multiple priorities. A regional application of this approach has been completed for the Northeast region, for which threats were summarized by major habitat type and priority SGCN (Anderson and Olivero Sheldon 2011).

In addition, threats could also be identified and prioritized by regional conservation opportunity areas (COAs) using a standardized repeatable set of criteria. CAP and OS both recommend three major criteria for ranking threats: 1) scope; 2) severity; and 3) irreversibility. Details on each of these three criteria can be found at

<https://www.conservationgateway.org/Files/Pages/action-planning-cap-handb.aspx>.

Although threats occur unevenly across the UM/GL LCC, they can be evaluated at multiple scales, including the multi-state scale. The examples provided above (agriculture, invasive species, natural system modifications (dams), urban development, and climate change) appear to be common challenges faced by each state (albeit to different degrees). Understanding which threats (or challenges) are having the biggest impact on regionally significant SGCN and habitats will be critical to developing an effective regional conservation network. Having common, ecologically based geospatial frameworks (both aquatic and terrestrial) would provide valuable insight into the scope and severity of specific threats to both SGCN and habitats within ecoregions and drainage units.

Conservation Actions

Classification of conservation actions

As with threats, a standardized taxonomy of conservation actions was suggested as a best practice during the development of the 2015 SWAPs (SWAP Best Practices Working Group 2012). The most commonly used classification was the IUCN classification of conservation actions (Salafsky et al. 2008). Similar to threats, six of the nine states used the IUCN taxonomy (Table 10); Illinois and Minnesota were

the only two states that did not mention the IUCN taxonomy. Although Pennsylvania did use the IUCN classification sparingly, they primarily used the conservation action categories in the US Fish and Wildlife Service’s Tracking and Reporting Actions for the Conservation of Species (Wildlife TRACS) system. Wisconsin used IUCN nomenclature loosely in a narrative format. Indiana used the IUCN taxonomy to classify actions for habitats; however actions for SGCN didn’t exactly follow this standardized classification.

Table 10. Summary of approach used by states to address conservation actions necessary for SGCN and their habitats

State	Classification used	Explicitly ranked and/or prioritized
IA	IUCN	no
IL	none	no
IN	IUCN	yes
MI	IUCN	no
MN	none	no
NY	IUCN	no
OH	IUCN	yes
PA	Wildlife TRACS & IUCN	no
WI	IUCN	no

Approaches for identifying conservation actions

As with assessing threats, the approaches taken to identify conservation actions varied across the states. Illinois and Michigan both listed relevant actions within each campaign (IL) or priority (MI). Actions within Michigan’s fifteen priorities correspond to habitats, focal species, or both depending on what was deemed most important to accomplish in the next ten years for each priority. Actions within Illinois campaigns are split into 1) universal actions which can be applied statewide, and 2) targeted actions in defined places. In Ohio, actions are aimed at maintaining and improving habitats that will benefit a large number of species. New York, Pennsylvania, Iowa and Minnesota all have broad goals identified in their SWAPs, and listed a set of conservation actions needed to achieve each goal. Wisconsin developed actions to address the specific threats identified in their plan, while Indiana developed conservation actions for habitats and SGCN within each planning region based on results of surveys.

Ranking and/or prioritizing conservation actions

The ranking and/or prioritizing of conservation actions was relatively rare across all states, and explicitly done by only two of the nine states: Indiana and Ohio. Indiana prioritized the top actions based on separate surveys for SGCN and habitats within each of their six planning regions. Top actions for SGCN were obtained from questions about individual species and do not follow the IUCN categorization. Ohio applied a ranking process developed by the Georgia Department of Natural Resources Wildlife Division (Georgia DNR 2005). Scores were based on seven criteria; benefits for high priority species/habitats, addresses un(der)funded needs, importance to ongoing local efforts, timeliness or urgency, connections

with other conservation actions, building public support for wildlife conservation, and probability of success. In contrast to the prioritization approaches used by Indiana and Ohio, New York linked every SGCN to applicable conservation actions, resulting in 3,804 species-action links.

Climate change actions

As climate change is an overarching threat with a wide range of potential effects on both species and habitats, it is not surprising that few direct and specific actions are identified within the SWAPs to specifically address this stressor. General themes regarding actions specific to climate change included better public education and outreach (e.g., Indiana), increased research and monitoring (e.g., Illinois, Michigan), and improved conservation design and planning (e.g., Michigan). While Wisconsin identified specific habitats most vulnerable to climate change, they additionally list specific actions to encourage climate change adaptation for some of these habitats (e.g., promote drought- and frost-tolerant plant species through regular prescribed burning within grasslands). In support of New York's first action plan goal they aim to reduce atmospheric discharges of greenhouse gases that contribute to climate change by continued support and involvement in the Regional Greenhouse Gas Initiative.

Pennsylvania put a large focus on adaptation when discussing actions specific to mitigating climate change, and summarized regional case studies and national strategies prior to outlining a Pennsylvania specific adaptation strategy. The Minnesota SWAP, in support of its first goal, identified a list of ecological communities thought to be most vulnerable to climate change (e.g., prairie stream ecosystems), and listed a suite of potential conservation actions to help mitigate the effects of climate change on those systems (e.g., restore the hydrology of prairie streams, rivers, and wetlands).

Recommendations for Regional Actions

Similar to threats, the first recommendation is for each of the nine states to adopt the IUCN conservation actions taxonomy (Salafsky et al. 2008). The IUCN taxonomy is like a language; if all states are speaking the same language it becomes much easier to communicate effectively and share information, as well as prioritize and measure progress across jurisdictions.

Both the guidelines for Conservation Action Planning (CAP) and the Open Standards for Conservation Practice recommend that priority conservation actions be linked to key threats. These threats in turn are directly linked to SGCN and habitats. This linkage allows practitioners to better understand and rank the potential effectiveness of conservation actions across multiple priorities. We also recommend that SWAP coordinators adopt a repeatable ranking process for prioritizing conservation actions. Both CAP and OS recommend three primary criteria for ranking conservation actions: 1) benefits; 2) feasibility; and 3) cost. Details on these criteria can be found at <https://www.conservationgateway.org/Files/Pages/action-planning-cap-handb.aspx>.

Although conservation actions can be identified and employed at multiple scales, conservation actions are typically most effective at the landscape, watershed or local scale. When considering actions at the multi-state scale, policy, education, research, and decision support may be the most appropriate categories to choose from. Applying common, ecologically based geospatial frameworks (aquatic and

terrestrial) to conservation actions should help states and partners identify the right types and scope of strategies for effective conservation results.

Conservation Opportunity Areas (COAs)

Development of Conservation Opportunity Areas across the region

Conservation Opportunity Areas (COAs) are intended to represent spatially explicit locations with the greatest opportunity to conserve SGCN. Of the nine states, three had developed COAs in their 2005 SWAPs (i.e., Illinois, Ohio, Wisconsin) and typically added new, or updated the current COAs for the 2015 SWAPs. While it was considered a best practice to develop and spatially depict COAs in the 2015 SWAP revisions (SWAP Best Practices Working Group 2012), it was also acknowledged that there is no standard methodology for the creation of COAs. With no standard framework to guide COA development, it is not surprising that the approaches taken varied considerably across the states. Some states decided against delineating specific COA polygons. Others chose to identify large-scale areas as a guide to collaborative conservation, while others identified more specific focal areas for COA development (Figure 17).

Common factors used in Conservation Opportunity Area development

While the approaches taken to develop COAs varied, some common themes, including that SGCN populations and/or their habitats tend to be explicitly considered in COA development (Table 11). For example, Indiana considered whether an area supports SGCN and whether unique habitats exist. Similarly, Wisconsin used species associations with broad scale landscapes and specific habitats to identify combinations that represent the best opportunities to manage, protect, restore and sustain SGCN within specific locations. Minnesota considered their potential return on investment by determining the number of SGCN and/or their habitats that would benefit from the conservation focus area. Illinois considered whether significant wildlife and habitat currently or potentially exist in certain locations, while Ohio identified COAs for each major terrestrial habitat category. Another common theme appeared to be the consideration of current efforts, funding, and support occurring in or around potential focal areas. The large-scale approach to COA development by Michigan and Ohio (for aquatics only) was in part to facilitate collaborative development of objectives and monitoring within high opportunity areas. Illinois considered available financial and human resources, and determined the likelihood of partners to collaborate in planning, implementing, and evaluating conservation actions within a potential COA. Indiana likewise assessed the available partners already working in the area and the funding opportunities available.

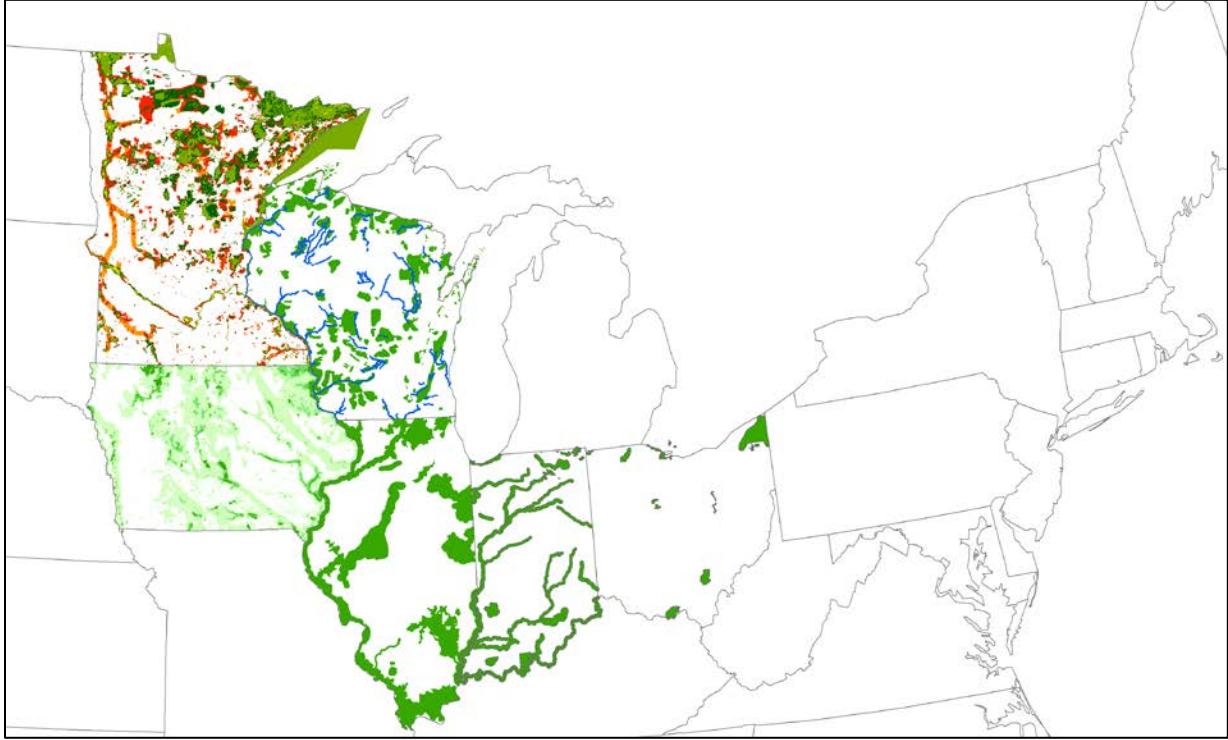


Figure 17. Conservation opportunity areas and other priority landscapes as identified by individual states within the UM/GL region. Michigan, Pennsylvania, and New York either did not map COAs or did not provide shapefiles for this project.

States without spatially explicit Conservation Opportunity Areas (NY, PA, IA)

Among the nine states, three did not specifically delineate spatially explicit COAs, but generally discussed or identified priority areas or alternative approaches using other efforts. While New York did not specifically develop COAs within their SWAP, they cite regional conservation planning efforts in the state that have identified priority species and geographic focal areas in which conservation actions have been based. Pennsylvania similarly did not develop COAs specifically for their SWAP. Instead, they created a decision support tool intended to allow users to dynamically evaluate tradeoffs and optimize decisions from various spatial and administrative scales (Catherine Haffner, personal communication, October 2015). Iowa also chose not to delineate specific COA polygons. Instead, they created a spatially explicit, grid based dataset of high opportunity areas for cooperative conservation actions. The dataset is a combination of 21 existing conservation-based layers (e.g., existing conservation and recreational areas, mapped prairies, wetland easements), aggregated into a single map with the highest opportunity areas located where the most conservation layers overlap.

Table 11. Description of conservation opportunity areas within the nine state UM/GL LCC region.

State	COAs 2005	COAs 2015	COA Description/Criteria	# of COAs
MI	N	Y?	COAs are in the form of "Partnership Areas"; Most are depicted as large landscape ecoregions as opposed to specific places on the landscape. This approach provides a broad area for partners to identify the best sites for achieving SGCN and habitat goals. COAs were identified for each major terrestrial and aquatic habitat type.	Too difficult to determine
WI	Y	Y	There is a high or moderate degree of probability that the Species of Greatest Conservation Need is associated with the Ecological Landscape, the SGCN-EL score = 3 or 2 (H or M), AND The Species of Greatest Conservation Need is significantly or moderately associated with the natural community, the SGCN-NC score = 3 or 2 (H or M) AND The Ecological Landscape represents a major opportunity to manage or sustain that natural community, the NC-EL score = 3 or 2 (H or M).	213?
IA	N	N	Created a grid based data layer of high opportunity areas for cooperative conservation actions. This new raster data layer is the result of combining 21 existing conservation based data layers.	NA
MN	N	Y	Developed a Wildlife Action Network (WAN) that represents quality habitats for terrestrial and aquatic SGCN. Criteria are: SGCN richness (hotspots); SGCN population viability; Condition of habitat; Sites of Biodiversity Significance; Lakes of Biodiversity Significance; and Stream Indices of Biological Integrity. Created Conservation Focus Areas (CFAs) - areas with high conservation value that have relatively urgent conservation needs for which there are resources, such as organized and willing partners or funding, to address those needs. Boundaries have not been finalized yet.	36 CFAs; will focus on 6 over next 10 years
NY	N	N		NA
PA	N	N	Instead of identifying COAs as static spatial units, they have decided to develop a decision support tool that would allow users to assess spatially refined management options for SGCN. Will be developed in the future.	NA
OH		Y	COAs were identified for each terrestrial habitat category. Areas chosen are of sufficient size and quality to maintain viable populations of most native wildlife species dependent on that particular habitat. Identified Conservation Opportunity Watersheds (COWs) based on stream monitoring data from four categories (physical habitat, biological integrity, biological diversity, and recreational opportunity).	6 Terrestrial COAs; 11 Conservation Opportunity Watersheds
IN	N	Y	River corridors were identified for their unique aquatic habitat and species diversity; and also for the opportunities to affect habitats within the immediate 4-mile riparian buffer and ultimately the associated watersheds. Natural lake catchment COAs were based on the habitat potential for species and the potential for habitats within the catchments. Terrestrial habitat COAs were based around areas of existing conservation efforts and those with the potential for increased connectivity and large-scale habitat project potential. Selected areas included known diverse or unique habitat features and SGCN.	River Corridors; 29 Lake Catchment COAs; 9 Terrestrial habitat COAs
IL	Y	Y	Significant existing or potential wildlife and habitat resources Partners are willing to plan, implement, and evaluate actions Financial and human resources are available Conservation is motivated by an agreed upon conservation purpose and set of objectives	33

States Delineating Broad Scale Conservation Opportunity Areas (MI, OH)

Michigan's approach to COA development aimed to identify large, landscape-scale ecoregions rather than specific locations on the landscape, and kept terrestrial and aquatic delineations separate for each major priority. This approach was intended to allow conservation partners to identify the specific locations for achieving SGCN and habitat goals within each broad area. When viewed together, Michigan's COAs cover the majority of the state. Ohio used a different approach, focusing only on aquatic COAs. Ohio developed a total of eleven Conservation Opportunity Watersheds (COWs), based on stream data describing physical habitat characteristics, biological integrity and diversity, as well as recreational opportunity areas. Similar to Michigan, when Ohio's COWs are viewed together, they cover approximately 71% of the state.

States Delineating Finer Scale Conservation Opportunity Areas (MN, WI, IL, IN, OH)

The remaining states delineated more specific areas that they considered could provide the greatest opportunity to conserve SGCN. Indiana used several broad criteria to designate COAs and identified four over-arching themes: 1) river corridors (habitat and species diversity - high opportunity to affect other habitats in close proximity); 2) cold- and cool-water natural lake catchments (habitat potential); 3) terrestrial COAs (based on current conservation efforts and places that could increase habitat connectivity); and 4) urban areas (opportunity to engage the general public about conservation efforts and provide educational opportunities on relationships between the health of ecosystems and wildlife with the health of human communities).

Minnesota used survey and sampling efforts to develop a Wildlife Action Network that represents quality habitats for terrestrial and aquatic SGCN. They further identified Conservation Focus Areas (CFAs) within the Network which signify priority areas to work with partners to identify, design, and implement conservation-based actions.

Illinois added one COA that was not included in their 2005 SWAP (for a total of 33), and revised boundaries for six others. They used primary information sources (e.g., Illinois Natural Areas Inventory Sites; High Quality Aquatic Resources) and a three pronged approach in COA identification. Overall criteria for COA development included areas that have: significant existing or potential wildlife and habitat resources; partners willing to plan, implement, and evaluate conservation actions; financial and human resources available; and agreement on conservation purpose and objectives. Illinois' approach provided a relative importance ranking at the parcel level.

Wisconsin developed COAs by numerically evaluating three components: species associations with ecological landscapes; species associations with habitats (i.e., natural communities); and the importance that the ecological landscape plays in a given natural community's management. The above components were evaluated to determine where all three were maximized at the same time, signifying the highest opportunity to conserve SGCN.

Ohio took a similar approach as Wisconsin, by concentrating efforts and resources into a few large landscapes that contain major habitat types. They also considered other significant yet rare habitats for

species with limited distribution or low populations. Ohio developed fine-scale COAs for each major terrestrial habitat category, (e.g., forests, grasslands, wetlands).

Recommendations for Regional Conservation Opportunity Areas

The lack of a standard methodology for identifying COAs makes their use somewhat difficult at a regional scale. We suggest that future development of and updates to COAs use a relatively standardized approach. The currently delineated COA products are likely very useful at state and local scales, but relatively incompatible if attempting to promote conservation efforts that cross state lines. While pros and cons inevitably exist within each states approach to developing COAs, we felt that Minnesota and Wisconsin both used a process that could be easily repeated in other states of the region. They both employed a methodical and objective approach to identifying COAs, and we feel a standard methodology similar to these would greatly improve the practicality of using state developed COAs at a regional scale in the future.

Representatives from Northeast Region are in the process of identifying the best opportunities for states to protect core landscapes, enable wildlife connectivity, restore threatened ecosystems, and support Regional Species of Greatest Conservation Need. The ultimate product of the Regional Conservation Opportunity Areas (RCOA) effort will be a spatially delineated network of areas within the Northeast where actions to support fundamental objectives are most likely to have the greatest impact. These RCOAs will be developed through a process of selecting important conservation features including species and habitats, agreeing on metrics for prioritizing these features, including species occurrences, habitat suitability, ecosystem integrity and ecosystem resiliency, and finally combining and weighting these metrics to achieve goals. More information on RCOAs in the northeast region can be found at <http://northatlanticlcc.org/groups/rcoa/the-rcoa-process#/0>.

Information management and delivery

An aspect of effective regional collaboration – and ultimately adaptive management – that touches on at least two of the components of collective impact is the management and delivery of information. Presently, there is little sharing of information across state boundaries in the UM/GL LCC region. SWAP coordinators also identified Wildlife TRACS (Figure 16) – a database for capturing conservation and related actions funded by US Fish and Wildlife Service grant programs – as an option for facilitating communication. Wildlife TRACS uses standard categories for actions, providing a common language for communicating about these actions, and is a shared database, so could also facilitate communication if its regular use were to become a standard practice across the region. Given a set of regional SGCN, information from all states pertaining to those species could be maintained and accessed in TRACS, thereby providing each SWAP coordinator with insight into the status of those species across the region. Wildlife TRACS could address some of the information needs related to SWAP management and regional collaboration, but it would not accommodate shared goals (part of a common agenda) nor data and knowledge about habitats, threats, and actions (see the TRACS User Guide: <https://tracs.fws.gov/learning/mod/book/view.php?id=21&chapterid=54>).

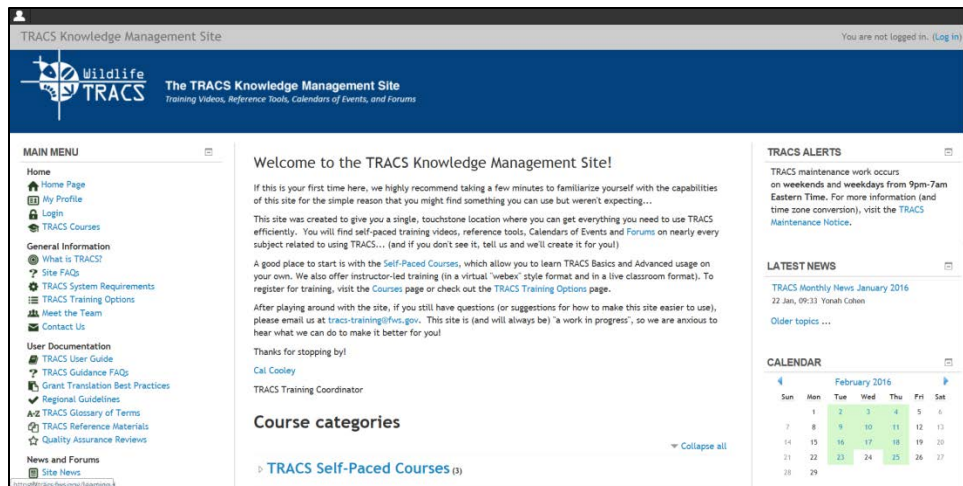


Figure 18. Screen capture of the Wildlife TRACS online knowledge management site (<https://tracs.fws.gov/learning/>).

Another option – currently in development – that could serve a regional collaboration among SWAP coordinators is the Great Lakes Inform website (<http://greatlakesinform.org/> Figure 19). Great Lakes Inform is designed to support collaborative adaptive management and its six modules accommodate all aspects of adaptive management. The UM/GL LCC has financially supported the development of Great Lakes Inform, and if the LCC becomes the backbone organization for the SWAP collaboration, Great Lakes Inform would be a logical option – either on its own or as a complement to Wildlife TRACS – for managing and delivering SWAP information.

We recommend that the LCC SWAP working group evaluate both of these options and develop a plan for information management and delivery that would support all aspects of collaborative, regional management of the SWAPs.



Figure 19. Screen capture of the home page of Great Lakes Inform (<http://greatlakesinform.org/>).

Conclusion

Findings from the surveys, interviews, interactive webinars, and review of final draft SWAPs demonstrate the independent nature of SWAPs. By design, SWAPs focus conservation priorities and actions within their borders. With few exceptions, each state took an independent approach in addressing each of the eight required elements. The exceptions were New York and Pennsylvania which used the habitat classification system and mapping developed for the Northeast Region. Despite these inconsistencies, several states used similar criteria for prioritizing threats and actions, and a few states utilized similar ecological frameworks. Most importantly, all nine states demonstrated strong interest in and support for the development of a conservation network within the UM/GL LCC region.

Three key recommendations were presented to both enhance future SWAPs as well as facilitate a regional approach to conservation within the UM/GL LCC region. The first key recommendation is for each state to adopt a consistent approach when addressing each of the eight elements. This is particularly important for characterizing, identifying and prioritizing habitats, threats, and conservation actions.

The second recommendation is centered on the development of a regional conservation network. A key element in the development of a network is the adoption of common spatial frameworks, both aquatic and terrestrial, that are based on ecological patterns and processes, and ideally, national frameworks that are established and in use in the UM/GL LCC region. Specifically, we recommend the adoption of Ecological Drainage Units (EDUs) for an aquatic framework (developed by NFHP), and the US Forest Service ecoregions (Bailey 1995) as updated in the National Hierarchical Framework of Ecological Units (NHFEU) (Cleland et al. 1997) for a terrestrial framework. EDUs seem to be particularly well suited to SWAPs since they group together large watersheds that share a common zoogeographic history, physiographic and climatic characteristics, and therefore are likely to have a distinct set of freshwater assemblages and habitats. However, if states are reluctant to adopt EDUs, we also recommend the adoption of US Geological Survey HUC units; level 6 or level 8. In regards to the USFS ecoregions, several of the state-based systems in use were based almost entirely (Wisconsin, Michigan, and New York) or partly (Pennsylvania, Indiana) on this framework. Consistency within the UM/GL LCC region would facilitate integration of research and strategic priorities.

Once adopted, states would have an ecologically defensible framework for identifying and prioritizing regional COAs that cross state boundaries. A common framework would also provide a solid tool for states to assess and prioritize both SGCN and habitats at multiple ecological scales. In addition, regional COAs provide a solid rationale for the prioritization of threats and actions. Threats vary by intensity, severity, and scope across the landscape. Identifying a key set of threats that specifically impact a well-defined regional scale COA is also an effective method for targeting conservation actions.

Finally, we also recommend that the SWAP coordinators and UM/GL LCC staff adopt the collaborative approach described in *Collective Impact* (Kania and Kramer 2012). This approach is based on five major components that the authors feel are critical to successful collaboration, particularly for difficult, complex issues: 1) Common agenda; 2) shared measurement system; 3) mutually reinforcing activities;

4) continuous communication; and 5) a backbone support organization. Despite the typical issues and obstacles associated with long-term collaborative efforts, we are highly optimistic that this group of SWAP coordinators and UM/GL LCC staff will be successful in creating and maintaining a regional collaboration, ultimately resulting in a robust, scientifically defensible, regional conservation network for the UM/GL LCC region.

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Appendix A: Summary of LCC SWAP Coordinator Survey Results

Question #	Question	Summary
Section 1 Eight Required Elements		
2	Are you revising Element 1 (SGCN)?	9 YES 0 NO
3	Are you revising Element 2 (habitats and natural communities)?	9 YES 0 NO
4	Are you revising Element 3 (threats)?	9 YES 0 NO
5	Are you revising Element 4 (conservation actions)?	9 YES 0 NO
6	Are you revising Element 5 (monitoring/adaptation)?	9 YES 0 NO
7	Are you revising Element 7 (partnerships)?	8 YES 1 NO
8	Are you revising Element 8 (Public Participation)?	9 YES 0 NO
9	What methods or approaches are you using to identify SGCN? Check all that apply:	<p>9- Legally listed species; 7- Declining species; 7- Other; 5- Nature Serve Rankings. Four states mentioned Species of special concern as determined in consultation with technical expert committees. One state will be limiting SGCN to T, E and SC only while another state is considering all native and naturalized species that are typically tracked to be SGCN. One state developed a simplified species status assessment process (similar to NatureServe or Partners In Flight) while another state is applying a scoring method developed by Milsap et al. (1992) for the state of Florida. All states are applying some sort of criteria to determine SCGN. Criteria mentioned by many states include: 1) current and anticipated threats, 2) indicators of biodiversity or habitat function, 3) state or stewardship responsibility, 4) statistically valid declines, and 5) life history characteristics. Other criteria include: ecological value, social value, urgency, cost of recovery, and potential for recovery. Most states are also identifying a subgroup of species that require additional data to determine their status.</p>

Question #	Question	Summary
10	Are you employing methods or tools to prioritize a subset of SGCN?	8 YES, 2 NO. Five states plan to do this but are still developing criteria. Methods or tools mentioned include: a spreadsheet to prioritize SGCN; using a tiered approach similar to SWAP 1.0.; using the Florida system (Millsap et al. 1990) and modifying it to fit their state to determine scores and ranks for all species; considering the state's relative responsibility for conservation of each species (what proportion of global pop in state) for those that they have this information; prioritize SGCN and/or identify surrogate SGCN to guide conservation actions once the SGCN list is updated; prioritize those species that have declined in the last decade; use criteria developed by partners based on values as the first priority layer, and then look at needs of species and group them using a focal/umbrella species approach. There is also a desire to focus efforts over next 10 years to show success/progress (or not) of actions. There is some concern that there won't be enough time to decide/establish criteria in time to complete the revision.

Question #	Question	Summary
11	What are your biggest challenges in revising the SGCN section?	<p>Many states expressed that there is: 1) limited staff time and they have limited data on species (especially invertebrates) which makes it hard to evaluate species status, 2) working and coordinating large numbers of state experts and partners is very time consuming, especially when using consensus decision process, 3) huge endeavor to compile data needed to review rangewide and statewide occurrence and state population trend for every species, 4) building consistency across taxa and evaluating status for all SGCN to measure effectiveness is a challenge, and 5) balancing species-driven vs. habitat/natural community driven conservation is difficult. One state mentioned that it is hard to find experts willing and qualified to serve on technical committees for some taxon. One state expressed that priorities limit the list and some partners are disappointed if favorite species or habitat type not on list. Finally, one state mentioned that the process for listing is not widely understood.</p>
12	What lessons have you learned in regards to how you are addressing SGCN that other states might benefit from?	<p>The biggest lessons learned are: 1) take a consistent approach across taxa, 2) develop a short, prioritized list, and 3) adopt a clear, science driven process. One state held a day-long workshop with 35 taxa experts to discuss approaches for evaluating various criteria and developing greater consistency in assessing species across taxa. Other lessons learned include: 1) make distinction between species with information needs vs. those with conservation need; 2) users of SWAP tend to be more interested in protection at habitat/natural community level rather than species level; 3) start early if using expert committees, they are very helpful; and 4) be prepared to learn how little you know about many species.</p>

Question #	Question	Summary
13	Are you using regional scale (multi-state) data or information to identify and/or prioritize SGCN?	7 YES 2 NO. Most states mentioned the use of NatureServe information (such as global and national ranks) and subject matter experts. Technical expert committees may use regional knowledge (or lack of) to add species of special concern. There is concern that regional data sources vary by taxa and there is disagreement of how much weight regional data should have. One state hopes to use data generated by an ongoing species modelling effort. Two states mentioned the use of Bird Conservation Region and Partner in Flight data to help prioritize their bird SGCN list. Lastly, two states mentioned the use of the North East Regional SGCN list as a criterion for identifying SGCN.
14	Are you using any new data or information to address SGCN?	7 YES 2 NO. New data to address SGCN varied by state and included: 1) climate change vulnerability; 2) working on standard definitions of "declining" and "rare" to be more quantitative and less subjective; 3) data gathered through a new Multiple Species Inventory and Monitoring project; 4) citizen science Odonate survey project; 5) updated list of state listed species, 6) updated species conservation status scores; and 7) state responsibility species (measured as the percent of N. American population or distribution that is in the state). Two states mentioned the use of LCC data as well as data from the NE Regional Conservation Needs network.
15	Are there other important aspects of the current revision of SGCN that are not covered above?	3 YES 6 NO. In one state, the technical expert committees used to list species are relatively small, so they will ask the larger conservation community for input on whether there are other species that should be considered. Another state will keep a comprehensive list (800+) but will prioritize a subset of species and gather information on other species through a research agenda. Another state is linking its new SGCN list to the current state T/E list revision.

Question #	Question	Summary
16	<p>What specific methods or approaches are you using to evaluate the extent and condition of habitats and natural communities? Please check all that apply.</p>	<p>7 - statewide landcover; 7 natural heritage database; 5 - ecoregional classification; 2 national fish and habitat partnership; 2 national landcover; 1 ecological integrity model. In addition one state is using Marxan for connectivity, and GIS for identifying core habitat areas, and another state is attempting to use national landcover data to conduct habitat and landscape modeling. Lastly, two states are using the NE Regional terrestrial and aquatic habitat classification. Overall it seems that most states are struggling with habitat classification, accurate landcover data, and evaluating condition. Also appears that each state is taking an independent approach to applying an ecoregional framework. The method that IN is taking to evaluate landscape condition via focal species models might be interesting to share with the rest of the states.</p>
17	<p>What are your biggest challenges in revising the habitats and natural communities section?</p>	<p>The biggest challenges are: 1) the resolution, accuracy, and availability of statewide landcover data layers, 2) Standardized habitat framework to track progress over time and that meets the needs of other end users, and 3) addressing disturbed and changing (due to climate change and other factors) natural communities.</p>
18	<p>What lessons have you learned in regards to how you are addressing habitats and natural communities that other states might benefit from?</p>	<p>There is strong recognition that species habitat requirements can differ from natural community types (heritage), and that tracking landcover changes doesn't necessarily reflect species status. However, a standardized classification adopted by multiple divisions and agencies can be a very powerful tool that meets a number of conservation needs. Lastly, there is a common need more accurate, finer scale landcover data. One state suggests keeping this section simple by only using major habitat types, and applying ecoregional boundaries to address heterogeneity within these major types.</p>

Question #	Question	Summary
19	Are you using regional scale (multi-state) data or information to identify, assess and/or prioritize habitats and natural communities?	5 YES 4 NO. Only one state is planning to use regional climate data.
20	Are you using any new data or information to address habitats and natural communities?	7 YES 2 NO. One state is using the NE geospatial condition analysis data layer. One state will be using habitat models and indicators species to help assess habitat condition. Most states are incorporating most current version of data layers they typically use in such analyses such as heritage data, landcover, and revised natural community classification.
21	Are there other important aspects of the current revision of habitats and natural communities that are not covered above?	1 YES 9 NO. One state is Identifying and mapping priority habitat areas in the revision.
22	What specific methods or approaches are you using to address threats to SGCN? Please check all that apply.	The most commonly used methods are Vulnerability Assessments (6 states) and IUCN taxonomy of threats (8 states). Other methods include threat prioritization (2 states) and species specific threats and needs (2 states; one is relying on taxon-based expert teams to identify key threats to individual species). Two respondents mentioned the unified threat classification (Salafsky et al. 2008) as recommended by AFWA Best Practices guide, which is the IUCN taxonomy, so there seems to be some confusion here.
23	What are your biggest challenges in revising the threats section?	Difficult to summarize across all states as several distinct challenges were identified, including limited staff time, inadequate climate change impact data, political sensitivity (including the word "threat"); integration of threats at the species, natural community or landscape level; lack of quantitative data on threat severity and extent; lack of standard definitions of threats across taxa and threat rating categories; some states haven't reached this point in the process yet.

Question #	Question	Summary
24	What lessons have you learned in regards to how you are addressing threats that other states might benefit from?	Several suggestions: 1) use standard language, framework, and definitions to allow for cross-state consistency; 2) make a strong link between threats and conservation actions (to enable measuring effectiveness); and 3) limit list of threats to just high-priority (don't use a laundry list approach). Other suggestions included: consider urban threats (to urban wildlife), and use a "healthy systems" approach that focuses on solving problems instead of a "threats" based model that may alienate potential collaborators.
25	Are you using or do you plan to use regional scale (multi-state) information or data to identify, assess and/or prioritize threats?	Most states answered yes; those that answered no seem open to considering options. Climate change vulnerability and downscaling are prominent among the examples listed, as well as threat assessments from other conservation plans including partners in flight (migratory birds) and the NE regional SGCN concerns. Change in forest composition was also mentioned.
26	Are you using any new information or data to evaluate threats?	States are incorporating new information from funded SWG projects, NE Regional Conservation Needs grants program, and climate vulnerability information. Others are assuming there will be new information as they get further into the process.
27	Are there other important aspects of the current revision of threats that are not covered above?	Only one state responded Yes and suggested a greater emphasis on a "collective set of threats" rather than individual threats. For the update they plan to identify a prioritized list of threats by major habitat type and planning area.
28	What specific methods or approaches are you using to address conservation actions? Check all that apply.	7- Spatial prioritization, 6- Ranking of actions; 6- IUCN taxonomy, 5- Results chain, 1- Other. One state will focus on developing key strategies with a list of specific conservation actions for each strategy. It was also mentioned that a results chain (one of the choices) is more applicable for implementation plans than for developing strategies.

Question #	Question	Summary
29	What are your biggest challenges in revising the conservation actions section?	Several states responded that it is too soon to answer this. Challenges identified include: 1) Prioritizing SGCN and making information relevant and understandable to multiple audiences; 2) defining a spatial component of actions; 3) developing focused conservation actions based on focal/umbrella species and main threats with expected outcomes based on actions; 4) Identifying advocacy actions in addition to conservation actions, and writing actions so they are "actionable" and linked to needs of SGCN; 5) Integrating actions at different levels of organization and spatial extent, as well as into different approaches and plans, and 6) Identifying the right people to be at the table for this part of SWAP development, and monitoring who is doing what in state or region.
30	What lessons have you learned in regards to how you are addressing conservation actions that other states might benefit from?	Majority of states answered "None yet". Lessons learned by some states include: 1) prioritization of actions is important to show if efforts are making a difference; 2) striving for more consistency in terminology and organizing conservation actions to make the Plan easier to use; and 3) IUCN taxonomy will provide consistency in terminology for conservation actions both within state and across the region.
31	Are there other important aspects of the current revision of conservation actions that are not covered above?	1 YES 7 NO. One state shared that it really matters how actions are communicated. End users struggled with understanding how to tie their work to the actions identified in the original SWAP. It has been described as too long and cumbersome. As a result they will try and make the conservation actions section more concise, prioritized, and user-friendly in the update.

Question #	Question	Summary
32	What new tools or methods will you use to monitor the effectiveness of conservation actions?	The majority of states (5) are still trying to figure out how best to monitor conservation actions. Two states mentioned using TRACs although it now appears that TRACs may not be set up to handle this type of analysis or allow for public access. One state mentioned results chains from CAP, a Citizen Based Monitoring program, and a volunteer natural areas stewards program to collect data from across the state. Another state is in the process of determining which outputs they should monitor and at which scales (project, regional, and statewide). Another state is attempting to apply the effectiveness measures framework developed by AFWA in their guidelines document.
33	What new tools or methods will you use to monitor the health of SGCN?	The majority of states (5) are still trying to figure out how best to monitor SGCN. examples provided include: 1) Results chain, 2) CBM, 3) NatureServe S rank Calculator, 4) Focusing on existing monitoring efforts, 5) existing Multi-Species Inventory and Monitoring Project, and 6) a newly formed Wildlife Health Unit.
34	What new tools or methods will you use to monitor the health of habitats/natural communities?	The Majority of states (6) are not sure about how to monitor habitats. Examples include: 1) Indicator species, 2) Results chain, 3) CBM, 4) stewards program, 6) focusing on monitoring effectiveness of habitat management actions, and 7) using an existing grassland monitoring project as a model for other ecosystem types (wetlands, forests, etc).
35	What are your biggest challenges in revising the monitoring section?	Monitoring can easily become a large unmanageable collection of isolated efforts. It is difficult to be focused, develop a succinct set of clear questions, and stay attentive to tracking trends. Of course, there are the usual suspects of limited funding and staff for implementing monitoring efforts which has been an ongoing challenge for the past couple of decades. Another challenge is collecting data on all ongoing, recent, and future monitoring efforts in in the state.

Question #	Question	Summary
36	What lessons have you learned in regards to how you are addressing monitoring that other states might benefit from?	<p>Focus monitoring on the effectiveness of your actions</p> <p>Make sure you document benchmarks early on and your monitoring questions are very clear</p> <p>Have a communication PROCESS in place to share monitoring results in order to facilitates adaptive management across divisions and organizations</p> <p>Partnerships are critical to success</p> <p>Take advantage of established or new Citizen Science programs</p>
37	Are there other important aspects of the current revision of monitoring/adaptation that are not covered above?	0 YES 7 NO
38	What specific methods or approaches are you using to coordinate with other entities? Select all that apply	Seven of the states are using working groups or committees; five states are using the Collaborative Conservation Model, and two states are using MOUs and other agreements. Several states are improving on their communications within the context of a Collaborative Conservation Model or technical advisory committee, while one state is contracting with a private communications firm.
39	What are your biggest challenges in coordinating with other entities?	The most common comments related to time and funding for both staff and partners/stakeholders. Other challenges mentioned include: 1) gaining access and being inclusive; 2) identifying and engaging new partners; 3) engagement with other ongoing planning efforts; 4) "turf wars" and individual personality conflicts; 5) poorly defined roles and authority, and 6) too many interested partners to effectively coordinate with all of them, 7) staff turnover, 8) burdensome process for contracting, and 9) travel restrictions.

Question #	Question	Summary
40	What lessons have you learned in regards to how you are addressing partnerships that other states might benefit from?	Good coordination requires a common focus, beneficial outcomes for all members, and effective people skills, cooperation, and communication. Other lessons learned include: 1) seek and incorporate input and feedback early and often, 2) avoid large group meetings, and focus instead on smaller groups and stronger partnerships (should lead to more effective implementation), 3) Include partners on advisory and technical committees to encourage long-term support, and 4) develop formal partnerships for common understanding and transparency. Two highlights of existing partnerships come from MN: Grassland monitoring partnership, and long-term Driftless Area Timber Rattlesnake partnership.
41	How do you plan to maintain these partnerships over time?	Responses varied and included: 1) creating a working group focused on partnerships or Wildlife Action Team/Advisory Committee; 2) regular (quarterly) meetings to facilitate implementation; 3) more active involvement in monitoring and reporting; 4) focus on strong partnerships for a targeted number of actions, and continuously seek partnership opportunities; 5) maintain support (staff and funding) for partnership maintenance and development; and 6) create a culture of partnership in the agency that is sustained over time. One state suggested that the LCC could help with regional partnerships.
42	Are there other important aspects of the current revision of partnerships that are not covered above?	No examples provided.
43	What specific methods or approaches are you using to address public participation? Select all that apply.	7 - public notification, 8 - website, 5 targeted presentation, 3 - webinars, 2 - townhall meetings, 3 - other. A key strategy across the board is to have targeted partnerships with a diverse set of conservation organizations.

Question #	Question	Summary
44	What are your biggest challenges in addressing public participation?	Across the board, it was recognized that It's very difficult to meaningfully engage the general public in any type of large scale plan. Lack of time, staff, and expertise in public outreach is a common challenge. Other challenges include reaching non-traditional constituents who are typically not involved in DNR issues, and making the connection between the right audience and a specific topic. One state mentioned the difficulty in bringing diverse constituents together in order to facilitate a broader awareness of diverse perspectives.
45	What lessons have you learned in regards to how you are addressing public participation that other states might benefit from?	Public meetings are not very helpful Need to reassess partners on a continual basis, and have a clear understanding of their expectations Public participation may not keep pace with schedule of SWAP revision Public input should be targeted at a specific issue Take your message to the public by getting on a group's agenda and attending their meetings Make use of existing Outreach and Education staff
46	How do you plan to maintain public participation over time?	This seems like a lower priority task, and was not even addressed by four of the states. Strategies provided include: website, social media, webinars, newsletter, stakeholder groups, and mechanisms already established within the agency. Of special note, in PA the Game Commission communications staff has begun to develop a communications plan that will serve as a template for the other states in the NE region. Additionally, WI has formed several working groups consisting of external experts to help revise the plan. They plan to maintain these working groups throughout the implementation stage, and are incorporating objectives into the Plan that many of these groups are trying to implement themselves.
47	Are there other important aspects of the current revision of public participation that are not covered above?	0 YES 8 NO

Question #	Question	Summary
Section 2 General SWAP questions		
48	What are the most important issues that you would like to focus on in your SWAP revision?	Important issues varied by state. Responses included: 1) making the plan more user-friendly so it is easier to find information, as well as repackaging content and clarifying messages; 2) the list of SGCN should be more clearly linked to habitat types, threats and conservation actions as well as species outcomes; 3) prioritize and focus on habitat needs (quantity and quality), conservation areas and critical actions to ensure long-term viability; 4) improvement of measuring and reporting success; 5) incorporating new and better data; 6) developing online tools to improve information on what's happening and where; and 7) Incorporating climate change information.
49	What are the biggest challenges you are facing in developing the SWAP revision?	Staff time and resources are the MAJOR limiting factors. Other challenges include shorter time frame and bigger task (reviewing and updating is more difficult); data management; pulling the pieces of the WAP together; too much time on Element 1 (more than expected); meeting diverse expectations of stakeholders.
50	How are you planning to address these challenges?	Several adjustments including altering (lowering) expectations, persevering, and increasing focus (most common response) or limiting scope to priority habitats and actions. Also, strategies such as gaining early support within agency and communicating regularly, reallocating staff, developing working groups, and building a database.

Question #	Question	Summary
51	Have you had any big successes with your SWAP? If yes, please describe, including how are you promoting each success.	<p>IN - highly committed Advisory Committee of ~ 30 partners</p> <p>WI - provide an annual update on implementation</p> <p>MI - targeted insect surveys and updated S-ranks (using NatureServe S-rank calculator) have led to several species that can be taken off the SGCN list. Promoted by press releases, government delivery stories and a 5 year SWG highlight report.</p> <p>IL - several partners have embraced the plan and use it as an operational guide; DNR Wildlife has realigned key staff positions to parallel the plan</p> <p>IA - increased info on species occurrences due to the Multi-Species Inventory and Monitoring project - also several habitat improvement projects through c-SWG</p> <p>MN - in process of developing a new funding and marketing strategy to help communicate successes to non-scientists.</p> <p>NY - population restoration of both spruce grouse and Hellbender - press releases and reports</p> <p>PA - Targeted surveys have led top the delisting of 10 state listed species (details in 2013 summary report).</p>
52	Are there other important aspects of the overall current revision that are not covered above	<p>2 YES 6 NO. Of those that answered yes, one state responded that developing focal areas is a new aspect to the WAP. Prioritizing conservation efforts as well as where to conduct them will be a significant change from the current WAP and may cause issues with some of their partners. the other state responded that you shouldn't get too bogged down in the revision because implementation is still the most important aspect.</p>

Question #	Question	Summary
Section 3 Regional Collaboration		
53	Do you have any suggestions for enhancing regional collaboration within the Midwest region once the revised SWAPs are completed? If so, please describe.	The responses to this question ranged from more formal to less formal: 1) formal organized mechanism with a clearly defined governance structure, 2) multi-state MOU with public/private collaboration so responsibility is distributed among SWAP users, 3) panel of state representatives that ID and vote on regional projects to pursue, 4) official designated facilitator of LCC SWAP working group, 5) small groups of staff from various states organized and focused on specific topics, and 6) meet as an informal group on a regular basis.
54	Please describe the most significant barriers/challenges to developing a regional collaboration within the Midwest region?	The biggest challenges were time (4) , travel restrictions (5) , and tight budgets (2) which all tend to lead to state priorities trumping regional priorities. Other barriers mentioned include: insufficient commitment from within the state agency, difficulty in defining the region, no clear entity to lead the effort, identifying sufficient funding for regional projects, programmatic and political differences between the states, as well as differences in fundamental frameworks such as ecoregions, habitats, and prioritization methods.
55	What opportunities (funding, research, information delivery, mitigation) are you aware of that could help advance collaboration in the Midwest region?	Several states mentioned the LCC as an existing opportunity that should be strengthened with respect to role and funding. Other ideas relate to funding sources such as cSWG, GLRI, National Fish Habitat Partnership, Joint Ventures, and Climate Science Center. Research and information delivery were both mentioned as an opportunity three times as well.
56	What do you think are the most important priorities (e.g., climate change, common habitat classification system, priority species, priority threats, funding) to focus on at the regional scale?	All of the suggested issues were mentioned at least once. Climate change and regional coordination on priority species and habitats were both mentioned the most often. Other ideas include: shared regional management actions, and regional effectiveness measures and reporting.

Question #	Question	Summary
57	Are you aware of any regional models of collaboration that the Midwest region could benefit from? If yes, please list.	Some states are aware of models of regional collaboration but not aware of any that have been applied in the Midwest. Three states mentioned the success of the Northeast Regional Conservation Needs Program (NE SWAP) and there may be some aspects transferrable to the Midwest. One state mentioned the Western Governor's Association model. Another state cautioned that often results are inversely proportional to the number of participants, and is not aware of a regional model that has figured out how to reverse this trend.

**Appendix B: Listing of Habitats Used by UM/GL LCC States in 2015 SWAP
Updates (organized by NLCD Land Cover Class)**

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
11	Open Water	IA	Aquatic	Shallow Lakes
11	Open Water	IA	Terrestrial	Open Water
11	Open Water	IA	Aquatic	Backwater Lakes & Oxbows
11	Open Water	IA	Aquatic	Streams (warm/cold classes)
11	Open Water	IA	Aquatic	Rivers
11	Open Water	IA	Aquatic	Ponds
11	Open Water	IA	Aquatic	On-stream Impoundments
11	Open Water	IA	Aquatic	Mississippi River Pools
11	Open Water	IA	Aquatic	Lakes (natural/constructed classes)
11	Open Water	IA	Aquatic	Federal flood control reservoirs
11	Open Water	IA	Aquatic	Surface Mines
11	Open Water	IL	Streams (and Lakes)	Lake Michigan
11	Open Water	IL	Streams (and Lakes)	Lakes/reservoirs
11	Open Water	IL	Streams (and Lakes)	Rivers
11	Open Water	IL	Streams (and Lakes)	Streams
11	Open Water	IN	Aquatic Systems	Oxbows/Backwaters/Sloughs/Embayments
11	Open Water	IN	Aquatic Systems	Impoundments
11	Open Water	IN	Aquatic Systems	Borrow Pits
11	Open Water	IN	Aquatic Systems	Lake Michigan
11	Open Water	IN	Aquatic Systems	Springs/Spring Brooks
11	Open Water	IN	Aquatic Systems	Creeks
11	Open Water	IN	Aquatic Systems	Big Rivers
11	Open Water	IN	Aquatic Systems	Deep Water Lakes
11	Open Water	IN	Aquatic Systems	Shallow Water Lakes
11	Open Water	IN	Aquatic Systems	Medium Rivers
11	Open Water	MI	Aquatic	SCDRS
11	Open Water	MI	Aquatic	Littoral Zones
11	Open Water	MI	Aquatic	Headwaters & Warmwater Streams
11	Open Water	MI	Aquatic	Big Rivers
11	Open Water	MN	Aquatic	River/stream
11	Open Water	MN	Aquatic	Lake
11	Open Water	NY	Lake	Small Lake; Oligotrophic
11	Open Water	NY	Large/Great River	High Gradient; Assume Moderately Buffered
11	Open Water	NY	Lakes and Ponds	Oligotrophic
11	Open Water	NY	Lakes and Ponds	Mesotrophic
11	Open Water	NY	Lakes and Ponds	Eutrophic
11	Open Water	NY	Lake	Very Large Lake; Oligotrophic

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
11	Open Water	NY	Lake	Very Large Lake; Eutrophic
11	Open Water	NY	Lake	Small Lake; Mesotrophic
11	Open Water	NY	Lake	Small Lake; Eutrophic
11	Open Water	NY	Lake	Reservoir
11	Open Water	NY	Lake	Large Lake; Eutrophic
11	Open Water	NY	Lake	Large Lake; Mesotrophic
11	Open Water	NY	Lake	Large Lake; Oligotrophic
11	Open Water	NY	Lake	Medium Lake; Eutrophic
11	Open Water	NY	Lake	Medium Lake; Mesotrophic
11	Open Water	NY	Large/Great River	Low Gradient; Assume Moderately Buffered
11	Open Water	NY	Lake	Medium Lake; Oligotrophic
11	Open Water	NY	Riverine Cultural	Created Stream
11	Open Water	NY	Medium Rivers	Moderate-High Gradient; Assume Moderately Buffered
11	Open Water	NY	Small Rivers	Moderate-High Gradient; Low-Moderately Buffered
11	Open Water	NY	Small Rivers	Moderate-High Gradient; Highly Buffered
11	Open Water	NY	Small Rivers	Low-Moderate Gradient; Low-Moderately Buffered
11	Open Water	NY	Small Rivers	Low-Moderate Gradient; Highly Buffered
11	Open Water	NY	Small Rivers	Low Gradient; Low-Moderately Buffered
11	Open Water	NY	Small Rivers	Low Gradient; Highly Buffered
11	Open Water	NY	Small Rivers	High Gradient; Low-Moderately Buffered
11	Open Water	NY	Medium Rivers	Low-Moderate Gradient; Assume Moderately Buffered
11	Open Water	NY	Lake	Very Large Lake; Mesotrophic
11	Open Water	NY	Large/Great River	Low-Moderate Gradient; Assume Moderately Buffered
11	Open Water	NY	Headwaters and Creeks	Moderate-High Gradient; Low-Moderately Buffered
11	Open Water	NY	Medium Rivers	Low Gradient; Assume Moderately Buffered
11	Open Water	NY	Medium Rivers	High Gradient; Assume Moderately Buffered
11	Open Water	NY	Marine	Marine Subtidal Shallow
11	Open Water	NY	Marine	Marine Subtidal Deep
11	Open Water	NY	Marine	Marine Intertidal
11	Open Water	NY	Large/Great River	Moderate-High Gradient; Assume Moderately Buffered
11	Open Water	NY	Small Rivers	High Gradient; Highly Buffered

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
11	Open Water	NY	Headwaters and Creeks	High Gradient; Highly Buffered
11	Open Water	NY	Estuarine	Brackish Subtidal Shallow
11	Open Water	NY	Estuarine	Freshwater Intertidal
11	Open Water	NY	Estuarine	Freshwater Subtidal Deep
11	Open Water	NY	Estuarine	Freshwater Subtidal Shallow
11	Open Water	NY	Great Lakes	Shoals and Bays
11	Open Water	NY	Estuarine	Brackish Subtidal Deep
11	Open Water	NY	Headwaters and Creeks	High Gradient; Low-Moderately Buffered
11	Open Water	NY	Headwaters and Creeks	Low Gradient; Highly Buffered
11	Open Water	NY	Headwaters and Creeks	Low Gradient; Low-Moderately Buffered
11	Open Water	NY	Headwaters and Creeks	Low-Moderate Gradient; Highly Buffered
11	Open Water	NY	Headwaters and Creeks	Low-Moderate Gradient; Low-Moderately Buffered
11	Open Water	NY	Headwaters and Creeks	Moderate-High Gradient; Highly Buffered
11	Open Water	NY	Estuarine	Brackish Intertidal
11	Open Water	OH	Aquatic	Lake Erie Tributaries
11	Open Water	OH	Aquatic	Headwater and Small Inland Streams
11	Open Water	OH	Aquatic	Lake Erie
11	Open Water	OH	Aquatic	Natural Lakes
11	Open Water	OH	Aquatic	Ohio River
11	Open Water	OH	Aquatic	Ohio River Tributaries
11	Open Water	OH	Aquatic	Man-made Lakes and Ponds
11	Open Water	PA	Lakes and Ponds	Oligotrophic
11	Open Water	PA	Headwaters and Creeks	High Gradient, Cold
11	Open Water	PA	Tidal Large Rivers	Tidal Large Rivers
11	Open Water	PA	Tidal Headwaters and Creeks	Tidal Headwaters and Creeks
11	Open Water	PA	Small Rivers	Moderate Gradient, Cool
11	Open Water	PA	Small Rivers	Low Gradient, Cool
11	Open Water	PA	Medium Rivers	Warm
11	Open Water	PA	Medium Rivers	Cool
11	Open Water	PA	Large Rivers	Warm
11	Open Water	PA	Lakes and Ponds	Mesotrophic
11	Open Water	PA	Lakes and Ponds	Hypereutrophic
11	Open Water	PA	Lakes and Ponds	Eutrophic
11	Open Water	PA	Headwaters and Creeks	Moderate Gradient, Warm
11	Open Water	PA	Headwaters and Creeks	Moderate Gradient, Cool

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
11	Open Water	PA	Headwaters and Creeks	Moderate Gradient, Cold
11	Open Water	PA	Headwaters and Creeks	Low Gradient, Warm
11	Open Water	PA	Headwaters and Creeks	Low Gradient, Cool
11	Open Water	PA	Tidal Small-Medium Rivers	Tidal Small-Medium Rivers
11	Open Water	PA	Headwaters and Creeks	High Gradient, Cool
11	Open Water	PA	Small Rivers	Moderate Gradient, Warm
11	Open Water	PA	Headwaters and Creeks	High Gradient, Warm
11	Open Water	PA	Water	Open Water (NLCD-NHD open water)
11	Open Water	PA	Small Rivers	Low Gradient, Warm
11	Open Water	WI	Aquatic	Small Lake--soft, bog
11	Open Water	WI	Aquatic	Large Lake--deep, soft and very soft, seepage
11	Open Water	WI	Aquatic	Large Lake--shallow, hard and very hard (marl), drainage
11	Open Water	WI	Aquatic	Large Lake--shallow, soft, drainage
11	Open Water	WI	Aquatic	Large Lake--shallow, soft, seepage
11	Open Water	WI	Aquatic	Riverine Impoundment
11	Open Water	WI	Aquatic	Riverine Lake - Pond
11	Open Water	WI	Aquatic	Small Lake--hard, bog
11	Open Water	WI	Aquatic	Large Lake--deep, hard, seepage
11	Open Water	WI	Aquatic	Small Lake--Other
11	Open Water	WI	Aquatic	Large Lake--deep, soft, drainage
11	Open Water	WI	Aquatic	Spring Pond, Lake--Spring
11	Open Water	WI	Wetland	Ephemeral Pond
11	Open Water	WI	Wetland	Submergent Marsh
11	Open Water	WI	Wetland	Submergent Marsh - Oligotrophic
11	Open Water	WI	Aquatic	Springs and Spring Runs (Hard)
11	Open Water	WI	Aquatic	Springs and Spring Runs (Soft)
11	Open Water	WI	Aquatic	Warmwater rivers
11	Open Water	WI	Aquatic	Warmwater streams
11	Open Water	WI	Aquatic	Small Lake--meromictic
11	Open Water	WI	Aquatic	Large Lake--deep, hard, drainage
11	Open Water	WI	Aquatic	Lake Superior
11	Open Water	WI	Aquatic	Lake Michigan
11	Open Water	WI	Aquatic	Coldwater streams
11	Open Water	WI	Aquatic	Coolwater streams
11	Open Water	WI	Aquatic	Large Lake--shallow, hard, seepage

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
21	Developed, Open Space	IN	Developed Lands	Rights-of-Way
22	Developed, Low Intensity	NY	Urban/Suburban Built	Residential Rural
23	Developed, Medium Intensity	IA	Terrestrial	Developed (intensity classes)
23	Developed, Medium Intensity	IN	Developed Lands	Suburban Areas
23	Developed, Medium Intensity	OH	Other	Artificial/Man-made Environments (Agricultural Fields, Skyscrapers, Bridges/Overpasses, Human Structures (boat docks, lowhead dams, etc.), Urban/Suburban Homes/Yards, Barns & Other Rural Structures)
23	Developed, Medium Intensity	PA	Urban/Suburban Built	Developed (NLCD 21-24 & 31)
23	Developed, Medium Intensity	WI	Miscellaneous	Transportation-Utility Corridor
24	Developed, High Intensity	IN	Developed Lands	Urban Areas
24	Developed, High Intensity	IN	Developed Lands	Roads
24	Developed, High Intensity	NY	Urban/Suburban Built	Commercial/Industrial and Residential
31	Barren Land (Rock/Sand/Clay)	IL	Wetland	Beach
31	Barren Land (Rock/Sand/Clay)	IL	Other habitats to consider	Caves
31	Barren Land (Rock/Sand/Clay)	IN	Barren Lands	Sand/Dunes
31	Barren Land (Rock/Sand/Clay)	IN	Wetlands	Mudflats
31	Barren Land (Rock/Sand/Clay)	IN	Barren Lands	Quarries
31	Barren Land (Rock/Sand/Clay)	IN	Barren Lands	Bare Rock/Talus
31	Barren Land (Rock/Sand/Clay)	IN	Barren Lands	Cliffs/Rock Outcrops
31	Barren Land (Rock/Sand/Clay)	MI	Terrestrial	Dunes & Beaches
31	Barren Land	MN	Terrestrial	Rock outcrop community

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
	(Rock/Sand/Clay)			
31	Barren Land (Rock/Sand/Clay)	MN	Terrestrial	Cliff/Talus Community
31	Barren Land (Rock/Sand/Clay)	NY	Alpine	Alpine
31	Barren Land (Rock/Sand/Clay)	NY	Lake and River Shore	Lake and River Beach
31	Barren Land (Rock/Sand/Clay)	NY	Coastal Grassland & Shrubland	Maritime Dunes
31	Barren Land (Rock/Sand/Clay)	NY	Cliff and Talus	Erosional Bluff
31	Barren Land (Rock/Sand/Clay)	NY	Extractive	Surface Mining
31	Barren Land (Rock/Sand/Clay)	NY	Outcrop and Summit Scrub	Rocky Outcrop
31	Barren Land (Rock/Sand/Clay)	NY	Cliff and Talus	Cliff and Talus
31	Barren Land (Rock/Sand/Clay)	OH	Terrestrial	Caves and Mines
31	Barren Land (Rock/Sand/Clay)	PA	Cliff and Talus	Calcareous Cliff and Talus
31	Barren Land (Rock/Sand/Clay)	PA	Cliff and Talus	Circumneutral Cliff and Talus
31	Barren Land (Rock/Sand/Clay)	PA	Glade, Barren, and Savanna	Appalachian Shale Barrens
31	Barren Land (Rock/Sand/Clay)	PA	Cliff and Talus	Acidic Cliff and Talus
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Glaciere Talus (Felsenmeer)
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Great Lakes Ridge and Swale
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Dry Cliff
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Bedrock Shore
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Clay Seepage Bluff
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Great Lakes Alkaline Rockshore
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Great Lakes Beach

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Great Lakes Dune
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Inland Beach
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Lacustrine Mud Flat
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Algific Talus Slope
31	Barren Land (Rock/Sand/Clay)	WI	Miscellaneous	Moist Cliff
41	Deciduous Forest	IA	Terrestrial	Deciduous Forest (3 height classes)
41	Deciduous Forest	IL	Forest and Woodlands	Woodland
41	Deciduous Forest	IL	Forest and Woodlands	Upland forest
41	Deciduous Forest	IL	Forest and Woodlands	Sand woodland
41	Deciduous Forest	IL	Forest and Woodlands	Sand forest
41	Deciduous Forest	IL	Forest and Woodlands	Flatwoods
41	Deciduous Forest	IN	Forest Lands	Early Successional Forest
41	Deciduous Forest	IN	Forest Lands	Hardwood Woodland
41	Deciduous Forest	IN	Forest Lands	Hardwood Forest
41	Deciduous Forest	MI	Terrestrial	Young Forest
41	Deciduous Forest	MN	Terrestrial	Upland hardwood forest
41	Deciduous Forest	MN	Terrestrial	Upland deciduous forest
41	Deciduous Forest	NY	Central Oak-Pine	Coastal Hardwoods
41	Deciduous Forest	NY	Central Oak-Pine	Oak Forest
41	Deciduous Forest	NY	Coastal Grassland & Shrubland	Great Lakes Dune and Swale
41	Deciduous Forest	OH	Terrestrial	Forests - Composition (oak-hickory, beech, etc.), Growth Stage (early successional through mature)
41	Deciduous Forest	OH	Terrestrial	Lake Erie Islands
41	Deciduous Forest	PA	Central Oak-Pine	Northeastern Interior Dry-Mesic Oak Forest
41	Deciduous Forest	PA	Central Oak-Pine	North Atlantic Coastal Plain Hardwood Forest
41	Deciduous Forest	PA	Central Oak-Pine	Allegheny-Cumberland Dry Oak Forest and Woodland
41	Deciduous Forest	PA	Coastal Grassland & Shrubland	Great Lakes Dune and Swale
41	Deciduous Forest	PA	Northern Hardwood and Conifer	Laurentian-Acadian Northern Hardwood Forest
41	Deciduous Forest	PA	Central Oak-Pine	Central Appalachian Pine-Oak Rocky

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
				Woodland
41	Deciduous Forest	PA	Northern Hardwood and Conifer	North-Central Interior Beech-Maple Forest
41	Deciduous Forest	PA	Northern Hardwood and Conifer	South-Central Interior Mesophytic Forest
41	Deciduous Forest	PA	Northern Hardwood and Conifer	Southern Atlantic Coastal Plain Mesic Hardwood Forest
41	Deciduous Forest	WI	Southern Forest	Southern Dry Forest
41	Deciduous Forest	WI	Northern Forest	Aspen-Birch
41	Deciduous Forest	WI	Southern Forest	Southern Dry-mesic Forest
41	Deciduous Forest	WI	Southern Forest	Southern Mesic Forest
41	Deciduous Forest	WI	Northern Forest	Mesic Floodplain Terrace
42	Evergreen Forest	IA	Terrestrial	Coniferous Forest
42	Evergreen Forest	IN	Forest Lands	Conifer Forest
42	Evergreen Forest	IN	Forest Lands	Conifer Woodland
42	Evergreen Forest	MI	Terrestrial	Northern Dry Forest & Pine Barrens
42	Evergreen Forest	MN	Terrestrial	Upland conifer forest
42	Evergreen Forest	NY	Boreal Upland Forest	Spruce-Fir Forests and Flats
42	Evergreen Forest	NY	Boreal Upland Forest	Mountain Spruce-Fir Forests
42	Evergreen Forest	OH	Terrestrial	Boreal Communities
42	Evergreen Forest	PA	Central Oak-Pine	Southern Appalachian Montane Pine Forest and Woodland
42	Evergreen Forest	WI	Northern Forest	Northern Dry Forest--late seral
42	Evergreen Forest	WI	Northern Forest	Northern Dry Forest--young seral
42	Evergreen Forest	WI	Northern Forest	Northern Dry Forest--mid-seral
42	Evergreen Forest	WI	Southern Forest	Pine Relict
42	Evergreen Forest	WI	Northern Forest	Mesic Cedar Forest
42	Evergreen Forest	WI	Northern Forest	Conifer Plantation
42	Evergreen Forest	WI	Northern Forest	Boreal Forest
42	Evergreen Forest	WI	Southern Forest	Hemlock Relict
43	Mixed Forest	IN	Forest Lands	Mixed Woodland
43	Mixed Forest	IN	Forest Lands	Mixed Forest
43	Mixed Forest	NY	Plantation/Pioneer Forest	Plantation, Disturbed Land, Pioneer Forest
43	Mixed Forest	NY	Central Oak-Pine	Oak-Pine Forest
43	Mixed Forest	NY	Northern Hardwood and Conifer	Mixed Northern Hardwoods
43	Mixed Forest	NY	Exotic Upland Forest	Non-native Upland Forest

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
43	Mixed Forest	PA	Northern Hardwood and Conifer	Appalachian (Hemlock)-Northern Hardwood Forest
43	Mixed Forest	PA	Central Oak-Pine	Central Appalachian Dry Oak-Pine Forest
43	Mixed Forest	PA	Northern Hardwood and Conifer	Laurentian-Acadian Pine-Hemlock-Hardwood Forest
43	Mixed Forest	WI	Northern Forest	Northern Mesic Forest--early seral
43	Mixed Forest	WI	Northern Forest	Northern Dry Mesic--late seral
43	Mixed Forest	WI	Northern Forest	Northern Wet-mesic Forest
43	Mixed Forest	WI	Northern Forest	Northern Dry Mesic--mid-seral
43	Mixed Forest	WI	Northern Forest	Northern Dry Mesic--young seral
43	Mixed Forest	WI	Northern Forest	Northern Mesic Forest--late seral
43	Mixed Forest	WI	Southern Forest	Central Sands Pine - Oak Forest
43	Mixed Forest	WI	Northern Forest	Northern Mesic Forest--mid seral
43	Mixed Forest	WI	Northern Forest	Northern Mesic Forest--young seral
52	Shrub/scrub	NY	Alpine	Subalpine Woodland and Shrub
52	Shrub/scrub	NY	Disturbed Land/Pioneer	Non-native Shrublands
52	Shrub/scrub	PA	Ruderal Shrubland & Grassland	Shrubland & grassland (NLCD 52/71)
71	Grassland/Herbaceous	IA	Terrestrial	Grassland
71	Grassland/Herbaceous	IL	Forest and Woodlands	Savanna
71	Grassland/Herbaceous	IL	Grassland	Prairie
71	Grassland/Herbaceous	IL	Forest and Woodlands	Sand Savanna
71	Grassland/Herbaceous	IL	Forest and Woodlands	Barrens
71	Grassland/Herbaceous	IN	Grasslands	Shrubland
71	Grassland/Herbaceous	IN	Grasslands	Haylands
71	Grassland/Herbaceous	IN	Grasslands	Reclaimed Mine Lands
71	Grassland/Herbaceous	IN	Grasslands	Savannas
71	Grassland/Herbaceous	IN	Grasslands	Vegetated Dunes
71	Grassland/Herbaceous	IN	Grasslands	Herbaceous Grasslands
71	Grassland/Herbaceous	IN	Grasslands	Old Fields (early successional)
71	Grassland/Herbaceous	IN	Grasslands	Farm Bill Program Lands
71	Grassland/Herbaceous	IN	Grasslands	Prairies
71	Grassland/Herbaceous	MI	Terrestrial	Prairies & Savannas
71	Grassland/Herbaceous	MI	Terrestrial	Large Grassland
71	Grassland/Herbaceous	MN	Terrestrial	Prairie-forest complexes
71	Grassland/Herbaceous	MN	Terrestrial	Prairie/grassland
71	Grassland/Herbaceous	NY	Glade, Barren, and Savanna	Native Barrens and Savanna

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
71	Grassland/Herbaceous	NY	Central Oak-Pine	Pine Barrens
71	Grassland/Herbaceous	NY	Central Oak-Pine	Coastal Coniferous Barrens
71	Grassland/Herbaceous	NY	Maintained Grasses and Mixed Cover	Urban and Recreational Grasses
71	Grassland/Herbaceous	OH	Terrestrial	Grasslands - Prairies, Pastures/Hayfields, Old Fields
71	Grassland/Herbaceous	OH	Terrestrial	Oak Savannas
71	Grassland/Herbaceous	PA	Glade, Barren, and Savanna	Central Appalachian Alkaline Glade and Woodland
71	Grassland/Herbaceous	PA	Glade, Barren, and Savanna	Eastern Serpentine Woodland
71	Grassland/Herbaceous	WI	Barrens	Sand Barrens
71	Grassland/Herbaceous	WI	Miscellaneous	Bedrock Glade
71	Grassland/Herbaceous	WI	Barrens	Oak Barrens
71	Grassland/Herbaceous	WI	Barrens	Pine Barrens
71	Grassland/Herbaceous	WI	Savanna	Oak Opening
71	Grassland/Herbaceous	WI	Savanna	Cedar Glade
71	Grassland/Herbaceous	WI	Savanna	Oak Woodland
71	Grassland/Herbaceous	WI	Grassland	Surrogate Grasslands
71	Grassland/Herbaceous	WI	Grassland	Wet-mesic Prairie
71	Grassland/Herbaceous	WI	Barrens	Great Lakes Barrens
71	Grassland/Herbaceous	WI	Grassland	Sand Prairie
71	Grassland/Herbaceous	WI	Grassland	Mesic Prairie
71	Grassland/Herbaceous	WI	Grassland	Dry-mesic Prairie
71	Grassland/Herbaceous	WI	Miscellaneous	Alvar
71	Grassland/Herbaceous	WI	Grassland	Dry Prairie
71	Grassland/Herbaceous	WI	Grassland	Bracken Grassland
71	Grassland/Herbaceous	WI	Grassland	Wet Prairie
81	Pasture/Hay	IA	Terrestrial	Cut Hay + Fallow
81	Pasture/Hay	IL	Grassland	Agriculture field
81	Pasture/Hay	NY	Agricultural	Pasture/Hay
81	Pasture/Hay	NY	Disturbed Land/Pioneer	Old Field/Managed Grasslands
81	Pasture/Hay	NY	Disturbed Land/Pioneer	Powerline
82	Cultivated Crops	IA	Terrestrial	Rowcrops
82	Cultivated Crops	IN	Agriculture	Cropland/Hedgerow
82	Cultivated Crops	NY	Agricultural	Cultivated Crops
82	Cultivated Crops	PA	Agricultural	Agriculture (NLCD 81-82)
90	Woody Wetlands	IL	Wetland	Swamp

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
90	Woody Wetlands	IL	Forest and Woodlands	Floodplain forest
90	Woody Wetlands	IN	Wetlands	Riparian Zones
90	Woody Wetlands	IN	Wetlands	Shrub Wetland
90	Woody Wetlands	IN	Wetlands	Forested Wetland
90	Woody Wetlands	MI	Terrestrial	Floodplain Forest
90	Woody Wetlands	MN	Terrestrial	Wetland-forested
90	Woody Wetlands	MN	Terrestrial	Lowland deciduous forest
90	Woody Wetlands	MN	Terrestrial	Lakeshore
90	Woody Wetlands	MN	Terrestrial	Lowland conifer forest
90	Woody Wetlands	NY	Coastal Plain Swamp	Coastal Red Maple-Black Gum Swamp
90	Woody Wetlands	NY	Northeast Floodplain Forest	Riparian
90	Woody Wetlands	NY	Northern Swamp	Conifer Forest Swamp
90	Woody Wetlands	NY	Boreal Forested Peatland	Boreal Forested Peatland
90	Woody Wetlands	NY	Central Hardwood Swamp	Hardwood Swamp
90	Woody Wetlands	NY	Coastal Plain Swamp	Atlantic White Cedar Swamp
90	Woody Wetlands	NY	Wet Meadow/Shrub Marsh	Wet Meadow/Shrub Marsh
90	Woody Wetlands	NY	Northeast Floodplain Forest	Floodplain Forest
90	Woody Wetlands	NY	Northern Swamp	Mixed Hardwood Swamp
90	Woody Wetlands	NY	Northern Swamp	Northern White Cedar Swamp
90	Woody Wetlands	PA	Central Hardwood Swamp	North-Central Interior Wet Flatwoods
90	Woody Wetlands	PA	Larger River Floodplain	North-Central Appalachian Large River Floodplain
90	Woody Wetlands	PA	Central Hardwood Swamp	Central Interior Highlands and Appalachian Sinkhole and Depression Pond
90	Woody Wetlands	PA	Northern Swamp	North-Central Appalachian Acidic Swamp
90	Woody Wetlands	PA	Northern Swamp	North-Central Interior and Appalachian Rich Swamp
90	Woody Wetlands	PA	Northern Swamp	Northern Appalachian-Acadian Conifer - Hardwood Acidic Swamp
90	Woody Wetlands	PA	Coastal Plain Swamp	North Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest
90	Woody Wetlands	PA	Northern Swamp	High Allegheny Headwater Wetland
90	Woody Wetlands	PA	Larger River Floodplain	North-Central Interior Large River Floodplain

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
90	Woody Wetlands	PA	Tidal Swamp	North Atlantic Coastal Plain Tidal Swamp
90	Woody Wetlands	WI	Southern Forest	Southern Tamarack Swamp (rich)
90	Woody Wetlands	WI	Wetland	Shrub Carr
90	Woody Wetlands	WI	Wetland	Alder Thicket
90	Woody Wetlands	WI	Wetland	Muskeg
90	Woody Wetlands	WI	Southern Forest	Southern Hardwood Swamp
90	Woody Wetlands	WI	Northern Forest	Northern Wet Forest
90	Woody Wetlands	WI	Southern Forest	Floodplain Forest
90	Woody Wetlands	WI	Northern Forest	Northern Hardwood Swamp
90	Woody Wetlands	WI	Northern Forest	Tamarack Swamp (poor)
90	Woody Wetlands	WI	Northern Forest	Black Spruce Swamp
90	Woody Wetlands	WI	Northern Forest	Forested Seep
90	Woody Wetlands	WI	Southern Forest	White Pine - Red Maple Swamp
95	Emergent Herbaceous Wetlands	IA	Aquatic	Wetland
95	Emergent Herbaceous Wetlands	IA	Terrestrial	Wetland
95	Emergent Herbaceous Wetlands	IL	Wetland	Wet Mudflat/Moist-soil plants
95	Emergent Herbaceous Wetlands	IL	Streams (and Lakes)	Backwaters (shallow, vegetated, non-flowing)
95	Emergent Herbaceous Wetlands	IL	Wetland	Marsh (Deep, Shallow, with shrub/forest)
95	Emergent Herbaceous Wetlands	IL	Wetland	Wet Meadow
95	Emergent Herbaceous Wetlands	IN	Wetlands	Ephemeral/Temporary Wetlands
95	Emergent Herbaceous Wetlands	IN	Wetlands	Bogs/Fens
95	Emergent Herbaceous Wetlands	IN	Wetlands	Herbaceous Wetland
95	Emergent Herbaceous Wetlands	MI	Wetland	Great Lakes Marsh & Emergent Marsh
95	Emergent Herbaceous Wetlands	MI	Wetland	Fen
95	Emergent Herbaceous Wetlands	MN	Terrestrial	Open peatland
95	Emergent Herbaceous Wetlands	MN	Terrestrial	Wetland-non-forested

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
95	Emergent Herbaceous Wetlands	MN	Terrestrial	Grassland-wetland complexes
95	Emergent Herbaceous Wetlands	NY	Vernal Pool	Vernal Pool
95	Emergent Herbaceous Wetlands	NY	Emergent Marsh	Great Lakes Freshwater Estuary Marsh
95	Emergent Herbaceous Wetlands	NY	Coastal Peatland	Open Alkaline Peatlands
95	Emergent Herbaceous Wetlands	NY	Coastal Plain Pond	Coastal Plain Pond
95	Emergent Herbaceous Wetlands	NY	Emergent Marsh	Freshwater Marsh
95	Emergent Herbaceous Wetlands	NY	Modified/Managed Marsh	Modified/Managed Marsh
95	Emergent Herbaceous Wetlands	NY	Northern Peatland	Open Acidic Peatlands
95	Emergent Herbaceous Wetlands	OH	Terrestrial	Wetlands - Marshes (Natural, Diked), Vernal Pools, Bogs, Fens
95	Emergent Herbaceous Wetlands	PA	Northern Peatland	North-Central Interior and Appalachian Acidic Peatland
95	Emergent Herbaceous Wetlands	PA	Tidal Marsh	North Atlantic Coastal Plain Tidal Salt Marsh
95	Emergent Herbaceous Wetlands	PA	Emergent Marsh	Laurentian-Acadian Freshwater Marsh
95	Emergent Herbaceous Wetlands	PA	Wet Meadow/Shrub Marsh	Laurentian-Acadian Wet Meadow-Shrub Swamp
95	Emergent Herbaceous Wetlands	WI	Wetland	Riverine Mud Flat
95	Emergent Herbaceous Wetlands	WI	Wetland	Open Bog
95	Emergent Herbaceous Wetlands	WI	Wetland	Northern Sedge Meadow
95	Emergent Herbaceous Wetlands	WI	Wetland	Southern Sedge Meadow
95	Emergent Herbaceous Wetlands	WI	Wetland	Shore Fen
95	Emergent Herbaceous Wetlands	WI	Wetland	Poor Fen
95	Emergent Herbaceous Wetlands	WI	Wetland	Patterned Peatland
95	Emergent Herbaceous Wetlands	WI	Wetland	Moist Sandy Meadow

NLCD Code	NLCD Cover Class	State	Macro Habitat Category	Micro Habitat Category
	Wetlands			
95	Emergent Herbaceous Wetlands	WI	Wetland	Interdunal Wetland
95	Emergent Herbaceous Wetlands	WI	Wetland	Floating-leaved Marsh
95	Emergent Herbaceous Wetlands	WI	Wetland	Emergent Marsh - Wild Rice
95	Emergent Herbaceous Wetlands	WI	Wetland	Emergent Marsh
95	Emergent Herbaceous Wetlands	WI	Wetland	Coastal Plain Marsh
95	Emergent Herbaceous Wetlands	WI	Wetland	Central Poor Fen
95	Emergent Herbaceous Wetlands	WI	Wetland	Calcareous Fen
95	Emergent Herbaceous Wetlands	WI	Wetland	Bog Relict
95	Emergent Herbaceous Wetlands	WI	Wetland	Boreal Rich Fen