Grand Calumet River Area of Concern
BUI #14 Revision

Citizens Advisory for the Remediation of the Environment (CARE)
Workgroup Meeting
Sept. 23, 2021

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AOC Background

Background

- **Great Lakes AOCs:** Geographic areas within the Great Lakes basin designated by the U.S. and Canada where significant impairment of beneficial uses has occurred as a result of human activities at the local level. AOCs focus on Great Lakes waterways.

- **Beneficial Use Impairment (BUI):** A change in the chemical, physical, or biological integrity of the Great Lakes system sufficient to cause significant environmental degradation.

General policies pertaining to AOCs are set forth in the U.S. – Canada Great Lakes Water Quality Agreement, particularly within Annex 1.

BUI Removal/Restoration Targets

- States and local advisory groups create (and periodically review) restoration targets for each BUI.
- The targets set forth the conditions under which a BUI is considered to have been successfully addressed.
  - An AOC may not be delisted until all beneficial uses are considered restored (all applicable BUIs have been removed).
- Targets should meet the following criteria:
  - Measurable
  - Achievable
  - Realistic
  - Flexible

Other BUI Removal Target Considerations

- Targets should:
  - Be based on local watershed goals
  - Be consistent with applicable federal and state regulations, objectives, and policies
  - Reflect the goals of the 2012 U.S. – Canada Great Lakes Water Quality Agreement

Current BUI #14 Removal Target

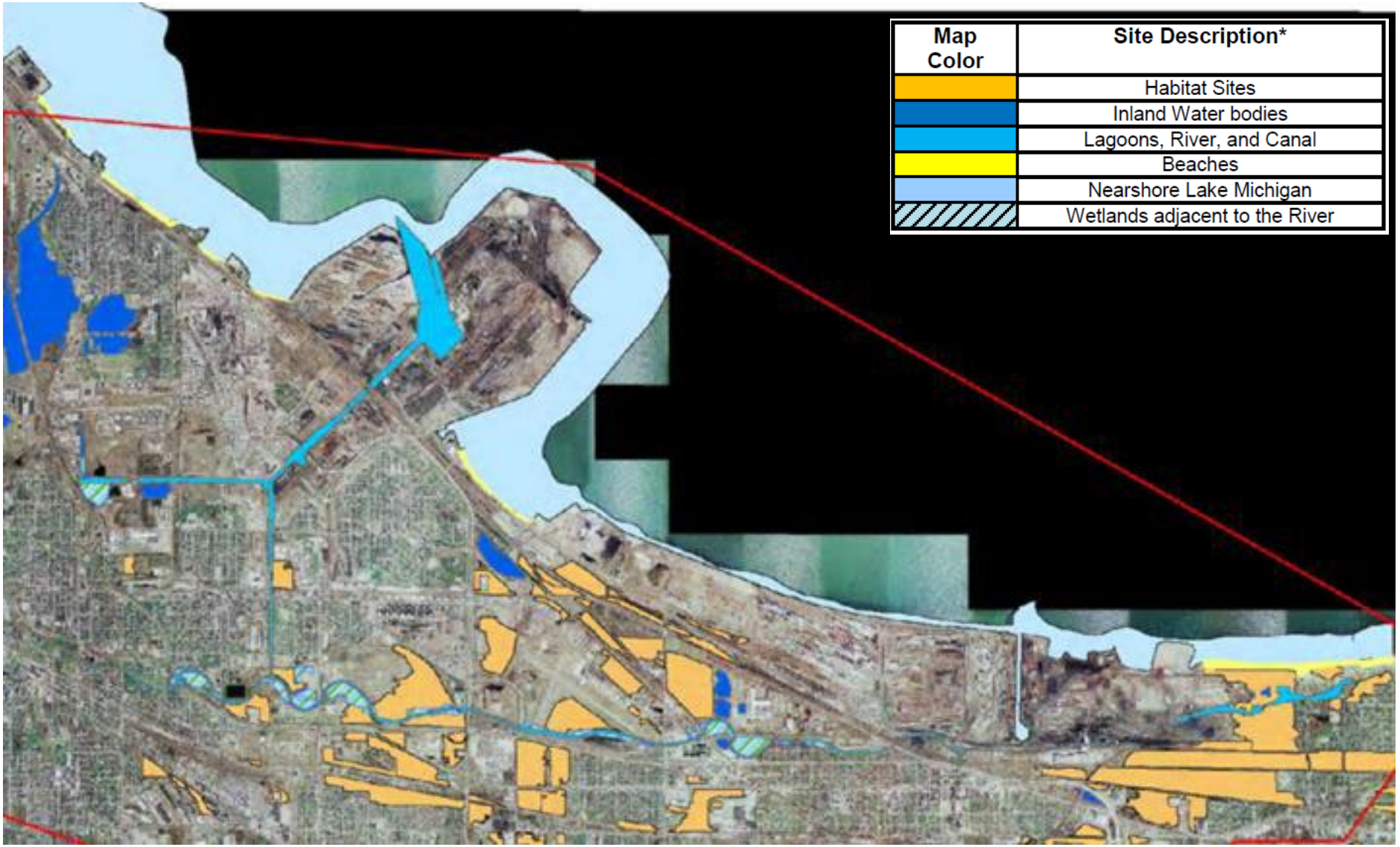
BUI #14 Listing/Delisting Guidance

IJC Listing Guideline: When fish and wildlife management goals have not been met as a result of loss of fish and wildlife habitat due to a perturbation in the physical, chemical, or biological integrity of the Boundary Waters, including wetlands.

IJC Delisting Guideline: When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.

U.S. EPA BUI Description: Local AOC leaders set standards for the amount and quality of habitat required to remove this BUI. Projects to restore this BUI involve creating and reestablishing habitat with the physical, chemical, and biological characteristics necessary to support native fish and wildlife populations. Restoration actions can include removing stream barriers, enhancing shoreline complexity, removing invasive species, or restoring wetlands.

AOC Habitat Map (RAP 2.5 Update)



Current Removal Target Background

- Developed in 2008 by CARE Habitat Subcommittee and subsequently vetted through the full CARE Committee and submitted to U.S. EPA.
- In 2014-2015, IDEM and CARE members developed a management action list.
  - Five proposed habitat restoration projects.
  - Funded by the Great Lakes Restoration Initiative (GLRI).
  - Designed to result in removal of the two "habitat-related BUIs."
    - Degradation of Fish and Wildlife Populations (designated BUI #3).
    - Loss of Fish and Wildlife Habitat (the subject of this presentation).

Current BUI #14 Removal Target (Part 1)

14. <u>Loss of Fish and Wildlife Habitat</u>

State of Indiana Removal Target, Fish Habitat:

- The habitat quality shall average a qualitative habitat evaluation index (QHEI*) score of 33 or better throughout the free-flowing stream stretches of the AOC; and
- If QHEI is assessed at 33 or better, then habitat quality should be maintained at or above that level.

* The QHEI is a comprehensive assessment of physical characteristics of a stream or river.

Current BUI #14 Removal Target (Part 2)

14. Loss of Fish and Wildlife Habitat

State of Indiana Removal Target, Wildlife Habitat:

- The habitat quality shall average a QHEI score of 33 or better using the Great Lakes Drowned River Mouth Coastal Wetland criteria; and
- Plant Index of Biotic Integrity shall meet 35; and
- Floristic Quality Index without adventives shall meet 20 ; mean CC value = 6; and
- If QHEI is assessed at 33 or better, then habitat quality should be maintained at or above that level.

Notes:

- FQI is used to determine the level of degradation of an area based on the plant species that live there.
- Adventives = Species not native to and not fully established in a new habitat or environment.
- CC = Coefficient of Conservatism (based on a scale of 1-10).

2015 Habitat Management Action List

Project Title	Estimated Cost & Timeline	Project Description	Historical Progress
Project 1: Dune and Swale and Great Lakes Legacy Act Wetlands Restoration	Cost ≈ $4.75-5.0 Million Timeline – This project is estimated to take five years to complete. Initial funding is required by August 2015 in order for on the ground work to begin during the winter of 2015. IDEM would prefer to obtain all funding at once to facilitate contractual agreements, however based on federal funding ability, the initial funding required in 2015 to initiate the project will be indicated in the full grant application.	This project includes the following two steps for the restoration of approximately 857 acres of habitat for shorebirds, amphibians, and other wildlife: 1. Large contractual woody and herbaceous treatment work at Pine Station, Gibson Woods, Tolleston Ridges, and Ivanhoe South. 2. The Nature Conservancy and Indiana Dept. of Natural Resources staff crews and/or contracted crews for post contractual habitat establishment work at Seidner, DuPont, Beemsterboer, Clark & Pine, Pine Station, Ivanhoe, Ivanhoe South, Gibson Woods, Tolleston Ridges, Cline Avenue NP, Martin Oil, Roxana Marsh, Lakeshore Railroad Prairie, USS Prairie, and Gary Lagoons.	1. Select units at Pine Station, DuPont, Gibson Woods, Beemsterboer, Ivanhoe, Cline Ave, and Martin Oil have received initial woody and/or herbaceous treatment through a 2010 GLRI grant administered by IDEM.
Project 2: Establishment of River Corridor Habitat	Cost ≈ $400,000.00 Timeline – This project will need to be implemented in 2016 and is expected to occur over the course of two years.	This project includes treatment via herbicide application of herbaceous weeds to approximately 35 acres along the Grand Calumet River corridor in an effort to minimize the impacts to current large scale GLLA riverine wetland remediation projects from non-restored areas in the river corridor in an effort to allow for the native communities to establish in the remediated areas: 1. West Branch from the Toll Road to the Stateline 2. East Branch from upstream Cline Avenue to Grant Street	1. Select areas have been treated through GLLA projects. 2. Spot treatment has been conducted at select locations through a Chi-Cal grant administered by TNC.
Project 3: Lake George Wetlands Habitat Establishment	Cost ≈ $300,000.00-400,000.00 Timeline - This project is estimated to begin in 2016 and is expected to occur over the course of five years.	This project includes the treatment of an estimated 80 acres for follow-up herbaceous weed herbicide treatment and possible supplemental seeding or planting as needed to establish native growth on primarily the DNR easements and adjacent habitat areas of George Lake to create habitat for shore birds, amphibians, and other wildlife species.	1. Initial treatment was conducted through a Sustain our Great Lakes Grant administered by IDNR.
Project 4: Prescribed Fire Plan and Contractual Burns	Cost ≈ $600,000.00 (estimate as costs for plan development are unknown and contract burn costs depend on site and burn unit size) Timeline – This project is estimated to begin in 2016 and be implemented over the course of 4 years.	This project includes the drafting and implementation of an AOC-wide prescribed burn plan that will impact approximately 857 acres by providing burns that decrease regrowth of non-native species and allow for native communities to flourish.	1. Prescribed burns conducted when able per site
Project 5: Pine Station Nature Preserve Ponds & Oxbow Restoration	Cost ≈ $1.1-1.95 Million (cost is dependent on thickness of cap) Timeline – This project is estimated to begin in 2017 and occur over the course of three years.	This project includes the following actions that will contribute to the completion of habitat restoration actions on the Pine Station Nature Preserve (approximate 258 acre) property as well as restore the Pine Station Oxbow (approximate 17 acres being the only manageable riverine wetland habitat in the east branch of the Grand Calumet River upstream of Cline Avenue): 1. Cap and/or improve fly ash impacted areas in the Pine Station Nature Preserve to better accommodate native plant community establishment 2. Remove and control herbaceous and woody non-native plants with herbicide treatment in order for native plant communities to establish 3. Re-vegetate areas with native species	1. Select units around the ponds have received initial woody treatment and clearing through the LAMP/RAP capacity grant administered by IDEM which was another significant step towards comprehensive restoration of this important nature preserve.

MA #1: Dune and swale
MA #2: Riverine corridor
MA #3: Lake George wetlands
MA #4: Prescribed fire plans and burns
MA #5: Pine Station ponds and oxbow

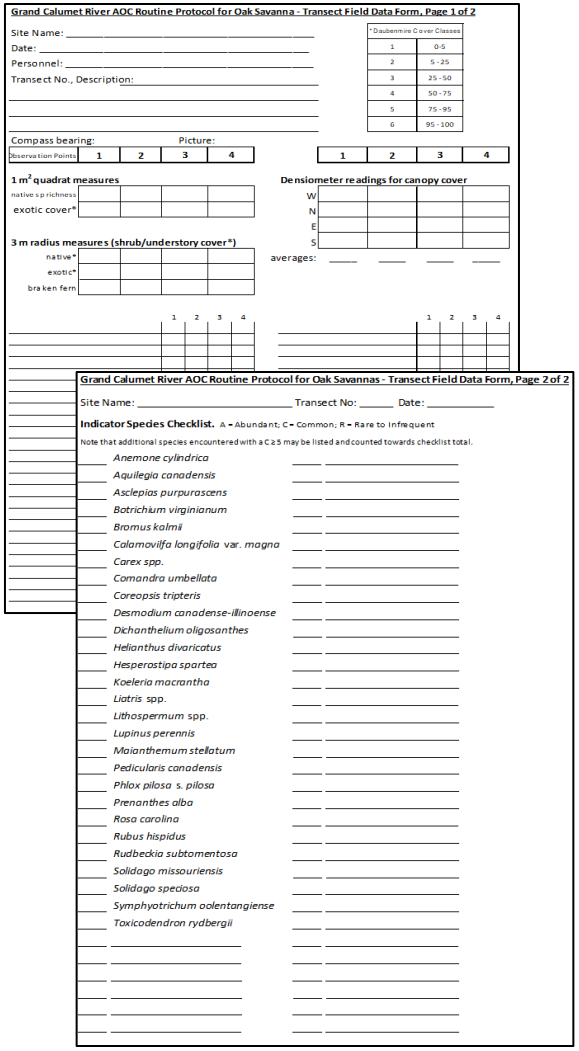
Evaluating the BUI #14 Removal Target

Current Removal Target Background

- Since 2015, IDEM and its partners have implemented various habitat restoration projects (management actions):
  - Dune and swale
  - Lake George wetlands
  - Prescribed burns
- Monitoring has been an important aspect of project design
  - Uniform formal monitoring protocols that could inform BUI removal
  - Informal monitoring and walkthroughs by project partners
- Spoilers: Project experience and related monitoring eventually led partners to refine several aspects of the existing removal target

AOC Habitat Monitoring – Transects

- Dune and swale (Habitat MA #1) and Lake George wetlands (Habitat MA #3) projects included extensive monitoring to track restoration progress.
- Initial monitoring utilized the Rothrock (2015) protocol at 60 meter long transects. Daubenmire cover classes, native species richness, canopy cover, understory cover, a list of indicator species, and other metrics were computed along the transects.
- Transect-based monitoring proved to be time intensive, required specialized knowledge, and was not representative of site conditions.
- Experience with transect monitoring led DNR, TNC, and Lake County Parks to consider revising the monitoring protocol to better reflect overall conditions observed by trained ecologists at various management units.



Grand Calumet River AOC Routine Protocol for Oak Savanna - Transect Field Data Form, Page 1 of 2

Site Name: _____
Date: _____
Personnel: _____
Transect No., Description: _____

*Daubenmire Cover Classes	
1	0-5
2	5 - 25
3	25 - 50
4	50 - 75
5	75 - 95
6	95 - 100

Compass bearing: Picture:

Observation Points	1	2	3	4

	1	2	3	4

1 m^2 quadrat measures

native sp richness				
exotic cover*				

Densiometer readings for canopy cover

W				
N				
E				
S				

3 m radius measures (shrub/understory cover*)

native*				
exotic*				
bracken fern				

averages: ____ ____ ____ ____

	1	2	3	4

	1	2	3	4

Grand Calumet River AOC Routine Protocol for Oak Savannas - Transect Field Data Form, Page 2 of 2

Site Name: _____ Transect No: _____ Date: _____

Indicator Species Checklist. A = Abundant; C = Common; R = Rare to Infrequent

Note that additional species encountered with a C ≥ 5 may be listed and counted towards checklist total.

____	*Anemone cylindrica*	____	
____	*Aquilegia canadensis*	____	
____	*Asclepias purpurascens*	____	
____	*Botrichium virginianum*	____	
____	*Bromus kalmii*	____	
____	*Calamovilfa longifolia var. magna*	____	
____	*Carex spp.*	____	
____	*Comandra umbellata*	____	
____	*Coreopsis tripteris*	____	
____	*Desmodium canadense-illinoense*	____	
____	*Dichanthelium oligosanthes*	____	
____	*Helianthus divaricatus*	____	
____	*Hesperostipa spartea*	____	
____	*Koeleria macrantha*	____	
____	*Liatris spp.*	____	
____	*Lithospermum spp.*	____	
____	*Lupinus perennis*	____	
____	*Maianthemum stellatum*	____	
____	*Pedicularis canadensis*	____	
____	*Phlox pilosa s. pilosa*	____	
____	*Prenanthes alba*	____	
____	*Rosa carolina*	____	
____	*Rubus hispidus*	____	
____	*Rudbeckia subtomentosa*	____	
____	*Solidago missouriensis*	____	
____	*Solidago speciosa*	____	
____	*Symphyotrichum oolentangiense*	____	
____	*Toxicodendron rydbergii*	____	
____	_____	____	
____	_____	____	
____	_____	____	
____	_____	____	
____	_____	____	
____	_____	____	
____	_____	____	

AOC Habitat Monitoring – Assessment Units

- DNR contracted with Orbis Environmental Consulting to develop and test a revised monitoring protocol between 2017 and 2019, in concert with TNC and Lake County Parks.
- Utilizes untimed meanders through polygonal assessment units to identify specific structural, compositional, and functional elements important to land managers.
- Protocol is standardized, semi-quantitative, representative of conditions observed by land managers, and efficient to execute.
- Project experience factored into both the revised monitoring protocol and an evaluation of the BUI removal target.
  - Focus on habitat function.
  - Concurrence between project monitoring and BUI monitoring.
  - What are realistic expectations for fish and wildlife habitat?

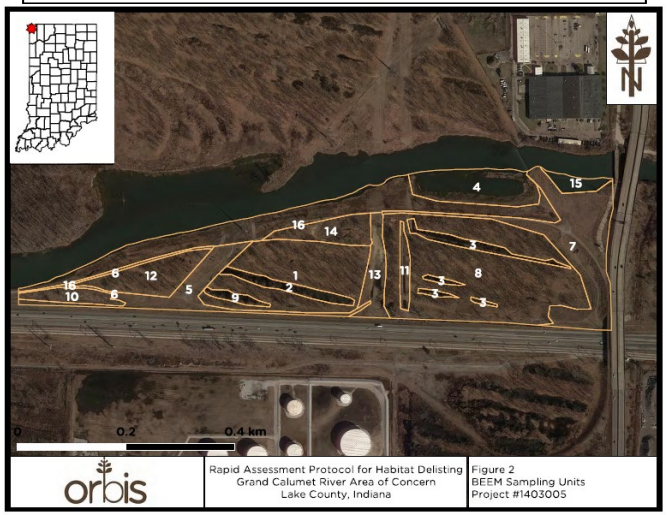
Dunes and Other Uplands

Date/Time:	Site:	Polygon ID:
Surveyors:		
General Description:		* Canopy Gaps: Size (m) / Count: 5-10; 10-20; 20+

Metric	Cover Class	Notes
Canopy Stratum		
Total	0 1 2 3 4 5 6	* Canopy Gaps
Oak	0 1 2 3 4 5 6	
Native Non-oak	0 1 2 3 4 5 6	
Exotic	0 1 2 3 4 5 6	
Understory Strata		
Total	0 1 2 3 4 5 6	** L | H
Native Desireable	0 1 2 3 4 5 6	
Native Aggressive	0 1 2 3 4 5 6	
Exotic	0 1 2 3 4 5 6	
Oak Regeneration		
>2m	0 1 2 3 4 5 6	
< 2m	0 1 2 3 4 5 6	
Ground Stratum		
Total	0 1 2 3 4 5 6	
Native Aggressive Woody	0 1 2 3 4 5 6	
Prairie Grasses	0 1 2 3 4 5 6	
Sun-loving Forbs	0 1 2 3 4 5 6	
Native Ruderal Herb	0 1 2 3 4 5 6	
Native Aggressive Herb	0 1 2 3 4 5 6	
Exotic (Combined Woody/Herb)	0 1 2 3 4 5 6	

Cover Classes: 0 (non-detect) 1 (0-5%) 2 (5-25%) 3 (25-50%) 4 (50-75%) 5 (75-95%) 6 (>95%)

Individual Species comprising >25% Cover:



Current Target: Lessons Learned

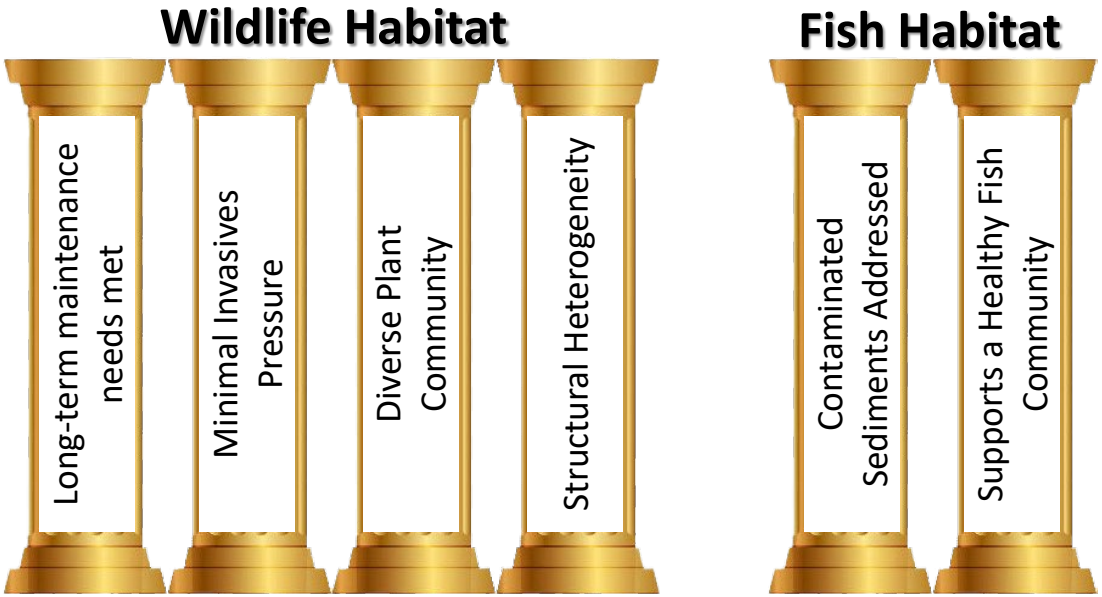
- The FQI focuses on measuring disturbance, not habitat function
- Achieving the FQI restoration target on more than 1,000 acres of managed lands would be unrealistic
- The QHEI target of 33 falls well below State expectations for aquatic habitat supportive of a robust warm water aquatic community
- The existing target does not reflect the key contribution remediation of contaminated sediment plays in improving habitat quality
- The target lacks a tie to long-term maintenance of restored habitat

Removal Target Revision Process

- IDEM RAP Program staff met with experts from DNR, USFWS, TNC, and IDEM's Office of Water Quality and Natural Resource Damages Programs in fall 2019 and most of 2020 to discuss the removal target's weaknesses and ways to address them.
- Desire to incorporate the revised assessment unit monitoring protocol developed by DNR, TNC, Lake County Parks, and Orbis Environmental Consulting.
- Target was discussed with staff and management from U.S. EPA's Great Lakes National Program Office.

New BUI #14 Removal Target Background and Key Concepts

Loss of Fish and Wildlife Habitat: Restoration Pillars



BUI Restoration Goal: Meet the restoration pillars while adapting to site-specific conditions.

Plant Survival Strategies

Ruderals

- Highly opportunistic
- Typically early successional species
  - Short-lived
  - Fast-growing (limited biomass)
  - Devote resources to seed production
- Thrive in areas of ecological disturbance where established plants are killed and competition reduced
- **Management approach: Investigate and work to minimize disturbance**

Competitors

- Highly dominant
- Often later successional species
  - Perennial
  - Fast-growing (extensive biomass)
  - Devote resources to biomass
- Thrive in and displace established plant communities, forming monocultures
- **Management approach: Minimize cover**

Proposed BUI #14 Removal Target: Upland Structure

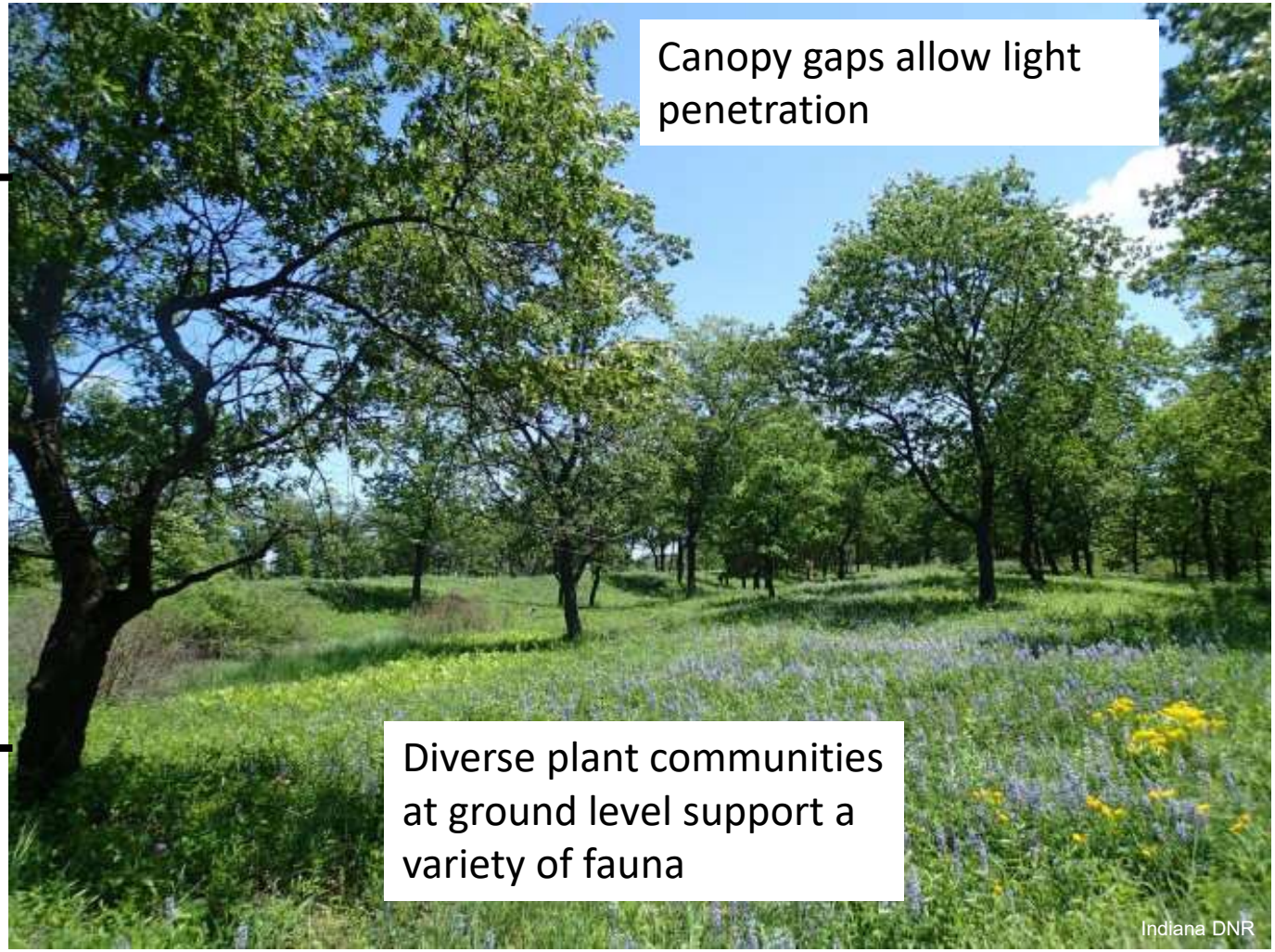
Canopy

10 meters (33 feet)

Understory

1 meter (3 feet)

Ground



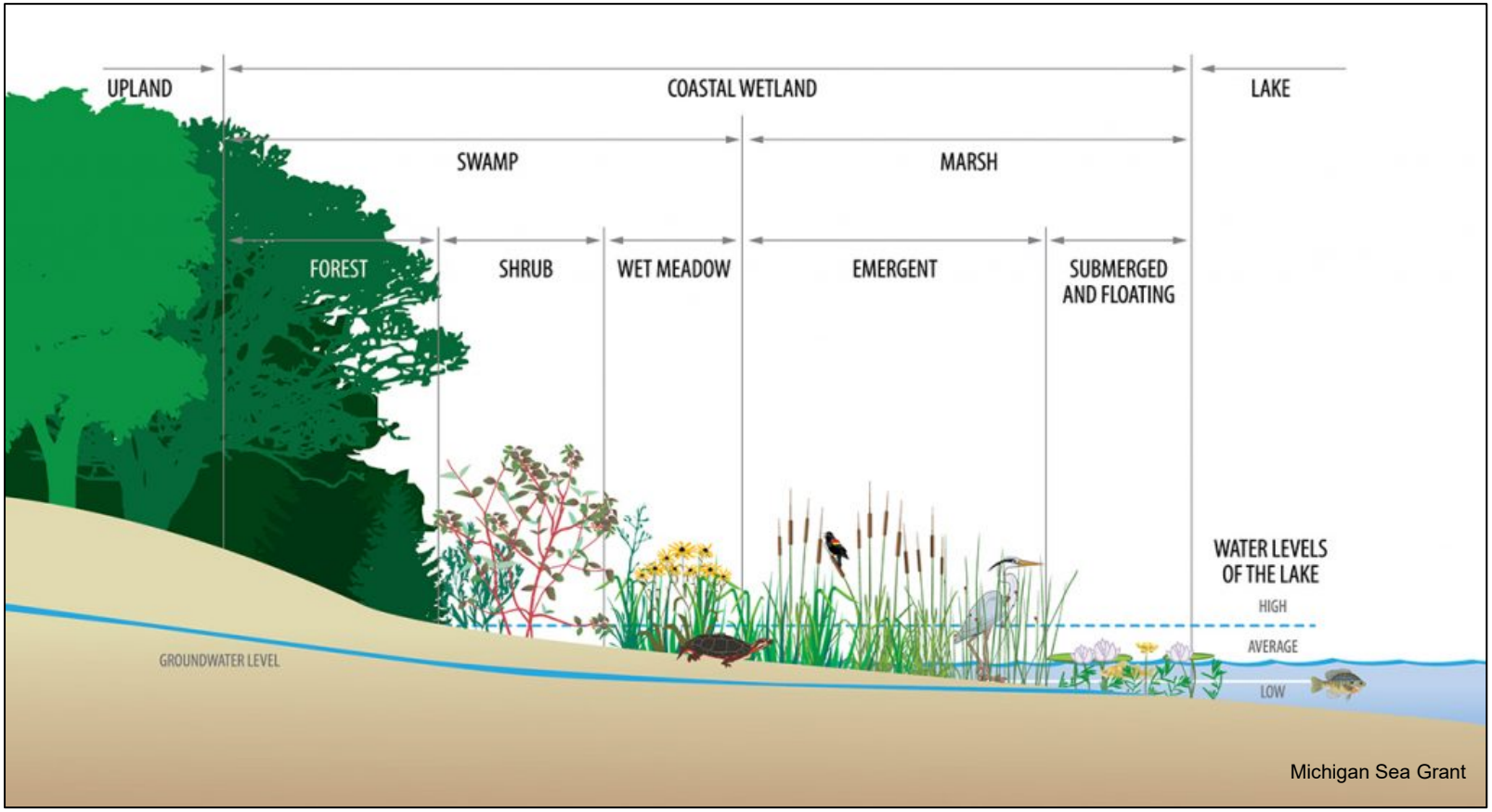
Upland Habitat Considerations: Woody Canopy/Understory

- **Minimize invasive species cover**
  - Invasives spread rapidly through an ecosystem
  - Invasives cause profound impacts to native flora and fauna
  - Control requires sustained effort
  - Complete elimination often not realistic
- Support canopy diversity and structure
  - Canopy closure, diversity, and structure controls the structure of lower levels
  - Canopy height diversity shown to be correlated with bird diversity
  - Gaps are particularly important once canopy cover exceeds 50 percent
- Support good understory structure and composition
  - Understory controls the structure of the ground stratum
  - Proliferation of native aggressive or invasive woody shrubs can suppress diversity below

Upland Habitat Considerations: Ground Layer

- **<u>Minimize invasive species competitive pressure</u>**
- Support native plant diversity in the ground stratum
  - Prairie grasses
  - Sun-loving forbs or shrubs
  - Oak saplings
  - All contribute to high degree of ground cover
- Watch for indicators of ecosystem disturbance
  - Ruderals (weedy, early successional species) are good indicators of ecosystem disturbance
  - Certain native aggressive herbaceous species can also outcompete other species, particularly when an area is subjected to disturbance
  - These aren't necessarily "bad" plants – at some level they also contribute to diversity

Proposed BUI #14 Removal Target: Wetland Structure



Although the example above is for a coastal wetland, many of the same plant communities can be found in swales or other wetlands within the AOC.

Wetland Considerations

- **Minimal invasive species competitive pressure**
- Low levels of dead plant material (detritus) and ruderals
- High levels of vegetative cover
- High diversity in the plant community
  - Woody
  - Wet meadow
  - Emergent
  - Submergent

Measuring Plant Communities: Daubenmire Cover Classes

Cover Class	Range of Coverage	Midpoint of Range
0	Not present	Not present
1	Trace – 5%	2.5%
2	5 – 25%	15.0%
3	25 – 50%	37.5%
4	50 – 75%	62.5%
5	75 – 95%	85.0%
6	95 – 100%	97.5%

Proposed BUI #14 Removal Target

Proposed BUI #14 Removal Target: Part 1

14. Loss of Fish and Wildlife Habitat – Proposed Revised Target

This BUI may be considered for removal when the following targets are met for wildlife and fish habitat, respectively:

State of Indiana Removal Target Wildlife Habitat:

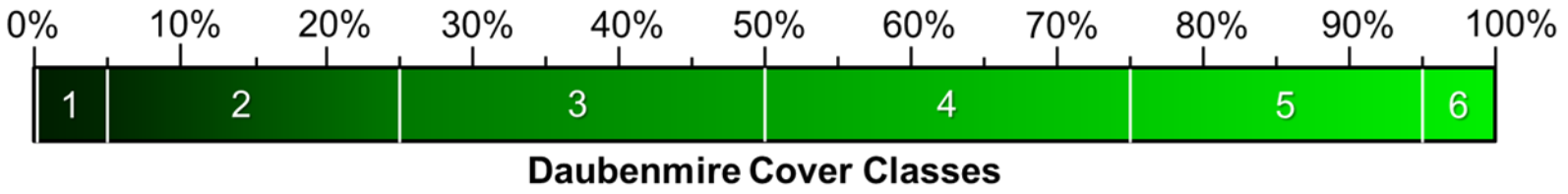
- Site conservation plans have been devised relating to the following habitat complexes listed within the 2014 Grand Calumet River Area of Concern Habitat Restoration Summary Report, where restoration was considered feasible by IDEM and the CARE Committee as of April 15, 2015:
  - DuPont/Tolleston Woods/Gibson Woods Complex, excepting USS Lead
  - Ivanhoe Complex
  - Clark & Pine/Pine Station Complex
  - Roxana Marsh Reach
  - BP Wetlands/Lake Mary
  - Lake George
- Key state and local land managers have agreements for long-term management at the aforementioned properties; and
- Assessment units within the aforementioned properties have met the following habitat quality metrics, based on two consecutive assessments, unless specifically exempted by the appropriate site conservation plan.

Proposed BUI #14 Removal Target: Part 2

- **Remnant or Constructed Upland Assessment Units:**
  - All assessment units shall meet the six-class Daubenmire Cover metrics and criteria set forth in Table 1.

Table 1. Daubenmire Cover Class Removal Targets for Remnant/Constructed Upland Units

Stratum	Cover Type	Daubenmire Cover Class Criteria
All	Invasive	• Cover class of 0 or 1
Canopy	Total	• Cover class of 4 or less • Assessment units measuring 4 or greater must have at least 1 canopy gap per acre
Understory	Total	• Cover class of 1 or 2
Ground	Total	• Cover class of 5 or 6
Ground	Native Aggressive Woody	• Cover class of 1 or less
Ground	Prairie Grasses	• Cover class of 1 or greater
Ground	Sun-loving Forbs	• Cover class of 1 or greater
Ground	Native Ruderal Herbaceous	• Cover class of 2 or less
Ground	Native Aggressive Herbaceous	• Cover class of 4 or less



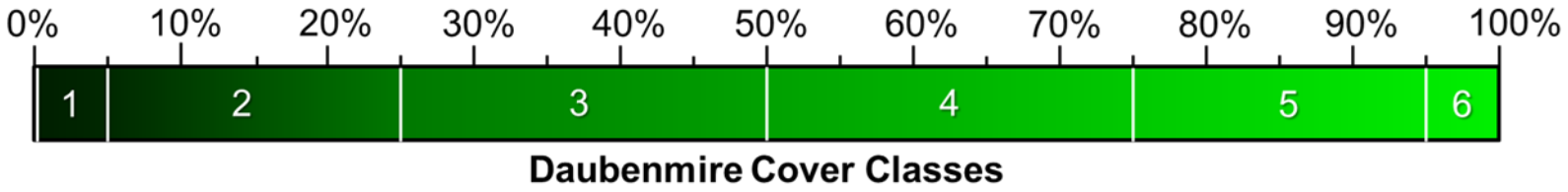
Proposed BUI #14 Removal Target: Part 3

- **Remnant or Constructed Swale/Emergent Marsh Wetland Assessment Units:**
  - All assessment units shall meet the six-class Daubenmire Cover metrics and criteria set forth in Table 2.

Table 2. Daubenmire Cover Class Removal Targets for Remnant/Constructed Wetland Units

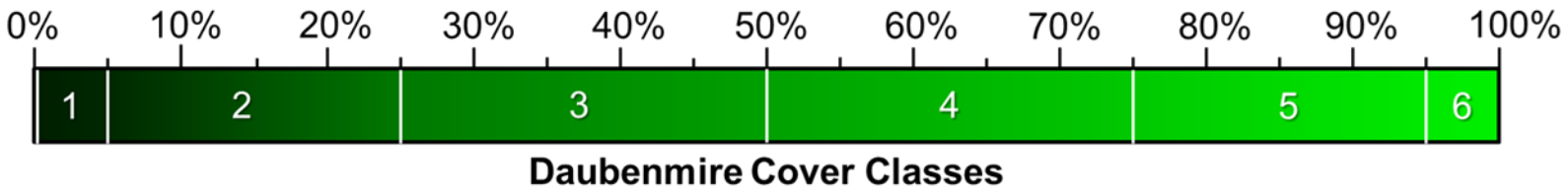
Cover Type	Daubenmire Cover Class Criteria
Exotic Detritus	• Cover class of 2 or less
Total Vegetative Cover	• Cover class of 4 or more
Total Invasive Cover	• Cover class of 1 or less
Total Ruderal Cover	• Cover class of 2 or less
Woody Class Cover*	• Cover class of 1 or greater
Submergent Class Cover*	• Cover class of 1 or greater
Emergent Class Cover*	• Cover class of 1 or greater
Wet Meadow Class Cover*	• Cover class of 1 or greater

* Any three of these types must have a cover class of 1 or greater to be considered for BUI removal.



Proposed BUI #14 Removal Target: Part 4

- **Riverine Wetlands:**
  - All assessment units falling into this category shall have an Invasive Daubenmire cover class of 1 or less. Six-class Daubenmire cover classes shall be used.



Proposed BUI #14 Removal Target: Part 5

State of Indiana Removal Target, Fish Habitat:

- Sediment remediation projects have been completed within all reaches of the Grand Calumet River and those portions of the Indiana Harbor Ship Canal lying wholly outside the federal navigation channel; and,

- The average Qualitative Habitat Evaluation Index (QHEI) score is 51 or greater within the remediated reaches, based on a minimum of two evaluations; or,

- If monitoring results indicate this value is unattainable, but the reach supports a fish community Index of Biological Integrity (IBI) of 36 or greater, a reach-specific QHEI target will be utilized. Once assigned, this value shall not decrease more than 10 percent in a subsequent evaluation.

Advantages of New Target

- Sets realistic habitat quality goals for terrestrial (wildlife) habitat
- Directly aligns with an effective monitoring protocol
- Allows for site-to-site variability while requiring key elements of the various ecological communities to be in place
- Increases the AOC instream habitat expectations while providing flexibility to address site-specific conditions
- Explicitly recognizes the contributions of contaminated sediment remediation to fish and wildlife habitat
- Ties removal of the BUI to the development of site conservation plans and long-term management agreements

Questions?