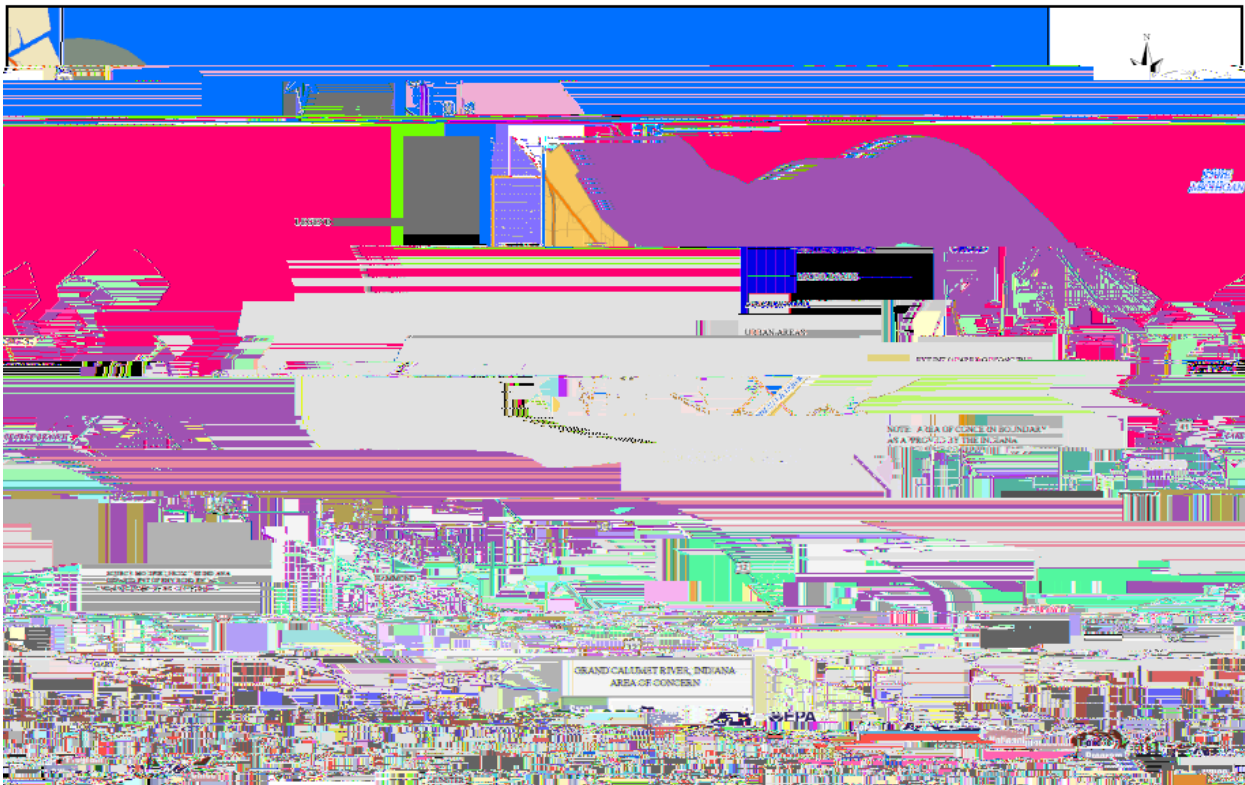


**Update to the Stage 2.5 Remedial Action Plan (RAP)
Grand Calumet River/Indiana Harbor Ship Canal
Area of Concern**



Indiana Department
Of
Environmental Management
June 20, 2012

Compiled by:

Ashley Snyder
Grand Calumet River/Indiana Harbor Ship Canal RAP Coordinator
Indiana Department of Environmental Management (IDEM)
Northwest Regional Office
8380 Louisiana Street
Merrillville, IN 46410
Phone: 219-757-0277
Fax: 219-757-0267
Email: asnyder@idem.IN.gov

Acknowledgements:

John Fekete, RAP Consultant
Dr. Jim Smith, IDEM
Paul Labus, The Nature Conservancy (TNC)
The Grand Calumet River /Indiana Harbor Ship Canal (GCR/IHSC) Citizens Advisory for
the Remediation of the Environment (CARE) Committee

Grand Calumet River/ Indiana Harbor Ship Canal Area of Concern Updated Stage 2.5 Remedial Action Plan

The Grand Calumet River/Indiana Harbor Ship Canal (GCR/IHSC) Area of Concern (AOC) is primarily driven by the river and its connection to habitat areas that are the

Introduction:

The GCR/IHSC was initially listed as impaired for all fourteen of the following beneficial uses:

1. Restrictions on fish and wildlife consumption
2. Tainting of fish and wildlife flavor
3. Degradation of fish and wildlife populations
4. Fish tumors or other deformities
5. Bird or animal deformities or reproduction problems
6. Degradation of benthos
7. Restriction on dredging activities
8. Eutrophication or undesirable algae
9. Restrictions on drinking water consumption, or taste and odor
10. Beach closings
11. Degradation of aesthetics
12. Added costs to agriculture or industry
13. Degradation of phytoplankton and zooplankton populations
14. Loss of fish and wildlife habitat

However, in September of 2011 BUI # 12 was officially removed from the AOC after it was determined that there was no added cost to agriculture or industry in utilizing water within the AOC and in March of 2012 the restrictions on drinking water consumption, or taste and odor BUI #9 was removed from the AOC as no additional treatment is required for drinking water in comparison to drinking water outside the AOC. Efforts toward removing the 12 remaining BUIs are currently in differing phases of completion as legacy sediment contaminants in the GCR continue to be the most persistent and long-term problem. Although water quality has greatly improved since the 1980s, parameters such as ammonia, cyanide, oil and grease, poly-chlorinated biphenyls (PCBs) and mercury in fish tissues do not currently meet state standards due to the legacy contaminants in the sediments. Contaminated sediment in the GCR has direct effects on BUIs #1, 2, 3, 4, 5, 6, 7, 8, 11, 13, and 14 – therefore resulting in the largest contributing factor of contamination in the AOC.

The river, riverbanks, and side stream wetlands contain contaminated sediment. While there have been ongoing restoration activities to improve ecosystems surrounding the aquatic habitat within the AOC, sediment contaminants are pervasive and persistent, and natural attenuation of contaminants cannot be relied on to restore the river. Therefore, it is believed that sediment removal and remediation in the GCR aquatic ecosystem will likely assist in restoring 11 of the remaining 12 BUIs. Dredging is the required course of action, followed by the in-stream restoration of habitat.

Dredging-Completed and Underway:

Consent Decrees

In 1997 the United States and the State of Indiana entered into a Consent Decree with the Industrial users of the Hammond Sanitary District, which settled claims

for the discharge of pollutants to the West Branch Grand Calumet River (WBGCR). The Consent Decree established the Grand Calumet River Restoration Fund (GCRRF) and the Grand Calumet River Restoration Fund Council. The council had one representative appointed by each of the Regulatory Agencies, U.S. EPA, IDEM, and Indiana (Dep) 469, 12 (p) Natural Resource Trustee (IDNR) 5 and 8 (e) representative appointed by each Natural Resource Trustee, U.S. Fish and Wildlife Service, IDEM and IDNR. A total of 4.7 million dollars were deposited into the Trust. In 1999 the United States and the State of Indiana entered into a Consent Decree with the Hammond Sanitary District which settled claims and established a schedule for Wastewater Treatment Plant Compliance Program Implementation. An additional 2.1 million dollars were paid into the GCRRF Trust. All monies in the Trust were to be used for the cleanup of contaminated sediment and the restoration of natural resources in the West Branch Grand Calumet River defined in the court order as that portion of the Grand Calumet River between Indianapolis Boulevard and the Indiana-Illinois Stateline. All dollars in the Trust Fund were expended on the characterization of the WBGCR and Roxana Marsh and also on the sediment removal and habitat restoration at Roxana Marsh. Approximately 7.4 million dollars have been used as a match for the Great Lakes Legacy Act (GLLA) project on the marsh cleanup.

The U.S. Steel Corporation, pursuant to a 1999 Federal Clean Water Act Consent Decree and a 1998 Resource Conservation and Recovery Act (RCRA) Corrective Action Order, dredged a five (5) mile segment of the east branch of the river and removed more than 800,000 cubic yards of contaminated sediment from the river. Completion of the dredge portion of this project occurred in 2007. Additionally, pursuant to the requirements of a 1999 Natural Resource Damage Assessment Consent Decree, U.S. (te)-5(s)5eeo serv2-3(r.)] TJ ET BT 1 0 0 1 72.0Sdhe Hammsn oes insteenu3(ran)rporrust3(m

properties, Cline Avenue Nature Preserves et. al.), restoration staff for IDNR and GLLA Cleanup activities on the WBGCR and the East Branch Grand Calumet River (EBGCR).

In 2005 a settlement for Natural Resource Damages at the Grand Calumet Riverine Site was reached with 8 industrial parties. Through this settlement approximately 200 acres of land were placed into protection via conservation easement or fee title transfer to a public agency. Along with land protection \$56.9 million was established in the Department of Interior (DOI) Natural Resource Damages Assessment and Restoration (NRDAR) Fund for restoration of the Grand Calumet River AOC. These dollars have been used to match grant funds from the National Oceanic and Atmospheric Administration (NOAA), Great Lakes Restoration Initiative (GLRI), United States Army Corp. of Engineers (USACE) and others to complete habitat restoration on many remnant dune and swale properties in the AOC, to support GLLA remediation of contaminated sediments, and restoration of riverine wetlands.

Great Lakes Legacy Act

As consent decrees initiated dredging within the AOC the US government signed into law the Great Lakes Legacy Act (GLLA) in 2002. The Legacy Act authorized the use of millions of federal dollars for the recovery of US AOCs plagued by legacy

dredged over the life of the project. Upon completion of the CDF dredging is estimated to begin in 2012.

Fish and Wildlife:

The impact on Fish and Wildlife by the contaminated sediments within the AOC is high due to the bioaccumulation of the contaminants in the tissue of such species as they are moved up the food chain. This contamination has contributed to reproductive problems, declines in populations and deformities in fish.

Resident bird populations that feed on fish in the AOC and depend on the open waters of the river for both summer and winter habitat have experienced in-egg deformities and low recruitment. The scarce or non-existent sensitive macroinvertebrate taxa in the AOC indicate that the contaminated sediments are more hospitable to pollutant tolerant species. Fish community structure and function has changed drastically with only pollution tolerant and non-native fish dominating the river. A high percentage of fish in the river suffer from deformities, erosions, lesions, and tumors, or DELTs, due to contaminants in the system and sediment. The ridge and swale habitat that once encompassed the area was filled with a diverse assemblage of herpetofauna. Many amphibians and reptiles use the river for breeding and foraging; therefore, they are also suffering the same ill effects of the sediment contamination as the fish and birds.

Since many of these species are dependent on each other for survival and research has shown the effects that bioaccumulation of the COCs has had on wildlife, it is evident that sediment remediation will assist in reducing impairment to wildlife populations and habitat.

In addition to the accumulation of chemicals in fish tissue impacting fecundity and survivorship of wildlife in the AOC, it has also resulted in restrictions on fish consumption. Fish consumption advisories have been issued by the Indiana State Department of Health due to high levels of harmful to human chemicals found in fish tissue. The accumulation of chemical contaminants in fish tissue also leads to flavor tainting.

Remediation of contaminated sediments through dredging and capping efforts will have a significant positive impact towards removal of 11 BUIs and greatly reduce the negative effects on fish and wildlife populations listed above that are driven by the legacy contaminants in the river sediments.

Along with the work toward sediment dredging, other types of restoration are also being conducted that contribute towards removal of habitat for fish and wildlife BUIs. Several groups and agencies are working within the AOC including The Nature Conservancy (TNC), the USFWS, IDEM, IDNR, Shirley Heinze Land Trust (SHLT), Lake County Parks, and Save the Dunes Council (StDC). These groups have acquired and are actively restoring and managing natural areas in and along the Grand Calumet River. Many of these groups and agencies were able to acquire land for the purposes of protection and restoration through the Natural Resource Damage Settlements or purchased with dollars obtained through Natural Resource Damage Settlements. A list of these sites is as follows and a map may be found in Appendix A, AOC Segment Areas and Maps:

1. BP Wetlands – status – IDNR obtained final Conservation Easement in 2011.
2. Lake Mary Pond – Status – IDNR obtained final Conservation Easement in 2011.
3. Roxana Marsh (includes lands south and north of river east of I-90 Toll Road and small lot in industrial complex to northeast of the Marsh – Status – IDNR holds title.
4. DuPont Natural Area – Status – IDNR holds conservation easement.
5. South Shore Railroad site – Status – Save-the-Dunes holds title.
6. Beemsterboer Natural Area – Status – The Nature Conservancy holds title.
7. Cline Avenue Nature Preserve – Status – Save-the-Dunes holds title.
8. Ivanhoe South (south of 5th Avenue, Gary) – Status – Shirley Heinze Land Trust holds the title to many parcels (but not all).
9. Gary Lagoons (north of Gary Airport) – Status – IDNR holds Title.
10. Pine Station Nature Preserve – Status – IDNR Holds Title.
11. Republic Steel Parcel (northeast of I65 and US 12 junction) – Status – Indiana Dunes National Lakeshore holds Title.
12. City of Gary site (east of Republic Steel Parcel) – Status – Indiana Dunes National Lakeshore holds title.
13. US Steel Mitigation site (south of Grand Calumet Lagoons) – Status – Indiana Dunes National Lakeshore holds title.

Though these are not the only sites that require restoration and protection, the placement of such lands into the hands of knowledgeable property managers is a step in the right direction. Permanent protection and continual monitoring and maintenance of these natural areas will provide healthy environments for the native flora and fauna of the area.

Great Lakes Restoration Initiative

In September of 2010 the IDEM was awarded a grant for 1,398,248 dollars through the Great Lake Restoration Initiative Fund. This award was given to fund habitat restoration within the AOC through four partners: The Nature Conservancy, Save the Dunes, Lake County Parks, and the Indiana Department of Natural Resources. Through their combined efforts a total of 204 acres of habitat will be restored by the removal and treatment of invasive species within the AOC by September 30, 2014. Treatment areas include the DuPont nature Preserve, Beemsterboer Natural Area, Gibson Woods Complex, Pine Station Nature Preserve, Cline Avenue Nature Preserve, and Martin Oil Natural Area. The funding requirements and the exact acreage for each of these sites are referenced in the attached Table C.

The River and Near shore Lake Michigan Water:

Beaches

The Environmental Protection Agency's Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000 required coastal states to construct and implement appropriate monitoring and notification plans for advisories and closures at beaches. For Indiana, this meant that beaches along Lake Michigan were required to implement the state water quality standard of 235 colony forming units of E. coli per 100mL of water. Beaches subject to the BEACH Act within the Area of Concern

Current Status:

Today, the CARE committee members and the organizations they represent continue working to achieve success in the Grand Calumet River and Indiana Harbor Ship Canal AOC. Monthly workgroup meetings are held with those members appointed by IDEM's Commissioner to continue work included in the Remedial Action Plan. In addition, quarterly public meetings are held to keep the public apprised of the status of the RAP process and AOC interests.

Recent activities include the completion of the removal targets for the fourteen beneficial use impairments of the GCR/IHSC AOC in December of 2008, and the approval of a segment approach to the AOC in 2008 which broke the AOC up into the following six segments;

1. Riverine Wetlands
2. Grand Calumet River and the Indiana Harbor Ship Canal up to Columbus Drive (includes lagoons)
3. Indiana Harbor Ship Canal north of Columbus Drive
4. Dune & Swale Habitat (including dry prairies, copses, black oak savannas)
5. Inland Water Bodies (Lake George, Wolf Lake, ponds)
6. Beaches and Near Shore

This approach allows for specific segments within the AOC to be deemed ready for BUI removal once that segment is remediated. A list of the segment areas and the BUIs for which they are impaired can be found in the attached Appendix A.

Additional accomplishments for the CARE committee were the removal of the added cost to agriculture and industry BUI in September of 2011 and the removal of the restrictions on drinking water consumption taste and odor BUI in March 2012. With the removal of these BUI's the GCR AOC is currently only impaired for 12 beneficial uses and has started us on the path toward delisting.

Dredging, habitat restoration, continued monitoring, and research work within the AOC is constantly being conducted for the remediation and removal of each of the BUI's. Even with continued progress and the excellent efforts of the CARE committee

Grand Calumet River/Indiana Harbor Ship Canal AOC BUI Removal Matrix

BUI Removal Matrix

Currently unknown due to the need for future dredge funding.	This BUI maybe able to be removed from certain AOC segments as dredging and post dredge monitoring are completed in reaches of the river and riverine wetlands.
--	---

TABLE A

Grand Calumet River/Indiana Harbor Canal Dredging Costs				
Area/Segments (with USACoE Feasibility Designations)	Sponsors/Partners	Estimated Cost	Estimated Dredge/Cap Completion Date	Estimated Monitoring Cost per monitoring event
Grand Calumet Lagoons				
East Lagoon (5C)	RDA/Gary GLRI	\$20- \$40 Million	Dependant on City of Gary	\$100,000
Middle Lagoon (5B)	NA	NA	NA	NA
West Lagoon (5A)	US Steel RCRA	NA	Dependant on RCRA corrective Action	Currently unknown

East Branch Grand Calumet River

TABLE B

Riverine Wetlands

Area

Acres

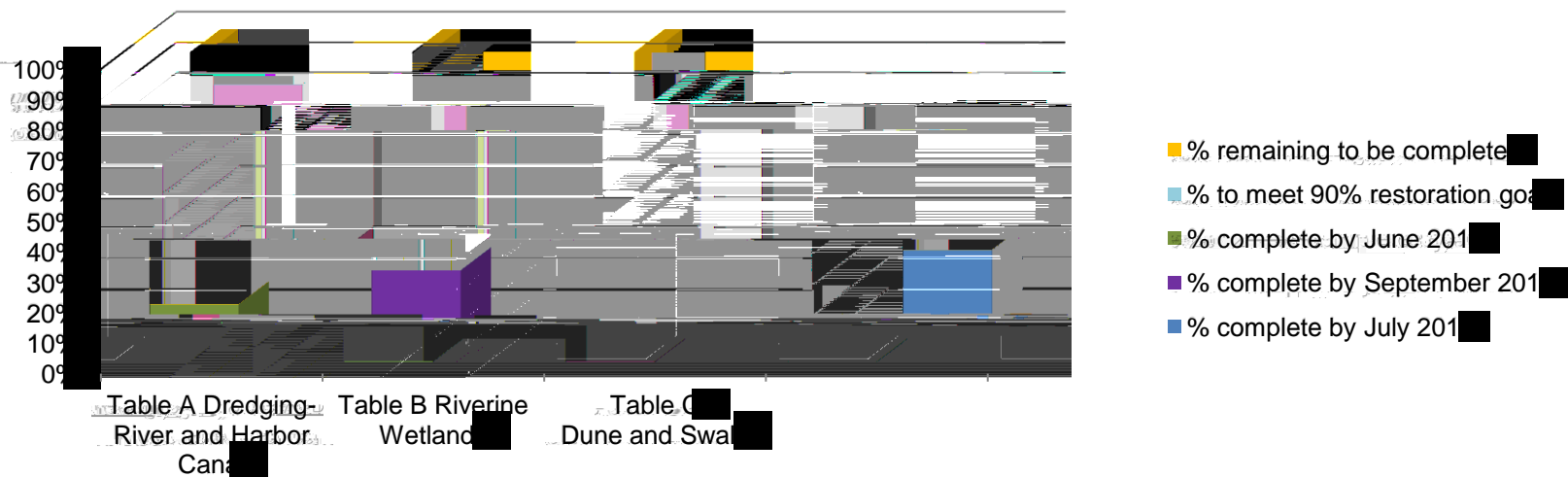
TABLE C



*A goal of 90% completion has been set based on current sites that provide a direct connect with the goal of BUI removal. An explanation for the selection of these sites may be found in the attached Appendix C, Habitat Site Locations. If 90% of the acres at these sites are remediated/restored to meet the removal criteria listed in Appendix B then the BUI can be considered for removal. Other properties/sites are not necessarily excluded from consideration towards the removal goal, however, in order to be considered proposed locations must meet the following guidelines;

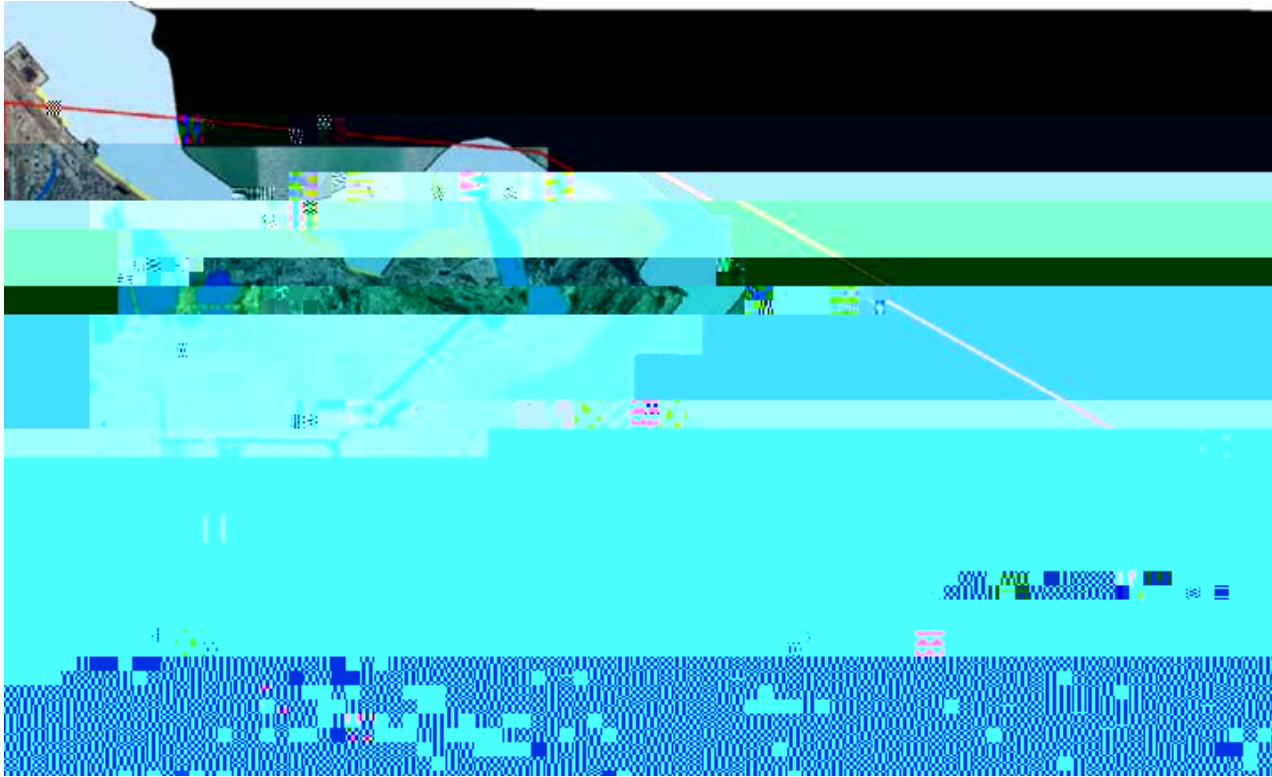
- The site must be able to be restored to the level of quality that meets the removal criteria for the Habitat BUI listed in Appendix B
- The site must have a recognizable relationship/connection to the Grand Calumet River
- The site must have a project scope
- The site must have identified Project Management (Ownership)
- Once the site is identified a remediation/restoration timeline must be in place (Completion within 5 years – extension waiver granted for cause)
- The project must have potential funding identified and be achievable based on prospective site locations
- Acreage not connected to the river may be included in the inventory once they are completed.

Graphical Depiction of Table A, B, and C**



**Graph does not include monitoring or maintenance needs

Segment Area Map

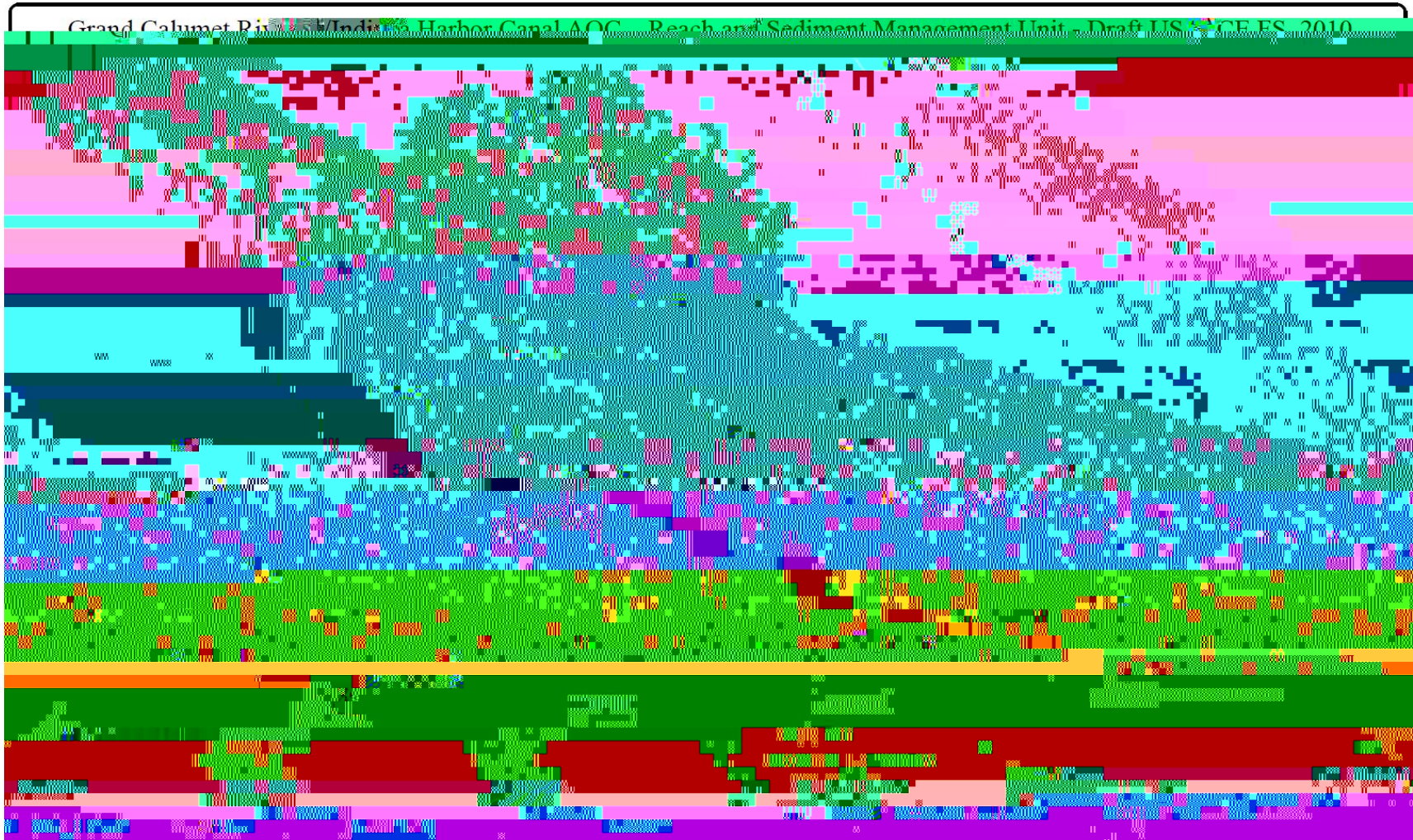


Color Key

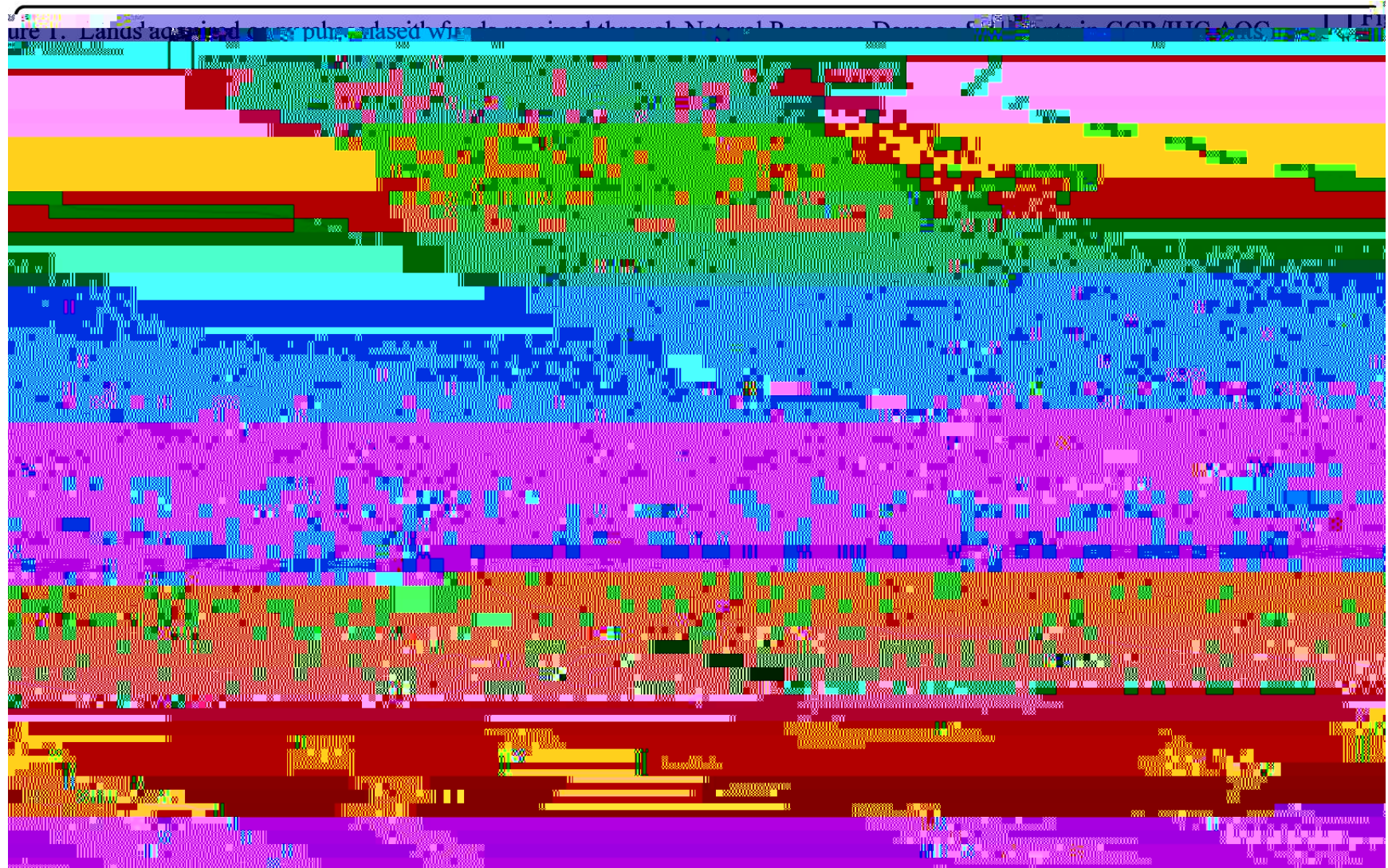
Map Color	Site Description*
Orange	Habitat Sites
Dark Blue	Inland Water bodies
Light Blue	Lagoons, River, and Canal
Yellow	Beaches
Light Purple	Nearshore Lake Michigan
Diagonal Hatching	Wetlands adjacent to the River

*This map does not depict the current AOC boundaries, but is used as a reference for Segment Areas located within the AOC.

Map of the Grand Calumet Area based on USACE 2010 Draft Feasibility Study Designations



NRD Settlement Habitat Site Land Acquisition Map



Appendix B

REMOVAL TARGETS FOR BENEFICIAL USE IMPAIRMENTS APPLICABLE TO THE GRAND CALUMET RIVER AOC

1. Restrictions on Fish and Wildlife Consumption

This BUI can be considered for removal when:

- Bioaccumulative chemicals of concern (BCCs) (including PCBs, mercury, dioxins, and furans) within the AOC have been controlled through issuance of the appropriate regulatory control document or eliminated; and
- Indiana Fish consumption advisories for the AOC, attributable to conditions within the AOC, fall within Group 1 or Group 2 for two consecutive sampling cycles; and
- Waters within the Grand Calumet River AOC are not listed as impaired due to fish consumption advisories and/or contaminant levels in fish tissue in the most recent Indiana Integrated Water Monitoring and Assessment Report (submitted to US EPA every two years) and/or the most recent Indiana Fish Consumption Advisory;

Or if the above is not achievable within 5 years:

- BCCs (including PCBs, mercury, dioxins, and furans) within the AOC have been controlled or eliminated; and
- A multi-year comparison study of fish tissue contaminant levels demonstrates that there is no statistically significant difference (with a 95% confidence interval) in fish tissue BCC concentrations in the AOC compared to fish tissue BCC concentrations in a representative non-impacted control site within the Lake Michigan Basin.

Actions

- Determine appropriate fish species for tissue concentration trend analysis.
- If a multi-year comparison study is necessary, establish appropriate control/comparison sites within the AOC or a similar watershed for evaluating relative progress toward attaining the restoration criteria utilizing comparative contaminant analysis. The studies should be designed to control variables known to influence contaminant concentrations such as species, size, age, sample type, lipids, and collection dates. The control site should be chosen based on physical, chemical, and biological similarity to the AOC.

2. Tainting of Fish and Wildlife Flavor

This BUI can be considered for removal when:

•

- Track progress toward achievement of restoration goals and management

- All remedial/restoration actions for specific impacted benthic communities are completed (except for minor repairs required during operations and maintenance) and monitored according to the approved plan(s); and
- Known contaminant sources within the AOC contributing to sediment contamination and degraded benthos have been identified and control measures implemented; and
- The macroinvertebrate Index of Biotic Integrity (mIBI) at all sampling sites is a minimum of 3 for samples collected following acceptable state protocols.; and
-

- Levels of chlorophyll-

- Develop appropriate scientifically based monitoring scenarios to establish a baseline and trends.

14. Loss of Fish and Wildlife Habitat

State of Indiana Removal Target Fish Habitat:

The habitat quality shall average a qualitative habitat evaluation index (QHEI)² 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.

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 Index³ without adventives⁴ shall meet 20 ; mean CC⁵ value = 6; and

If QHEI is assessed at 33 or better, then habitat quality should be maintained at or above that level.

Actions for Fish Habitat:

- Track changes and measure QHEI scores.
Track watershed survey results (Technical Support Documents, TMDLs, Water Quality Monitoring and Assessment Report, etc.)
- Conduct a habitat assessment of applicable segments in the AOC.

For Wildlife Habitat:

- Track changes and measure Great Lakes drowned river mouth coastal wetland habitat scores.
Track percentage of riparian buffers along the Grand Calumet River and Indiana Harbor Ship Canal.
- Habitat is sufficient to support wildlife goals for the applicable segments within the AOC.
- Establish a monitoring program using plant indicators as measures of habitat quality to determine the appropriate restoration goals for the AOC;
- Develop restoration goals based on pIBI reference conditions for the AOC when implementing the appropriate restoration measures and benchmarks.

² The QHEI is a comprehensive assessment of physical characteristics of a stream or river.

³ Used to determine the level of degradation of an area based on the plant species that live there.

⁴ Not native to and not fully established in a new habitat or environment.

⁵

Appendix C Habitat Site Locations

Background

Located within the GCR AOC is a series of natural area remnants that continue to support fragments of the native dune and swale ecosystem. Despite their hostile surrounding and decades of neglect, the natural communities captured within these sites are surprisingly diverse. For example, the Clark and Pine Nature Preserve has the highest concentration of rare, threatened and endangered species per acre throughout all of Indiana. Since 1979, The Nature Conservancy, Indiana Department of Natural Resources, Lake County Parks and Recreation Department, The Shirley Heinze Land Trust, and the Save the Dunes Conservation Fund have protected approximately 900 acres of this highly threatened dune and swale ecosystem. Of these acres approximately 650 were purchased or protected through conservation easements after 1987 when the Grand Calumet River was listed as an AOC. Historically dune and swale covered approximately 45 square miles of land surrounding the Grand Calumet River in northwest Indiana. Currently there are roughly 1000 acres of intact dune swale remaining in the western portion of the AOC. These tracts ra(ca 1 0 0 d 1 0 0 1 6ct)-4(s zy)12 1 0 0(f)-

