

**REMEDIAL ACTION PLAN UPDATE
for the
MILWAUKEE ESTUARY AREA OF CONCERN**



November 2016 DRAFT



**Wisconsin Department of Natural Resources
Office of the Great Lakes**

**Remedial Action Plan Update
for the
Milwaukee Estuary Area of Concern
December 2016**

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Disclaimer

The Great Lakes Water Quality Agreement is a non-regulatory agreement between the U.S. and Canada, and criteria developed under its auspices are non-regulatory. The actions identified in this document as needed to meet beneficial use impairment (BUI) delisting targets are not subject to enforcement or regulatory actions.

The actions identified in this Remedial Action Plan Update do not constitute a list of preapproved projects, nor is it a list of projects simply related to BUIs or generally to improve the environment. Actions identified in this document are directly related to removing a BUI and are needed to delist the Area of Concern.

2016 Progress Summary

The Wisconsin Department of Natural Resources (WDNR) and partners are working to improve conditions in the Milwaukee Estuary Area of Concern (AOC). During the past year progress has been made on moving sediment remediation forward, completing assessments to gather information on BUI status and support decision making, and continuing to make progress on habitat restoration management actions. Details about projects in the AOC are included in Appendix C.

Sediment

Contaminated sediments contribute to the majority of Beneficial Use Impairments (BUIs) in the Milwaukee Estuary AOC. Therefore, remediating contaminated sediment sites is necessary in making progress in addressing this impairment. A memo documenting the strategy for addressing contaminated sediment is included in Appendix D. Since the last Remedial Action Plan (RAP) Update, the following dredging related actions occurred:

- Sediment was sampled for characterization via the Great Lakes Legacy Act Program in the Milwaukee River from Estabrook Dam to the confluence with the Menomonee River.
- The report detailing the 2015 Legacy Act sediment characterization sampling in the Menomonee River from the Little Menomonee to the confluence with the Milwaukee was completed.
- A request was submitted for additional characterization work in the selected areas throughout the remainder of the AOC. This request builds on several successful requests in the past three years.
- WE Energies submitted an application to U.S. Environmental Protection Agency (USEPA) Great Lakes National Program Office (GLNPO) for a Great Lakes Legacy Act betterment project in portions of the Milwaukee and Menomonee Rivers.
- Dredging began at the Cedar Creek Superfund Alternative site by contractors for Mercury Marine in November. This followed several years of planning for this site to address PCB contamination.
- Miller Compressing has continued planning for remediation at the Burnham Canal Superfund site.
- WDNR and U.S. Geological Survey (USGS), along with partners such as Milwaukee Metropolitan Sewerage District (MMSD), worked to develop a project proposal to assess non-point source PAH loading to the Milwaukee Estuary. The proposal will be submitted to USEPA for possible Great Lakes Restoration Initiative (GLRI) funding.

Assessments

This year, there are many assessment projects underway, nearing completion or publishing final reports. These include several projects which WDNR received GLRI funding to carry out in previous years. Final reports for the fish tumor rate assessment as well as the waterfowl consumption assessment were published by USGS and WDNR respectively. Those publications are included as appendices E and F in this RAP Update. A final interpretive report on the 2012 plankton and benthos sampling was completed in July, and a report for the 2014 sampling is in final draft awaiting publication. Reporting out on work completed under a WDNR/GLRI grants to University of Wisconsin – Milwaukee (UWM) School of Freshwater Sciences (tracking sources of sewerage and bacterial contamination) and Milwaukee Riverkeeper (citizen based aesthetics monitoring) are due by the end of the year. USGS also published some results from their tree swallow studies in AOCs, including Milwaukee. All of these reports are being used to determine status and/or next steps that are needed for the following BUIs, respectively: fish tumors or other deformities, restrictions on fish and wildlife consumption, degradation of benthos, degraded phytoplankton and zooplankton populations, beach closings/recreational restrictions, degradation of aesthetics, and bird or animal deformities or reproductive problems.

In addition, several fish and wildlife population assessments are underway. These are to assist in determining management actions and metrics for the degradation of fish and wildlife populations impairment. Most are scheduled to be completed by the end of September 2017, but field work on one, the non-wadeable fisheries assessment, was completed this fall. Reporting out is expected to begin in spring 2017. This coincides with the work that the Fish and Wildlife Technical Team (Tech Team) will do to start ramping up work on this BUI. WDNR received GLRI funding for assessments being completed by staff of the UWM Field Station, Milwaukee County Dept. of Parks, Recreation & Culture (DPRC), Ozaukee County Planning & Parks Dept. and WDNR Fisheries Bureau. UWM School of Freshwater Sciences (SFS) received funding from Fund for Lake Michigan and WDNR for their assessment work in the harbor.

Habitat Restoration and Management Action Implementation

Throughout the year, the AOC coordinator worked with partners to continue to develop project proposals and make progress on projects identified as management actions. The majority of these were habitat restoration projects and one was a beach remediation. In addition, partners made great strides in implementing some projects. The City of Milwaukee/the Redevelopment Authority of the City of Milwaukee have been ramping up work on the restoration of the Bay View/Grand Trunk wetland restoration. A feasibility study is underway, building upon a Master Plan for the site, both funded by Fund for Lake Michigan. The AOC Coordinator and Tech Team have been providing technical support for the effort. WDNR applied for and received funding for the City to begin final design and permitting for the project in 2017. MMSD has been working on planning for two habitat projects (Burnham Canal Wetland Restoration and Kinnickinnic River Rehabilitation) as well as implementing two others (Five Low Flow Barriers Removal and Menomonee River Concrete Removal). Both the low flow barrier and concrete removal projects were completed this year. WDNR worked with MMSD to develop a project proposal for moving on to the next steps for the Kinnickinnic project. WDNR received the funding this fall and design work is scheduled to begin in 2017. Working with Milwaukee County DPRC, WDNR applied for and received funding to further two other habitat projects, the Kletzsch Dam Fish Passage and the Little Menomonee Corridor Restoration. In addition, working with DPRC, WDNR applied for and received funding to continue work on remediating South Shore Beach. This builds upon a recent master plan that was completed for part of the park as well as improvements aimed at reducing bacterial loading that are underway.

Next Year

In the next year the AOC Coordinator and WDNR staff will continue to make progress on many fronts in the Milwaukee Estuary AOC. The following activities are planned for 2017:

- Work with the Tech Team to begin reviewing and synthesizing data for the degradation of fish and wildlife populations impairment. This will be followed by working on developing final metrics and management actions for the impairment.
- Work with the Community Advisory Committee to review Aesthetics data and determine next steps for the degradation of aesthetics impairment.
- Review the final results of the plankton and benthos assessments completed by USGS and determine next steps for the degradation of benthos and degradation of phytoplankton and zooplankton populations impairments.
- Review TMDL and bacteria source tracking outputs and determine next steps for the eutrophication or undesirable algae and beach closings/recreational restrictions impairments.
- Continue sediment characterization and evaluate data to determine where additional cleanups might be necessary.
- Work with new and ongoing sediment cleanup projects to assure AOC goals and targets are met.

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PURPOSE STATEMENT

This Remedial Action Plan (RAP), which updates the 2015 RAP, documents and communicates progress made in the AOC in the last year and shares the path forward with our partners and stakeholders. The RAP includes a concise summary of beneficial use impairment status and tracks progress on specific actions that are important for reaching the delisting targets. These “actions” may include on-the-ground restoration projects, monitoring and assessment projects, and stakeholder engagement processes. As the primary agency with the responsibility to develop and implement the RAP, the Wisconsin Department of Natural Resources and the Office of Great Waters is committed to making progress in remediating and restoring Wisconsin’s Areas of Concern. In order to be lasting and effective, the AOC program must continuously improve, evaluating its course as new information and technology become available. Subsequent RAP updates will be produced as needed to incorporate new information.

Remedial Action Plans are required by Annex 1 of the Great Lakes Water Quality Protocol of 2012 (which replaced the 1987 Protocol amending the Revised Great Lakes Water Quality Agreement of 1978). The 2012 Protocol indicates that Remedial Action Plans must include the following elements:

1. Identification of beneficial use impairments (BUIs) and causes;
2. Criteria for the restoration of beneficial uses that take into account local conditions and established in consultation with the local community;
3. Remedial measures to be taken, including identification of entities responsible for implementing these measures;
4. A summary of the implementation of remedial measures taken and the status of the beneficial use; and
5. A description of surveillance and monitoring processes to track the effectiveness of remedial measures and confirm restoration of beneficial uses.



Figure 1. The boundaries of the Milwaukee Estuary Area of Concern. For additional information about the history of the AOC and a narrative description of the AOC boundary, please refer to previous RAP documents which are available online: <http://WDNR.wi.gov> Search “Milwaukee Estuary AOC”; RAP documents are stored on the “AOC Plans” tab. A listing of previous RAPs, RAP Updates, and important historical documents is included in the References section.

Table 1. Current Status of Beneficial Use Impairments in the Milwaukee Estuary AOC (Refer to Appendix C for more detail).

Beneficial Use Impairment	Beneficial Use Remains Impaired	Summary Status
Fish tumors or other deformities	Yes	The final fish tumor study publication was published in 2016. As stated in the previous RAPs the assessment indicates this BUI is impaired. Work on removing contaminants from the AOC continues as discussed in the 2016 Progress Summary.
Bird or animal deformities or reproductive problems	Suspected	Tree swallow monitoring, which is the selected indicator organism for the Milwaukee Estuary AOC, continues by USGS researchers. The results of this monitoring effort will be used to assess the BUI status when complete.
Restrictions on fish and wildlife consumption	Yes	Final results of the waterfowl consumption assessment project indicate that an advisory will remain in place. Fish consumption advisories also remain in place.
Restrictions on dredging activities	Yes	While progress on dredging projects continues, more work is still needed.
Degradation of benthos	Yes	Final results from the USGS benthos and plankton study are pending. Next steps will be determined after final conclusions are reviewed.
Degradation of phytoplankton and zooplankton populations	Yes	Final results from the USGS benthos and plankton study are pending. Next steps will be determined after final conclusions are reviewed.
Loss of fish and wildlife habitat	Yes	Progress continues on implementing the management actions including feasibility, design and implementation of projects. Some management actions are complete.
Degradation of fish and wildlife populations	Yes	Fish and wildlife population assessments are almost complete. The process to determine management actions will begin in 2017.
Beach closings	Yes	The outputs from both the TMDL and bacterial contamination source tracking are due in early 2017. Work continues with Milwaukee County on beach improvements, focusing on South Shore Beach.
Eutrophication or undesirable algae	Yes	TMDL studies will inform nutrient sources and loading, with final outputs expected in 2017.
Degradation of aesthetics	Yes	The target was adjusted in 2016. On-going citizen-based monitoring will characterize the impairment to assist in determining if further action is needed.

BENEFICIAL USE IMPAIRMENT UPDATES

FISH TUMORS OR OTHER DEFORMITIES

Target (Updated 2011)	Status
Removal may occur if: <ul style="list-style-type: none"> All known major sources of PAHs and chlorinated organic compounds within the AOC and tributary watershed have been controlled or eliminated. A fish health survey of resident benthic fish species, such as white suckers, finds incidences of tumors or other deformities at a statistically similar incidence rate of minimally impacted reference sites. OR, in cases where tumors have been reported: <ul style="list-style-type: none"> A comparison study of resident benthic fish such as white suckers of comparable age and maturity, or of fish species found with tumors in previous fish health surveys in the AOC, with fish at minimally impacted reference sites indicate that there is no statistically significant difference (with 95% confidence) in the incidence of liver tumors or deformities. 	In Progress & Action Needed Assessment Complete (2015) Reassess Post Remediation Assessment Complete (2015) Reassess Post Remediation

Status

An assessment of this impairment was completed in 2013 by USGS in the Milwaukee Estuary AOC and 2014 at the Root River reference site. Presence of neoplastic liver tumors in white suckers is the indicator which is used in the Milwaukee Estuary AOC to assess fish tumor rates. Researchers found that 15% of the white suckers in the Milwaukee Estuary had neoplastic liver tumors, above the 8.5% rate for the Root River (Racine, WI) and above documented background rates. As a result of this assessment, the status of this BUI was confirmed as “Impaired” and the suspected/potentially impaired was removed from the BUI status in 2014. The final publication associated with this assessment was published by USGS in 2016. A copy of that publication is included in Appendix E.

The results indicate that more work needs to be done to control or eliminate the sources of contaminants in the Milwaukee Estuary AOC. Sites with elevated amounts of PAHs, metals, and other substances must be addressed before removal of this impairment can occur. The BUI will be reassessed when a sufficient amount remediation of contaminants has occurred that may result in a decrease in fish tumor rate.

Management Actions

Management actions for this impairment are those projects which control or eliminate contaminants of issue from the AOC. These actions are usually sediment remediation or dredging projects. The first step in determining the management actions is to adequately characterize the conditions within the AOC. This information can then be used to determine management actions that need to be taken. The following actions need to be completed in order to determine contamination related management actions:

- Assess potential impacts to sediments from the remainder of the AOC that is currently uncharacterized. This includes the Milwaukee River downstream of the confluence with the Menomonee River, the south Menomonee Canal and upper Burnham Canal, portions of the Kinnickinnic River, inner harbor, and selected sites in the outer harbor and nearshore waters of Lake Michigan.
- Review and act upon Legacy Act sediment assessment data from other areas of the AOC. This includes, but is not limited to, Kinnickinnic River/Turning Basin, Menomonee River from

confluence with Little Menomonee to the harbor, Milwaukee River between Estabrook Dam and confluence with Menomonee River and existing Milwaukee River data.

The following management actions are necessary to move towards removing this impairment. This list is not complete. The actions that have been implemented are italicized.

- 1) Sources of contamination within the AOC need to be remediated.
 - a. Complete the assessment and cleanup of PCBs at the Cedar Creek Superfund Alternative Site.
 - b. Complete the management of sediments containing PAHs and metals from the Burnham Canal Superfund Alternative Site.
 - c. Complete the assessment of contaminated sediment and evaluate and implement cleanup related to the Solvay Coke Superfund Alternatives Site.
 - d. *Blatz Pavilion, Lincoln Park Phase 1 and Phase 2 Contaminated Sediment Remediation*
 - e. *Kinnickinnic River Legacy Act Cleanup*

USGS researchers have been using tree swallows as indicators of environmental contamination in areas across the Great Lakes and United States. The tree swallow is the organism that is being used to assess this BUI in the Milwaukee Estuary AOC. Since 2010 researchers have sampled five sites in the Milwaukee Estuary including Cedar Creek, Lincoln Park, Three Bridges Park, Lakeshore State Park and Baran Park. This represents one site each on Cedar Creek, Milwaukee River, Menomonee River, Kinnickinnic River and in the Estuary. This sampling will provide data robust enough to determine if this beneficial use is impaired. However, as this is a Great Lakes wide project, there has not been funding to sample the Milwaukee Estuary at each site, in each year. Work will continue in 2017 to collect and analyze an adequate amount of data to use in determining the status of this impairment.

Management Actions

Management actions have not been defined for this impairment. Management actions will be determined if studies indicate the BUI is impaired. If management actions are defined, they would likely be very similar to sediment management actions defined for other BUIs.

RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION

Target (Updated 2011)	Status
<p>Fish Approach to be used with current level of monitoring for fish consumption advisories within the AOC (every five years):</p> <ul style="list-style-type: none"> • All known man-made sources of BCOCs (including PCBs, mercury, dioxins, and furans) within the AOC and tributary watershed have been controlled or eliminated; and • State fish tissue monitoring confirms that waterbody-specific fish consumption advisories are no longer needed for PCBs for waters in the AOC. • Waters within the Milwaukee Estuary AOC are not listed as impaired due to fish consumption advisories in the most recent Clean Water Act 303(d) and 305(b) Wisconsin Water Quality Report to Congress (submitted to USEPA every two years). <p>Approach to be used with funding to support additional monitoring:</p> <ul style="list-style-type: none"> • All known man-made sources BCOCs (including PCBs, mercury, dioxins, and furans) within the AOC and tributary watershed 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 BCOc concentrations in the AOC compared to fish tissue BCOc concentrations in a representative non-impacted control site within the Lake Michigan Basin. <p>Wildlife There are no waterfowl consumption advisories for resident waterfowl due to contamination originating within the AOC.</p>	<p>In Progress & Action Needed</p> <p>Action Needed</p> <p>In Progress (ongoing monitoring)</p> <p>In Progress & Action Needed</p> <p>TBD (based on results of current monitoring)</p> <p>Assessment Complete (2015) Reassess Post Remediation</p>

Status

This BUI remains impaired for both Fish and Wildlife. WNDR wildlife staff completed a grant-funded assessment of the wildlife consumption advisory in 2015. This project was shortened from three years to two based on the results from the first two seasons of sampling. It was determined that additional sample collection would not change the consumption advisory determination, and not worth the investment of additional resources. The results were reviewed by both WDNR and Wisconsin Department of Health Services. Based on the findings, the agencies concur that a consumption advisory for waterfowl will remain in place in the Milwaukee Estuary AOC. The report is included in Appendix F. WDNR Fisheries Management samples waterbodies every 5 years in order to assess consumption advisories. The Milwaukee River and Cedar Creek are due for resampling in 2017 and 2018, respectively.

Areas of the AOC contaminated with PCBs or other bioaccumulative chemicals of concern (BCOCs) need assessment and remediation to address this impairment. This process is ongoing as discussed in the 2016 Progress Summary. As the progress continues to address the contaminants, the consumption advisories for fish and wildlife need to be reassessed until delisting targets are met.

Management Actions

Management actions for this impairment are those projects which control or eliminate contaminants of issue from the AOC. These actions are usually sediment remediation or dredging projects. The first step in determining the management actions is to adequately characterize the conditions within the AOC. This

information can then be used to determine management actions that need to be taken. The following actions need to be completed in order to determine contamination-related management actions:

- Assess potential impacts to sediments from the remainder of the AOC currently uncharacterized. This includes the Milwaukee River downstream of the confluence with the Menomonee River, the south Menomonee Canal and upper Burnham Canal, portions of the Kinnickinnic River, inner harbor, and selected sites in the outer harbor and nearshore waters of Lake Michigan.
- Review and act upon Legacy Act sediment assessment data from other areas of the AOC. This includes, but is not limited to, Kinnickinnic River/Turning Basin, Menomonee River from confluence with Little Menomonee to the harbor, Milwaukee River between Estabrook Dam and confluence with Menomonee River and existing Milwaukee River data.

The following management actions are necessary to move towards removing this impairment. This list is not complete. The actions that have been implemented are italicized.

- 1) Sources of contamination within the AOC need to be remediated.
 - a. Complete the assessment and cleanup of PCBs at the Cedar Creek Superfund Alternative Site.
 - b. Complete the management of sediments containing PAHs and metals from the Burnham Canal Superfund Alternative Site.
 - c. Complete the assessment of contaminated sediment and evaluate and implement cleanup related to the Solvay Coke Superfund Alternatives Site.
 - d. *Blatz Pavilion, Lincoln Park Phase 1 and Phase 2 Contaminated Sediment Remediation*
 - e. *Kinnickinnic River Legacy Act Cleanup*

RESTRICTIONS ON DREDGING ACTIVITIES

Target (Updated 2011)	Status
<p>Removal of this BUI can occur when:</p> <ul style="list-style-type: none"> • Contaminated sediment hotspots within and upstream from the AOC have been identified. • Implementation actions to remediate contaminated sites have been completed. As a source control measure and for AOC remediation, known contaminated sites must be addressed before BUI removal is possible. • There are no special handling requirements of material from routine navigational dredging due to contamination originating from controllable sources within the AOC. 	<p>In Progress & Action Needed In Progress & Action Needed In Progress & Action Needed</p>

Status

This BUI remains impaired in the Milwaukee Estuary AOC. While progress continues as described in the 2016 Progress Summary, there is still much work to be done before all known sites and impacts to future dredging operations are addressed.

Management actions

Management actions for this impairment are those projects which control or eliminate contaminants of issue from the AOC. These actions are usually sediment remediation or dredging projects. The first step in determining the management actions is to adequately characterize the conditions within the AOC. This information can then be used to determine management actions that need to be taken. The following actions need to be completed in order to determine contamination related management actions:

- Assess potential impacts to sediments from the remainder of the AOC currently uncharacterized. This includes the Milwaukee River downstream of the confluence with the Menomonee River, the south Menomonee Canal and upper Burnham Canal, portions of the Kinnickinnic River, inner harbor, and selected sites in the outer harbor and nearshore waters of Lake Michigan.
- Review and act upon Legacy Act sediment assessment data from other areas of the AOC. This includes, but is not limited to, Kinnickinnic River/Turning Basin, Menomonee River from confluence with Little Menomonee to the harbor, Milwaukee River between Estabrook Dam and confluence with Menomonee River and existing Milwaukee River data.

The following management actions are necessary to move towards removing this impairment. This list is not complete. The actions that have been implemented are italicized.

- 1) Sources of contamination within the AOC need to be remediated.
 - a. Complete the assessment and cleanup of PCBs at the Cedar Creek Superfund Alternative Site.
 - b. Complete the management of sediments containing PAHs and metals from the Burnham Canal Superfund Alternative Site.
 - c. Complete the assessment of contaminated sediment and evaluate and implement cleanup related to the Solvay Coke Superfund Alternatives Site.
 - d. *Blatz Pavilion, Lincoln Park Phase 1 and Phase 2 Contaminated Sediment Remediation*
 - e. *Kinnickinnic River Legacy Act Cleanup*

DEGRADATION OF BENTHOS

Target (Updated 2011)	Status
Removal may occur if: <ul style="list-style-type: none"> • Known contaminant sources contributing to sediment contamination and degraded benthos have been identified and control measures implemented; and • All remediation actions for contaminated sediments are completed and monitored according to an approved plan; or • The benthic community within the site being evaluated is statistically similar to a reference site with similar habitat and minimal sediment contamination. 	In Progress & Action Needed In Progress & Action Needed Assessment In Progress (2012-2016)

Status

The status of this impairment is currently being assessed. USGS was contracted to assess both the planktonic and benthic communities of the Lake Michigan AOCs and reference rivers. Sampling was completed in 2012 and 2014. The 2012 final report is complete and a draft of the 2014 report is currently under review. When the reports and the conclusions are fully evaluated, next steps for this BUI will be determined.

At a minimum, sources of contamination to the benthic community within the AOC need to be remediated. The status and condition of the benthic community in the entire AOC needs to be determined. There may be a need to supplement the USGS study to adequately characterize the range of benthic conditions in the AOC. Given the disturbance found in some of the AOC waterways, it is unlikely that high quality benthic communities can be established at all sites. For instance, the inner harbor has high degrees of disturbance, sediment deposition and lack of suitable habitat that tend to be dominated by very tolerant organisms. Changes in the habitat in this area are unlikely. Refinement of the target may be needed, taking into consideration the achievability of targets for BUI removal and the varied benthic conditions throughout the AOC.

Management Actions

Management actions for this impairment are those projects which control or eliminate contaminants of issue from the AOC. These actions are usually sediment remediation or dredging projects. The first step in determining the management actions is to adequately characterize the conditions within the AOC. This information can then be used to determine management actions that need to be taken. The following actions need to be completed in order to determine contamination related management actions:

- Assess potential impacts to sediments from the remainder of the AOC currently uncharacterized. This includes the Milwaukee River downstream of the confluence with the Menomonee River, the south Menomonee Canal and upper Burnham Canal, portions of the Kinnickinnic River, inner harbor, and selected sites in the outer harbor and nearshore waters of Lake Michigan.
- Review and act upon Legacy Act sediment assessment data from other areas of the AOC. This includes, but is not limited to, Kinnickinnic River/Turning Basin, Menomonee River from confluence with Little Menomonee to the harbor, Milwaukee River between Estabrook Dam and confluence with Menomonee River and existing Milwaukee River data.

The following management actions are necessary to move towards removing this impairment. This list is not complete. The actions that have been implemented are italicized.

- 1) Sources of contamination within the AOC need to be remediated.

- a. Complete the assessment and cleanup of PCBs at the Cedar Creek Superfund Alternative Site.
- b. Complete the management of sediments containing PAHs and metals from the Burnham Canal Superfund Alternative Site.
- c. Complete the assessment of contaminated sediment and evaluate and implement cleanup related to the Solvay Coke Superfund Alternatives Site.
- d. *Blatz Pavilion, Lincoln Park Phase 1 and Phase 2 Contaminated Sediment Remediation*
- e. *Kinnickinnic River Legacy Act Cleanup*

DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS

Target (Updated 2012)	Status
<p>A stepped approach is needed for delisting for this impairment:</p> <ol style="list-style-type: none"> 1. The first step toward delisting will be to establish a baseline condition for the estuary to evaluate the extent of this impairment. Phytoplankton and zooplankton community surveys should be conducted and compared to a non-impacted or minimally impacted reference site to set the baseline condition. If the community structure is statistically different than the reference conditions, this BUI should be considered impaired. 2. Identify the factors leading to this impairment. <ol style="list-style-type: none"> a. Ambient water chemistry sampling should be conducted to determine if nutrient enrichment is the main contributor. If nutrients are the main contributor, sources causing nutrient enrichment to the outer harbor and nearshore waters are identified and controlled. b. If nutrient enrichment is not considered the cause of the impairment, conduct bioassays to determine if ambient water toxicity is causing impairment. 	<p>Assessment In Progress (2012-2016)</p> <p>Action Needed (based on results of current assessment)</p>

Status

The status of this impairment is currently being assessed. USGS was contracted to assess both the planktonic and benthic communities of the Lake Michigan AOCs and reference rivers. Sampling was completed in 2012 and 2014. The 2012 final report is complete and a draft of the 2014 report is currently under review. When the reports and the conclusions are fully evaluated, next steps for this BUI will be determined.

If the planktonic community is found to be impaired compared to other Lake Michigan rivers, based on the target there is a need to investigate if nutrient enrichment and/or toxicity are causes of the plankton impairment. This determination would inform any additional necessary management actions. A target adjustment may also be needed depending on the results of the study.

Management Actions

No management actions have been defined for this impairment. Management actions will be determined if studies indicate the BUI is impaired. If management actions are defined, they would likely be very similar to sediment or nutrient management actions defined for other BUIs.

LOSS OF FISH AND WILDLIFE HABITAT

Target (Updated 2011)	Status
<p>This BUI will be considered to be eligible for removal when the following have occurred:</p> <ul style="list-style-type: none"> • All contaminated sediment hotspots within the AOC have been identified, and implementation actions to remediate contaminated sites have been completed. • A local fish and wildlife management and rehabilitation plan has been compiled for the estuary that: <ul style="list-style-type: none"> ○ Defines the causes of all habitat impairments within the AOC ○ Establishes site-specific habitat and population targets for native indicator fish and wildlife species within the AOC ○ Identifies all fish and wildlife habitat rehabilitation programs/activities within the AOC and establishes a mechanism to assure coordination among all these programs/activities, including identification of lead agencies ○ Establishes a time table, funding mechanism, and lead agency or organization responsibility for all fish and wildlife habitat rehabilitation activities needed within the AOC. • The programs and actions necessary to accomplish the recommendations of the fish and wildlife habitat plan are implemented, and modified as need to ensure continual improvement. 	<p>In Progress & Action Needed</p> <p>In Progress</p> <p>In Progress</p>

Status

Significant progress has been made on this BUI in the past several years. A management action list of habitat projects was finalized and all projects are in some phase of implementation (planning, design or construction) or complete. Progress on these habitat projects as well as the sediment remediation actions are discussed in the 2016 Progress Update section.

WDNR applied for and received grant funding to move implementation forward for several habitat management action projects including: Kletzsch Dam Fish Passage, Bay View Wetland Restoration, Little Menomonee Corridor Restoration and the Kinnickinnic River Habitat Rehabilitation. In the coming year, WDNR will work with partners to continue making progress on these and other management actions.

Management Actions

The first set of management actions for this impairment are habitat restoration projects that address one or more of the physical or biological habitat goals, as determined in consultation with the Fish and Wildlife Technical Advisory Committee. The second set of management actions for this impairment are those projects which control or eliminate contaminants of issue from the AOC. These actions are usually sediment remediation or dredging projects. The first step in determining the management actions is to adequately characterize the conditions within the AOC. This information can then be used to determine management actions that need to be taken. The following actions need to be completed in order to determine contamination related management actions:

- Assess potential impacts to sediments from the remainder of the AOC currently uncharacterized. This includes the Milwaukee River downstream of the confluence with the Menomonee River, the south Menomonee Canal and upper Burnham Canal, portions of the Kinnickinnic River, inner harbor, and selected sites in the outer harbor and nearshore waters of Lake Michigan.

- Review and act upon Legacy Act sediment assessment data from other areas of the AOC. This includes, but is not limited to, Kinnickinnic River/Turning Basin, Menomonee River from confluence with Little Menomonee to the harbor, Milwaukee River between Estabrook Dam and confluence with Menomonee River and existing Milwaukee River data.

The following management actions are necessary to move towards removing this impairment. This list is not complete as all sediment projects have not been identified and defined. The actions that have been implemented are italicized.

- 1) Implement habitat restoration projects defined in the fish and wildlife management and rehabilitation plan.
 - a. Little Menomonee Grassland Restoration*
 - b. Milwaukee River Fish Habitat Enhancement and Expansion*
 - c. Wheelhouse Gateway Riparian Restoration*
 - d. Menomonee River Concrete Removal*
 - e. Five Low Flow Barriers Removal*
 - f. Kinnickinnic River Habitat Rehabilitation
 - g. Burnham Canal Wetland Restoration
 - h. Little Menomonee Corridor Restoration
 - i. Bay View Wetland Restoration
 - j. Estabrook Park Dam Fish Passage
 - k. Kletzsch Park Dam Fish Passage
- 2) Sources of contamination within the AOC need to be remediated.
 - a. Complete the assessment and cleanup of PCBs at the Cedar Creek Superfund Alternative Site.
 - b. Complete the management of sediments containing PAHs and metals from the Burnham Canal Superfund Alternative Site.
 - c. Complete the assessment of contaminated sediment and evaluate and implement cleanup related to the Solvay Coke Superfund Alternatives Site.
 - d. Blatz Pavilion, Lincoln Park Phase 1 and Phase 2 Contaminated Sediment Remediation*
 - e. Kinnickinnic River Legacy Act Cleanup*

DEGRADATION OF FISH AND WILDLIFE POPULATIONS

Target (Updated 2011)	Status
<p>Fish This BUI will be considered to be eligible for removal when the following have occurred:</p> <ul style="list-style-type: none"> • All contaminated sediment hotspots within the AOC have been identified, and implementation actions to remediate contaminated sites have been completed. • A local fish and wildlife management and rehabilitation plan has been compiled for the estuary that: <ul style="list-style-type: none"> ○ Defines the causes of all population impairments within the AOC ○ Establishes site specific local population targets for native indicator fish and wildlife species within the AOC ○ Identifies all fish and wildlife population rehabilitation programs/activities within the AOC and establishes a mechanism to assure coordination among all these programs/activities, including identification of lead and coordinative agencies ○ Establishes a time table, funding mechanism, and lead agency or organization responsibility for all fish and wildlife population activities needed within the AOC. ○ The actions/projects necessary to accomplish the recommendations of the fish and wildlife management and restoration plan are implemented. • Populations for native indicator fish species are statistically similar to populations in reference sites with similar habitat but little to no contamination. <p>Wildlife Assess wildlife populations and the possible extent of any impairment within the AOC before setting specific wildlife population targets.</p>	<p>In Progress & Action Needed</p> <p>In Progress</p> <p>Unknown</p> <p>In Progress</p>

Status

Currently, information is being collected that will inform our decision making process for this BUI. There are several fish and wildlife population assessments and habitat mapping underway which will provide the data, suggested metrics and suggested actions for this impairment. These projects are discussed in the 2016 Progress Summary. These projects will be wrapping up in 2016 and 2017. Following reporting out, the AOC Coordinator will consult with the Fish and Wildlife Tech Team to determine the necessary management actions. Given the size and complexity of the AOC, it is expected that this process will take at least 12-18 months to complete. The goal is to include management actions in the 2018 RAP. The draft Fish and Wildlife Plan will also be completed once all management actions and metrics are determined.

Management Actions

The first set of management actions for this impairment will be projects that address the goals and metrics for this BUI, to be determined in consultation with the Fish and Wildlife Technical Advisory Committee. The second set of management actions for this impairment are those projects which control or eliminate contaminants of issue from the AOC. These actions are usually sediment remediation or dredging projects. The first step in determining the management actions is to adequately characterize the conditions within the AOC. This information can then be used to determine management actions that

need to be taken. The following actions need to be completed in order to determine management actions:

- Complete the fish and wildlife population assessments and associated mapping. Review the final products with the Tech Team and consult on proposed management actions.
- Assess potential impacts to sediments from the remainder of the AOC currently uncharacterized. This includes the Milwaukee River downstream of the confluence with the Menomonee River, the south Menomonee Canal and upper Burnham Canal, portions of the Kinnickinnic River, inner harbor, and selected sites in the outer harbor and nearshore waters of Lake Michigan.
- Review and act upon Legacy Act sediment assessment data from other areas of the AOC. This includes, but is not limited to, Kinnickinnic River/Turning Basin, Menomonee River from confluence with Little Menomonee to the harbor, Milwaukee River between Estabrook Dam and confluence with Menomonee River and existing Milwaukee River data.

The following management actions are necessary to move towards removing this impairment. This list is not complete as all sediment projects have not been identified and defined. The actions that have been implemented are italicized.

- 1) Sources of contamination within the AOC need to be remediated.
 - a. Complete the assessment and cleanup of PCBs at the Cedar Creek Superfund Alternative Site.
 - b. Complete the management of sediments containing PAHs and metals from the Burnham Canal Superfund Alternative Site.
 - c. Complete the assessment of contaminated sediment and evaluate and implement cleanup related to the Solvay Coke Superfund Alternatives Site.
 - d. *Blatz Pavilion, Lincoln Park Phase 1 and Phase 2 Contaminated Sediment Remediation*
 - e. *Kinnickinnic River Legacy Act Cleanup*

BEACH CLOSINGS

Target (Updated 2011 & 2012)	Status
<p>This BUI will be considered removed when:</p> <ul style="list-style-type: none"> • All known sources of bacterial contamination to the AOC and tributary watersheds have been identified and, if feasible, have been controlled or treated to reduce possible exposures; and • No unpermitted overflows (either from sanitary sewers or combined sewers) have occurred within the AOC during the previous five year period. • All municipalities within the AOC have adopted and are implementing storm water reduction programs including an illicit discharge elimination program; and • No water bodies within the AOC are included on the list of impaired waters due to contamination with pathogens or chemicals having a public health concern (i.e., carcinogenic, mutagenic) in the most recent Wisconsin Impaired Waters list that is submitted to USEPA every two years; and • No local or state contact advisories related to the presence of a chemical contaminant have been issued within the AOC during the previous five years. • No water bodies (including beaches) within the AOC are included on the list of impaired waters for recreational restrictions in the most recent Wisconsin Impaired Waters list. • Implementation of the Milwaukee River Total Maximum Daily Load Study for bacteria is complete. 	<p>Assessment in Progress & Action Needed Unknown</p> <p>Complete</p> <p>In Progress & Action Needed</p> <p>Unknown</p> <p>In Progress & Action Needed</p> <p>In Progress & Action Needed</p>

Status

Progress has been made on this impairment in 2016, but more work is needed to further define the target and management actions based on work currently underway. Reviewing the final outputs from the Total Maximum Daily Load (TMDL) for bacteria and the Identification and Quantification of Sanitary Sewage Contamination in the Milwaukee Estuary AOC will elucidate what is needed to address this impairment. Both of these products should be available by early 2017. After reviewing and disseminating this information, the next steps for this impairment will be determined. It is likely that a target adjustment will be called for based on this new information.

At the same time, Milwaukee County has continued their work on planning improvements to beaches in the AOC. Right now the focus is high bacterial levels at South Shore Park Beach. Milwaukee County DPRC has undertaken a Master Planning and redesign of park elements. Designs are currently being developed for the parking lot and green infrastructure at the park. WDNR applied for and received funding to assist DPRC in continuing work to address bacterial levels and closings in the beach area. This work will continue in 2017.

Management Actions

Management actions have not been defined for this impairment. Management actions will be determined after review of pertinent information and in consultation with stakeholders.

EUTROPHICATION OR UNDESIRABLE ALGAE

Target	Status
Removal of this BUI can occur when: <ul style="list-style-type: none"> • Total phosphorus (TP) concentrations within the AOC rivers, harbors, and nearshore waters meet the criteria recommended for the State of Wisconsin, as established by WDNR. • When the results from the total maximum daily load study for phosphorus, total suspended solids, and bacteria are completed for the Menomonee, Kinnickinnic, and Milwaukee Rivers. • Measures to meet the Total Maximum Daily Loading Implementation Plan are being completed. • No water bodies within the AOC are included on the list of impaired waters due to nutrients or excessive algal growths in the most recent WI Impaired Waters list. • Chlorophyll-a concentrations within the AOC lake and impoundment areas do not exceed 4.0 µg/L. • There are no beach closures in the AOC due to excessive nuisance algae growth. 	In Progress & Action Needed In Progress Action Needed Action Needed Unknown Unknown

Status

There is much ongoing work in the Milwaukee Estuary to address eutrophication and nutrient loading into the rivers and Lake Michigan. Much of this work is currently associated with the TMDL study and subsequent implementation planning. As these efforts evolve, work is still needed in the AOC to further define the target and management actions. Reviewing the final outputs from the TMDL in 2017 will assist in determining the next steps for this impairment. It is likely that a target adjustment will be called for based on this new information.

Management Actions

Management actions have not been defined for this impairment. Management actions will be determined after review of pertinent information and in consultation with stakeholders.

DEGRADATION OF AESTHETICS

Target (Updated 2016)	Status
<p>This delisting target is consistent with Chapter NR 102, Wisconsin Administrative Code, Water Quality Standards for Surface Waters. Delisting shall occur when monitoring data within the AOC and/or surveys collected by multiple observers for any two consecutive year period indicates that water bodies in the AOC do not exhibit unacceptable levels of the following properties in quantities which interfere with the Water Quality Standards for Surface Waters:</p> <ul style="list-style-type: none"> a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water shall not be present in such amounts as to interfere with public rights in waters of the state. b) Floating or submerged debris, oil, scum, or other material shall not be present in such amounts as to interfere with public rights in waters of the state. c) Materials producing color, odor, taste, or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state. <p>The following target will also be met to determine when restoration has occurred:</p> <ul style="list-style-type: none"> • Corrective action plans are in-place and being implemented for significant, persistent issues contributing to the degradation of aesthetics within the AOC identified via aesthetics monitoring/surveys. 	<p>Assessment in Progress</p> <p>Assessment in Progress</p> <p>Assessment in Progress</p> <p>Action Needed</p>

Status

The target for this BUI was adjusted in 2016, in consultation with the Community Advisory Committee. These changes were crafted to include the monitoring strategy developed with stakeholders over the past several years. This included adding language regarding multiple observers, two consecutive survey seasons, and identification of significant or persistent issues identified by the surveys. These changes bring the target in line with the current knowledge and approach to this impairment. The previous target and new target are compared in Appendix G.

WDNR has received funding to support citizen-based monitoring efforts for this BUI, and continued with the second year of monitoring in 2016. Milwaukee Riverkeeper coordinated the volunteers, who use a survey based on the target to assess AOC waterways. This survey data will then be used to assess the impairment in 2017 to determine if management actions or more monitoring is needed.

Management Actions

Management actions have not been defined for this impairment. Management actions will be determined after review of pertinent information and in consultation with stakeholders.

REFERENCES

Janish, T., D. Kaemmerer, A. O'Brien, T. Sheffy and A. Stenstrup. 1991. Milwaukee Estuary Remedial Action Plan: A Plan to Clean Up Milwaukee's Rivers and Harbor. Wisconsin Department of Natural Resources. Publication PUBL-WR-276-91

Galarneau, S., J. Harschlip, M. Jones, R. Sternkopf and R. Cors. 1994. Milwaukee Estuary Remedial Action Plan: progress through January 1994: A Plan to Clean Up Milwaukee's Rivers and Harbors. Wisconsin Department of Natural Resources.

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O'Shea, M. 2012. Remedial Action Plan Update for the Milwaukee Estuary Area of Concern. Wisconsin Department of Natural Resources

O'Shea, M. 2013. Remedial Action Plan Update for the Milwaukee Estuary Area of Concern. Wisconsin Department of Natural Resources

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Hron, S. 2015. Remedial Action Plan Update for the Milwaukee Estuary Area of Concern. Wisconsin Department of Natural Resources

List of Previous Remedial Action Plans, Updates, and other important historical documents:

APPENDICES

Appendix A	Acronyms
Appendix B	Definitions
Appendix C	BUI Tracking Matrix
Appendix D	Sediment Strategy
Appendix E	Fish Tumor Publication
Appendix F	Waterfowl Consumption Assessment Report
Appendix G	Aesthetics BUI Target Adjustment Comparison

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Appendix A

List of Acronyms

AOC	Area of Concern
BUI	Beneficial Use Impairment
DPRC	Department of Parks, Recreation & Culture (Milwaukee County)
GLNPO	Great Lakes National Program Office
GLRI	Great Lakes Restoration Initiative
µg/L	Micrograms per liter
mg/L	Milligrams per liter
MMSD	Milwaukee Metropolitan Sewerage District
MS4	Municipal Separate Storm Sewer System
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
ppm	Part per million
RAP	Remedial Action Plan
SFS	School of Freshwater Science
TMDL	Total Maximum Daily Load
TP	Total phosphorus
TSS	Total suspended solids
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
UWM	University of Wisconsin – Milwaukee
WDNR	Wisconsin Department of Natural Resources
WPS	Wisconsin Public Service

Appendix B

Definitions

(to be added later)

Appendix C

BUI Tracking Matrix

(to be added later)

Appendix C

Note that projects listed in the table below are the next clearly delineated action steps that have been identified by WDNR in collaboration with AOC partners and stakeholders to make progress toward delisting the AOC. This list does not necessarily reflect all actions that will ultimately be needed to remove impairments, and will be updated as more information is collected and as actions are completed.

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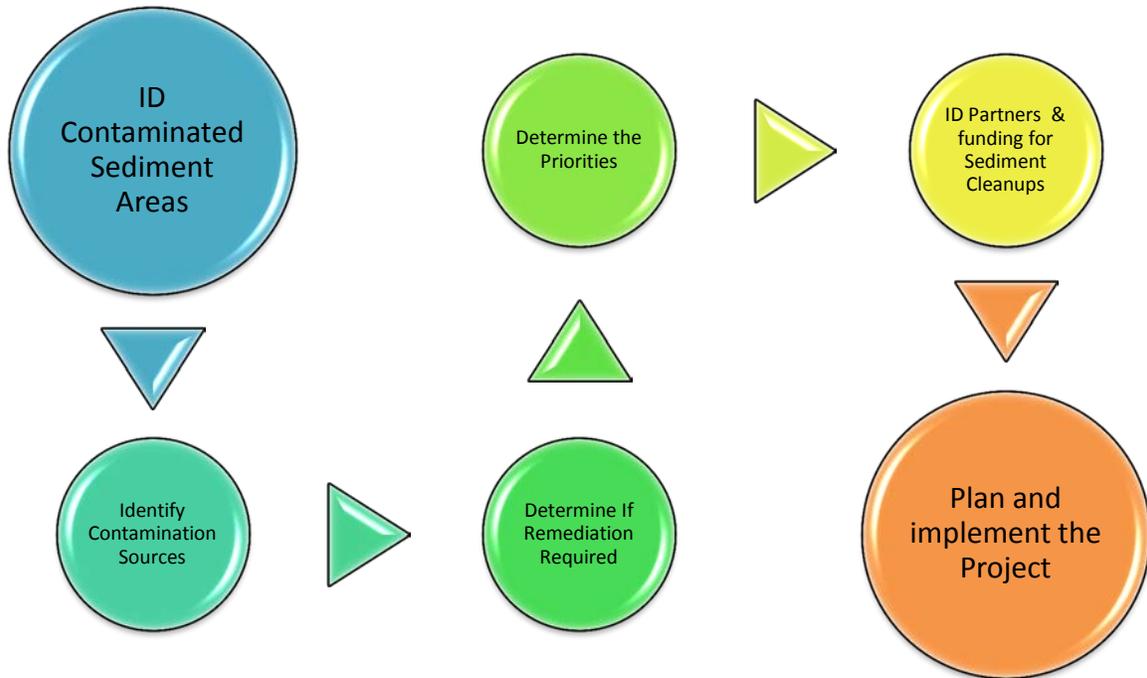
Milwaukee Estuary AOC BUI Tracking Matrix

Appendix D
Sediment Strategy

Milwaukee AOC Sediment Strategy

Overview

Contaminated sediments contribute to at least 7 of the 11 beneficial use impairments identified in the Milwaukee Estuary Area of Concern. A crucial part of delisting these contaminated sediment related BUIs is to identify the areas with contaminated sediment requiring remediation, identify sources, control sources (if possible) and implement sediment management strategies to address the contamination. This document outlines the process the Wisconsin Department of Natural Resources (WDNR) is using to meet the goals of eventually delisting these BUIs.



Identify Areas with Contaminated Sediment

Fish consumption advisory monitoring beginning in the 1980s helped identify several river reaches in or adjacent to the AOC with fish contaminated with polychlorinated biphenyls (PCBs). These efforts helped DNR to determine that contamination in Cedar Creek, and the Milwaukee River contributed to fish consumption advisories. Subsequent studies in the late 1980s through the mid-1990s help to narrow down specific river reaches that may require remediation.

More recent studies show that sediments contaminated with other compounds, such as polycyclic aromatic hydrocarbons (PAHs) likely contribute to the higher incidence of fish tumors and other deformities in the Milwaukee Estuary AOC compared to urbanized reference sites.

Several land based cleanup sites have identified contaminated sediment components and are under study by the responsible parties. These small scale site characterizations, while useful, only give us part of the overall picture of the status of sediment contamination in the AOC.

In the navigational channels maintained by the US Army Corps of Engineers (ACOE), periodic sediment sampling is completed to determine the quality of sediment to be dredged and placed in the Milwaukee

confined disposal facility adjacent to the Port of Milwaukee. Like the smaller scale studies, this gives us a partial view of the status of sediment contamination in the AOC.

Fortunately, the Great Lakes Legacy Act site characterization program is helping to augment the information WDNR and other entities have collected to provide the big picture overview of AOC contaminated sediment status. DNR has been submitting requests to utilize this program for the past several years in an effort to move systematically through the AOC. In 2015, the Kinnickinnic River Mooring Basin and the Menomonee River downstream from Little Menomonee River to the confluence with the Milwaukee River were sampled through the site characterization program. For the Menomonee River, this is the most comprehensive study of contaminated sediment in the AOC ever collected. These data combined with smaller studies from some responsible parties and the ACOE will help WDNR determine areas that may require some type of sediment management actions. A characterization, with sampling completed in 2016 of the Milwaukee River downstream from the Estabrook Park Dam to the confluence with the Menomonee River will help to complete the contaminated sediment process in this portion of the AOC. Similar characterization sampling has been requested for selected areas in the remainder of the AOC, specifically inner and outer harbor and near shore Lake Michigan, for 2017.

Identify Sources of the Sediment Contamination

The source of the contamination needs to be determined in order to determine what program and or regulatory measures need to be taken to cleanup an area, and also to ensure that sources are controlled before implementing sediment management strategies. Discharges from industry, storm sewers, spills, known contaminated sites, landfill records or other historic documents showing potential contributors need to be examined. Possible sources need to be vetted and investigated.

The WDNR maintains a database with known contaminated sites that can provide valuable information for understanding potential sources of contamination to the AOC. The records contained in the database (BRRTS) contain information about source of contamination (i.e. spill, underground storage tank, industrial site...) as well as contaminants of concern from each site.

Determine if Areas within the AOC Require Remediation

The WDNR sediment management and AOC programs are in the process of examining the information collected from the recent characterizations as well as the smaller scale studies mentioned earlier to determine if additional areas within the AOC require remediation. In addition to looking for possible sources, identification of background concentrations of contaminants is important for establishing remediation needs and also clean up goals.

Determine the Priorities for Sediment Management Actions

For contaminated sediment cleanups, when possible, upstream sources/sites should be addressed before addressing sites further downstream. This helps avoid recontamination of downstream areas. However, anytime opportunities present themselves to address contamination, they should be taken, even if a downstream site is cleaned up ahead of a site further upstream as long as the potential for recontamination is low. Sediment projects are often complicated and costly to implement, so getting it right the first time is extremely important. The potential for recontamination of sites is a major driver for determining clean up priorities. It does not make sense to remediate a site if sources that can re-contaminate the area following remediation are not first controlled.

Identify Potential Partners, Cooperators and Funders to Assist with Sediment Cleanups

Generally, anybody can be a partner on sediment management projects. In some cases responsible parties are easily identifiable and are required through various laws to address the contamination they have caused. However, in complicated areas with long histories of industrial uses, it is not always possible to identify those solely responsible for causing the pollution. Therefore it is important that we examine all options to fund successful projects. These include, but are not limited to:

Responsible Parties
State, County and other Municipal Partners
Adjacent Landowners

Federal partners (Legacy Act, Corps of Engineers)
Nonprofit organizations

Plan and Implement the Project

Once a potential project has been identified, it is important to thoroughly plan the clean up strategy due to the cost, complexity and time needed to complete projects. In some cases enough information is available to identify the degree and extent of contamination and set clean up goals. However, if more information is needed it might be appropriate to conduct a focused remedial investigation that fills in data gaps, ensures all sources have been identified and controlled and helps ensure the overall success of the remedial action. Other steps in the process include conducting a feasibility study, which looks at all the available techniques, management options (including disposal options) as well as implementability and community acceptance to select the best option for implementation. This is the stage where identification of regulatory requirements is also accomplished (permits needed, etc.).

Once a remedial option has been selected, it's on to designing the project. This can take several months to a year depending on the complexity and size of the project. Following design is implementation, which also includes sampling following the remedial action to ensure short term goals are met. In some cases, especially with contaminants like PCBs that accumulate and magnify in fish and other wildlife it is also desirable to conduct some long-term monitoring to ensure that the concentrations of these contaminants are declining.

Status of AOC Sediment Projects

Please see the attached map that illustrates the current status of sediment projects in the Milwaukee Estuary AOC as of December 2016. The following are known sites and or projects within the AOC, which may expand based on characterizations or new investigations.

Superfund or State-Lead Regulatory Actions

- Cedar Creek Superfund Alternative Site – Upland site remediation complete in some areas, dredging of Ruck Pond raceway and excavation of adjacent contaminated soil completed in December 2016. Facilities are being put in place to conduct the larger dredging project in Columbia and Wire and Nail Ponds beginning in Spring of 2017.
- Burnham Canal Superfund Alternative Site – Design in approval process with regulatory agencies.
- Third Ward MGP and West Side MGP – Legacy Act Project with Responsible Party and US EPA/GLNPO to conduct focused remedial investigation and feasibility study.
- Solvay Coke Superfund Alternative Site– Remedial investigation complete. Feasibility study process underway
- Milwaukee River PCB – Site assessment underway by regulatory agencies.
- Moss American Superfund Site – Remedial action complete, additional source area work underway by regulatory agencies.

Characterization

- Milwaukee River from Cedar Creek to Lincoln Park – Some sampling completed, gap analysis needed to determine if additional sampling is necessary.
- Milwaukee River from Estabrook Dam to confluence with Menomonee River – Sampling completed in Fall 2016. Characterization Report due mid-2017.
- Menomonee River from Little Menomonee River to confluence with Milwaukee River – Sampling completed in Fall 2015, report complete Summer 2016.
- South Menomonee Canal & Upper portions of Burnham Canal – More investigation needed, requested for 2017.
- Kinnickinnic River from Chase to Becher – More investigation needed, requested for 2017.
- KK River Mooring Basin Characterization – Sampling completed spring 2015, report completed fall 2015.
- Inner and Outer Harbors – More investigation needed, requested for 2017.

- Nearshore Waters – More investigation needed in select areas, requested for 2017.

Legacy or Voluntary/Cooperative Dredging Projects

- Blatz Pavilion (state funded), Lincoln Park Phases I and 2 (Legacy Act)– Remediation complete, some ongoing work to establish and maintain vegetation for phase 2.
- Kinnickinnic River Legacy Project – Complete

Contaminated Sediment Progress in the Milwaukee Estuary Area Of Concern

Sediment Management Status

- In Progress
- Completed
- Investigation Underway
- Assessment Needed

Total Extent of Milwaukee Estuary AOC

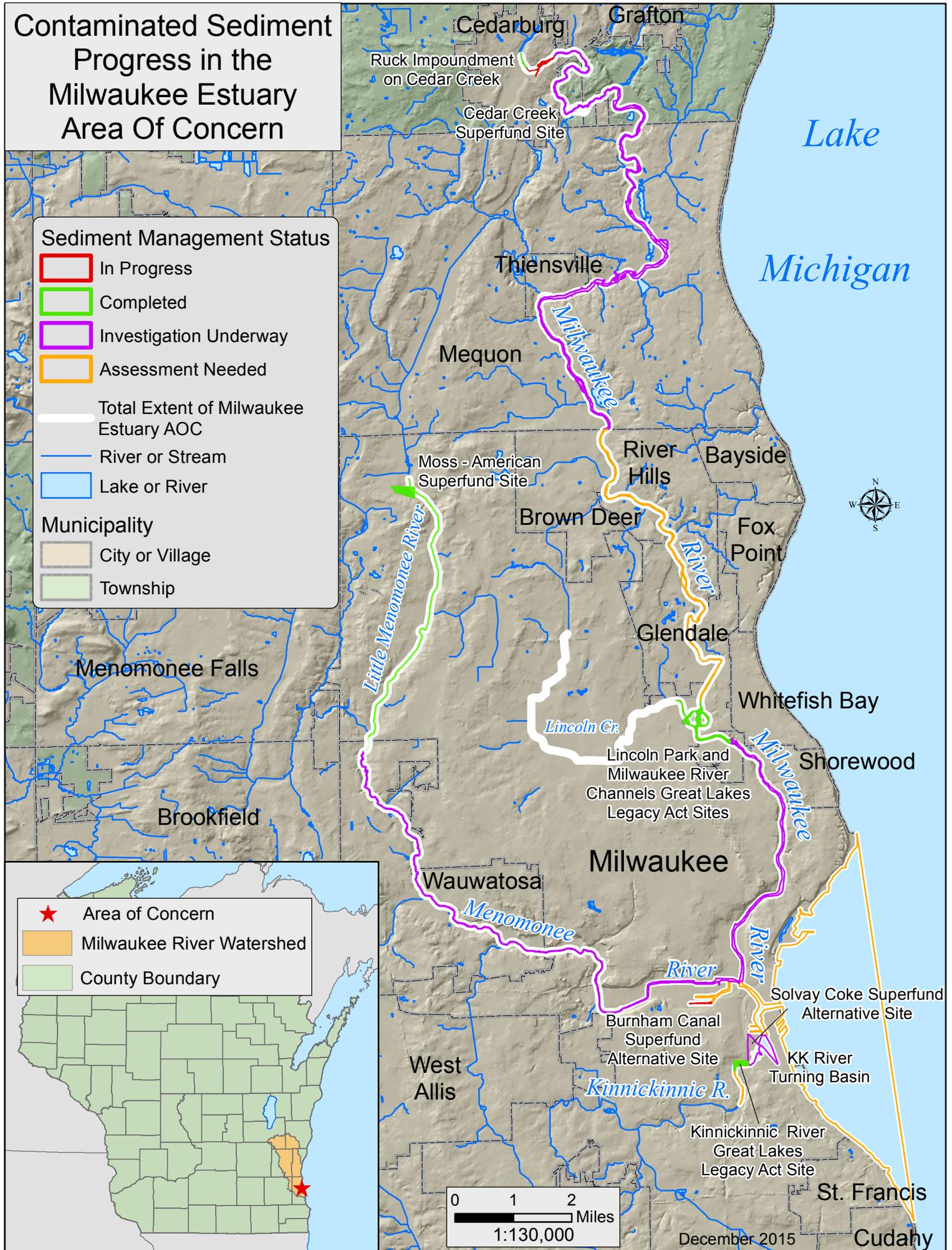
River or Stream

Lake or River

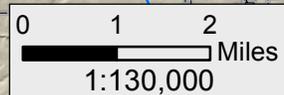
Municipality

City or Village

Township



- ★ Area of Concern
- Milwaukee River Watershed
- County Boundary



December 2015



Appendix F

Waterfowl Consumption Assessment Report

(to be added later)

Appendix G

Aesthetics BUI Target Adjustment Comparison

(to be added later)

